COLLABORATIVE GROUP WORK IN AN ONLINE LEARNING ENVIRONMENT: A DESIGN RESEARCH STUDY

by

EUNJUNG OH

(Under the Direction of Thomas C. Reeves)

ABSTRACT

This dissertation focused on improving the design of online learning environments for adult learners who need and want to continue their professional development. For such a design effort to be successful, two pedagogical approaches were assumed to be especially important in enhancing online learning environments: collaborative learning and authentic tasks. Group work connects both approaches and offers great potential for learners to achieve their goals. For adult learners, group work is fundamental to an effective and meaningful learning experience because students must discuss concepts and processes as well as enact these ideas to produce a real life outcome they are likely to perform in their lives. However, the literature also addresses challenges for online learners working together to achieve common goals. Previous research emphasizes the importance of careful design for online courses employing group work.

An education design research methodology was used to explore how to optimize adult learners' collaborative group work in a graduate level online E-Learning Evaluation course. This two-year design research encompassed three iterative cycles of design, implementation and testing, and redesign. Data were collected from 23 graduate students and one instructor. Findings include the challenges the online groups encountered, attributes of groups working-well together

and not working-well together, and the kinds of support learners needed during the group work process.

Design research pursues dual goals in practice and theory. Accordingly, course components were refined to optimize students' online group work experience, while at the same time, design principles were generated that can be used to support online collaborative group work in this E-learning Evaluation course, as well be applicable in other higher education online evaluation courses or courses employing collaborative group work and authentic learning tasks as their primary pedagogy. Seven design principles and 30 associated design/implementation strategies were generated and refined via three iterative cycles. These design principles to optimize group work include guidance on the following: communication, the learning community, technology, the group work process, positive interdependence, individual accountability and engagement, and individual learning.

INDEX WORDS: Online learning environment, Collaborative group work, Teaching evaluation, Authentic learning tasks, Educational design research

COLLABORATIVE GROUP WORK IN AN ONLINE LEARNING ENVIRONMENT: A DESIGN RESEARCH STUDY

by

EUNJUNG OH

B.A., Ewha Womans University, Republic of Korea, 2001

M.S., Indiana University-Bloomington, 2003

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2011

COLLABORATIVE GROUP WORK IN AN ONLINE LEARNING ENVIRONMENT: A DESIGN RESEARCH STUDY

by

EUNJUNG OH

Major Professor: Thomas C. Reeves

Committee: Michael J. Hannafin
Janette R. Hill
Lorilee R. Sandmann

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2011

DEDICATION

This dissertation is dedicated to my heavenly father, God, who opened the door for me to the field of Educational Technology in 1997, who gave me a great desire to pursue graduate studies in this field when the only resource I had was the hope to do so, and who guided my every step with His fullness of blessings. The work is a dedication to His unchanging goodness and unfailing love that has made and will continue to make me who I am and who I will become.

ACKNOWLEDGEMENTS

This dissertation would not have been possible without the support and assistance of many people. First, my sincerest appreciation goes to my advisor, Dr. Thomas Reeves, for his vital support and wise mentoring throughout my doctoral studies. I would not have been able to come this far without him. I also thank him for being such an important role model as an educator and a scholar, and for so kindly and patiently guiding me every step of the way during my doctoral studies. I especially thank him for introducing me to educational design research and inspiriting me to have an aspiration to become a more socially responsible educational researcher, a direction that I will continue pursue throughout my career.

I also would like to acknowledge the invaluable support and help I have received from my committee members, Drs. Michael Hannafin, Janette Hill, and Lorilee Sandmann. I appreciate their great interest in my research, their insightful comments and feedback on my ideas and writings, the fantastic opportunities and guidance they provided to assist me in building my career, and the many sincere letters they wrote in support of my efforts.

I cannot possibly express sufficient appreciation to the research participants of my preliminary studies and this dissertation who were willing to give their time and share their thoughts with me. Their participation made this dissertation possible and helped me learn so much about online collaborative group work. I am also very grateful to Harriett Allison for her extraordinary work on reviewing this dissertation, as well as my writing throughout my doctoral program, and for her heartfelt friendship encouraging me during this journey.

I would like to acknowledge all the excellent learning opportunities I have had in the Learning, Design, and Technology program. With the support and friendship of the members of this academic community, I was able to establish my scholarly credentials in a most enjoyable learning environment. I particularly appreciate Ms. Gretchen Thomas, my teaching supervisor, for her superior mentoring and kind encouragement for my teaching and career. My experience as a design researcher was made smoother and richer because of a wonderful collaborator and friend, Ying Liu, who worked with me in this dissertation project. I hope that we continue collaborating on many more projects.

Before beginning the doctoral study, I had studied Educational Technology in two other programs, and those experiences certainly helped me establish my foundation. First, I would like to thank the professors in the Department of Educational Technology at Ewha Womans University where I first studied Educational Technology and dreamed about continuing to study in this field. I am particularly thankful for Drs. Youngjoo Joo, Myunghee Kang, and Jeasam Jung, who motivated me significantly, for their dedication to their students and the field, and for their continuous encouragement and support for the past 14 years. I also would like to acknowledge the professors in the Department of Instructional Systems Technology at Indiana University-Bloomington. In particular, I deeply appreciate Dr. Curtis Bonk for the many valuable and inspiring resources he shared with me, for the many wonderful learning opportunities he gave me, and for the priceless mentoring and encouragement he has given me on my work since I met him in 2001.

I cannot thank enough John and Cindy Gaultneys, and the members of the Athens Link Fellowship who made Athens, Georgia, my second home. I am truly grateful for their sincere prayers and heartfelt encouragement for my studies and career. The love and care that I received

from this community will be in my heart forever. Also, I would like to give special thanks to the brothers and sisters of the Kwanglim Methodist Church, my home church in Seoul, Korea, for their sincere prayers and great care for my family and me through the years. I would also like to thank my friends in the United States and Korea who have always prayed for and encouraged me.

Thinking of my family, I do not know where to begin. Without the sacrifice and love of my parents, Changsuk Oh & Kyunghee Lee, I could have not even embarked on this journey. They have always inspired me to take courageous steps and lifted my spirit with their loving encouragement. I am forever indebted to them for their immeasurable love, unchanging faith, and ceaseless prayers for me. I am also thankful to my parents-in-law, Jaekang Koo & Kyunghwa Choi, for their uplifting prayers and encouragement throughout this process. I am grateful that they loved me even more when I was weaker and experiencing difficult times. I am blessed to have my dear brother, Sanghun, brother-in-law, Seungwon, and sisters-in-law Jinyoung, Eunyoung, and Seungyoung, and I am thankful for the prayers and much joy they gave me.

Lastly, but most importantly, there is my husband, David Seunghyun Koo, who has been the greatest blessing in my life. We have been through both dry and colorful seasons over the past several years in our lives together. In every season, he has been my strongest supporter as well as my academic partner. I am truly thankful that I have a husband who has been walking with me in the same direction as we are empowering each other in fulfilling our calling. I send him my deepest thanks that he always loves me as I am and has a greater belief in me than I do myself.

Finally, I lift up my heart with greatest appreciation to the Almighty, my heavenly father, for all the blessings and abundant grace He has presented me with. Above all, I am thankful for the many wonderful things that he may bless me with in my future studies, career, and life.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

For my dissertation research, I focused on improving the design of online learning environments for adult learners who need and want to continue their professional development while pursuing their careers and living their personal lives. For such a design effort to be successful, two pedagogical approaches were assumed to be especially important in enhancing online learning environments: (1) collaborative learning and (2) authentic tasks. Specifically, group work connects both approaches and offers great potential for learners to achieve their goals so that their learning and the transfer of their learning to practice is maximized. My research was guided by the principle that students working in groups collaboratively to complete authentic tasks constitute a pedagogically strong approach that can improve the quality and effectiveness of current online learning. The processes and outcomes of extended efforts to implement this principle in online learning environments are described in this dissertation.

A national study, "Degrees of Opportunity," investigating the attitudes of American adults toward their continuing education found that almost half of adult Americans want to pursue more education (Mbilinyi, 2006). In general, for adult learners, an investment in education beyond high school makes a significant contribution to their well-being and brings enriched opportunities for both personal development and family prosperity. Besides the discretionary educational choices, life-long education is also often required in adults' work lives. Many people around the globe live in knowledge societies that demand continuous professional development (Merriam, Caffarella, & Baumgartner, 2007). The life cycle of knowledge and

skills is increasingly brief, especially in technical and professional fields. The rapid production of new knowledge and skills in the disciplines, such as sciences, business, information technology, healthcare, and education requires adults to become lifelong learners to remain competent in their professions. To respond to the demand for lifelong learning in the 21st Century, organizations and other agencies where adults work, including higher education institutions and professional associations, increasingly provide opportunities for professional development.

In particular, more and more institutions of higher learning have been developing online education programs, and enrollments in those online learning programs in the United States have been steadily increasing (Allen & Seaman, 2008). In higher education institutions, more than 77% of chief academic officers and 62% of online teaching faculty believe that online courses are important to meet students' needs for flexible access for life-long learning (Allen & Seaman, 2008). However, criticism exists. Even though online learning, as a promising alternative to traditional face-to-face instruction, has provided more access and opportunities to adult learners (Gibson, 2000; Gunawardena & McIsaac, 2004), when it is designed and delivered without careful consideration of integrating proper pedagogies (Reeves, Herrington, & Oliver, 2004), both the quality of online learning and the assumption that it is actually fulfilling the real needs of students have been challenged (Davies & Stacey, 2003).

Having meaningful learning experiences is important to learners across every age range regardless of the delivery method or educational setting; however, it is even more critical for adults because for this group life-long learning is typically not an end in itself. Instead, adults tend to pursue specific goals that will contribute to their professional and/or personal needs (Merriam et al., 2007). For adults, the paramount goal for learning is often to improve their own

real-life problem-solving abilities because they constantly deal with complex issues and tasks that require multiple competencies and capabilties. Therefore, the real or perceived relevance of learning tasks is significant, and adult learning experiences should be designed in ways that mirror real-world tasks. Accordingly, providing authentic learning environments and tasks that are situated in real contexts and cultures will help these learners maximize their retention of what they learn and transfer it to their complex daily lives (Barab, Squire, & Dueber, 2000; Bennett, 2004; Brown, Collins, & Duguid, 1989; Herrington & Herrington, 2005a, 2005b; Herrington, Reeves, & Oliver, 2006; Herrington, Reeves, Oliver, & Woo, 2004; Reeves, Herrington, & Oliver, 2002).

Collaborative learning is another pedagogical approach that can contribute to the quality of online learning for adult learners. Based upon a widely, but not universally, accepted theoretical paradigm that defines learning–knowledge as the outcome of social construction processes shared among participants in learning environments (Lave & Wenger, 1991; Vygotsky, 1978), collaborative learning has been acknowledged as a powerful strategy (Bruffee, 1999; McConnell, 2006; Roberts, 2004). In addition, organizations in modern society assert that their employees should have not only high levels of expertise specific to their jobs, but also general abilities to work with other people, such as social, collaborative and communicative skills (Kirschner, 2004; McLoughlin & Luca, 2002). Indeed, Kirschner (2004) argues that the kinds of abilities and qualities this society demands of professionals "can only be achieved" (p. 40) in a collaborative learning environment. Numerous studies have identified other benefits that collaborative learning brings to learners such as increased satisfaction, higher-level thinking, and greater cohesion among participants (Brandon & Hollingshead, 1999; McConnell, 2005).

In relation to online learning, advocates have long argued that online environments have advantages that support collaborative learning (Harasim, 1990). Advances in Information and Communication Technology (ICT) provide ever more powerful affordances to support collaborative learning in online environments (Alavi & Dufner, 2005), but the degree to which these affordances have been integrated with the most appropriate pedagogies is still unclear (Reeves, 2003).

Among collaborative learning strategies, group work is distinctive and widely used in adult education (Smith, 2005). In addition, in a learning environment that uses authentic tasks, due to the nature and the scope of the tasks, collaborative group work is a common and necessary pedagogical approach (Jonassen, Lee, Yang & Laffey, 2005). For adult learners, group work is fundamental to effective and meaningful learning experience because students not only discuss concepts and processes but they also must enact these ideas to produce a real life outcome that they will be likely to perform in their professional, if not personal lives. Additionally, as mentioned above, working with others also allows learners opportunities to be exposed to and deal with the authentic experience of collaboration, just as they must work together to achieve certain goals in their lives.

While there are considerable benefits to using group work for accomplishing real world projects, it is certainly challenging for online learners when they communicate at a distance as they work together to achieve common goals (Roberts and McInnerney, 2007). Group work, particularly online group work, cannot be achieved without effort and planning from instructors and learners alike. Online courses that require group work should be designed and implemented with careful consideration. Moreover, group work has not been used sufficiently in online

learning environments, even though it has been widely discussed in the literature and practiced in business settings and face-to-face learning settings (Graham & Misanchuk, 2004).

To address the need for and importance of collaborative learning and group work for adult learners as previously described, particularly in online learning environments, I have conducted "educational design research" (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006) with the pedagogical goal of optimizing the collaborative group work of adult learners within an online environment. The context for this research is an Instructional Product Evaluation (subsequently named "E-Learning Evaluation") course in which students were required to complete authentic evaluation projects with their group members. This course was originally only available to graduate students at the College of Education at a large research university located in the southeastern United States, but the online version of the course enabled students from around the world to join the learning environment. The course had been offered for more than fifteen years in a face-to-face format, but there were numerous requests to have it converted to an online version, not only from students in the aforementioned university but also from faculty members and students around the globe who are not affiliated with the institution. Design research begins with a need or goal defined by practitioners, and this project was prompted by a desire on the part of the practitioner, i.e., the course instructor, to provide the course online. The instructor also stressed the importance of ensuring that such a course offered in an alternative format be as effective as a face-to-face version. To provide the quality of learning experience that the face-to-face course has offered to previous students, I and my collaborating researchers (the course instructor and another doctoral student) identified supporting students' group work on their evaluation projects as a major factor in making students' learning experience meaningful and successful. This design research study

encompassed three iterations of design, implementation and data collection, and redesign from Spring 2008 to Spring 2009.

Definitions

Before discussing the topic of this dissertation further, the following operational definitions of several important terms are provided: collaborative learning, collaborative group work, educational design research, authentic learning, socially responsible research, and scaffolding.

- Collaborative learning: Broadly speaking, it can be seen as "a situation in which two or more people learn or attempt to learn something together" (Dillenbourg, 1999, p. 2).
- Collaborative group work: As a one of the collaborative learning strategies, it is widely used in adult education (Smith, 2005). Collaborative groups are "small, interdependent, and heterogeneous groups that construct knowledge (Vygotsky, 1978) through the resolution of ill-structured problems (Jonassen, 2000) to achieve consensus and shared classroom authority (Bruffee, 1999)" (Smith, 2005, p. 183).
- Educational design research: It can be defined as "a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories (Wang & Hannafin, 2005, p. 6).
- Authentic learning: The notion of authentic learning has its roots in theory of situated learning. The fundamental assumption is that students can learn usable knowledge best in learning settings with the following characteristics (Herrington & Oliver, 2000):

  1) Provide authentic contexts that reflect the way the knowledge will be used in real life
  2) Provide authentic activities

3) Provide access to expert performances and the modeling of processes
4) Provide multiple roles and perspectives
5) Support collaborative construction of knowledge
6) Promote reflection to enable abstractions to be formed
7) Promote articulation to enable tacit knowledge to be made explicit
8) Provide coaching and scaffolding by the teacher at critical times
9) Provide for authentic assessment of learning within the tasks (Herrington, Reeves, & Oliver, 2010, p. 20)

- Socially responsible research: In education, socially responsible research not only adheres to the basic principles and rigor of social research, but also addresses significant problems related to learning and performance and seeks ways to ameliorate these problems through research (Reeves, Herrington & Oliver, 2005). Educational design research is one example of socially responsible research in that it integrates the effort to solve real world problems with the search for reusable design principles. Socially responsible research is sometimes contrasted with pure basic research that has no overt need to focus on real world problems.
- Scaffolding: Scaffolding is an educational psychology construct that can be described generally as assistance that will help learners to achieve a goal or complete a learning activity, specifically a goal or an activity that without the additional assistance they could not accomplish. In this collaborative learning environment, scaffolding can be seen as "the social interaction among students and teachers that precedes internalization of the knowledge, skills and dispositions deemed valuable and useful for the learners" (Roehler & Cantlon, 1997, p. 9).

Chapter Overviews

The structure of this dissertation is primarily based upon what Boote and Beile (2005) called the "*compilation of research articles*" (p. 10) format for dissertations recommended by Duke and Beck (1999). The three parts (chapters two, three, and five) of this dissertation *are*

submitted for publication or ready to be published manuscripts in refereed journals. The shared purposes of these three manuscripts are to improve our theoretical understanding and practice of online collaborative group work and to share the insights gained through the process and the outcomes of design research. Chapter four follows the methodology and findings chapters of a traditional dissertation study to describe the full story of the three iterations of a design research project and to avoid omitting important information.

The first paper, *A Conceptual Framework for Online Collaborative Group Work in Higher Education,* presents the study's conceptual framework. The paper begins with a brief review of the meaning of collaborative learning and collaborative group work. Then, a discussion of theoretical foundations of collaborative group work follows. Next, the paper presents a discussion of collaborative group work using authentic learning tasks, within the context of online learning environments designed for adult learners in a higher education setting. The paper continues by delineating the need for a new model for online collaborative group work for adult learners in this environment. Finally, the paper concludes with implications for future research and practice in online collaborative group work in academia. The manuscript will be submitted to the *Journal of Asynchronous Learning Network* in Spring 2011.

The second paper, *Teaching an Online Graduate Level Evaluation Course: Supporting Collaborative Group Work,* presents the design framework of an optimal online learning environment for teaching a graduate level online E-Learning Evaluation course by employing collaborative group work. The paper begins with a description of the need for and feasibility of the optimal design of such an online evaluation course by examining current practices in teaching evaluation, including adult learning principles and strategies. Next, the paper explores a primary pedagogical strategy that can maximize the effectiveness of teaching evaluation in an

online environment: group work that will elicit optimal collaboration. Finally, the paper presents a design framework, including design principles, design/implementation strategies, and associated course components and interventions, for an optimal online learning environment to teach evaluation courses by introducing and discussing the case of an online E-Learning Evaluation course. The manuscript will be submitted to *American Journal of Evaluation* in Spring 2011.

The third chapter is titled *Collaborative Group Work in an Online Course: Methodology, Findings, and Discussion.* This chapter includes the content of three chapters found in a traditional dissertation: methodology, findings, and discussion. In brief, the chapter presents the process, activities, and outcomes of my design research project from Summer 2007 through Spring 2009 semesters. The chapter describes how both design and research have been initially planned, implemented and evolved during the three iterations of an online E-Learning Evaluation course. Additionally, information regarding the iterations, including the characteristics, research and course designs, findings, and their discussion, are presented. Also, each iteration includes a discussion of the findings, and the refined design principles and design/implementation strategies based upon findings, to optimize the support of collaborative group work in online evaluation courses. After discussing and examining findings, implications for further research and practice are shared. In Spring 2011, a manuscript based on these findings on aspect of students' challenges was submitted as a book chapter to *Real-Life Distance Learning: Case Studies in Research and Practice;* it is under review. From this chapter, additional manuscripts will be generated and submitted to appropriate refereed journals in the Spring and Summer of 2011.

The fourth paper is titled *Conducting Educational Design Research as Doctoral Students: Process and Lessons Learned.* This reflection and implication paper presents my

design research project experience for an audience of doctoral students and young scholars who aspire to conduct design research. The paper includes an overview of educational design research, briefly introduces this design research study project as a case, and discusses the project's process, related issues, and lessons learned. The paper, primarily intended for a target audience of doctoral students and young scholars, will also include clear recommendations for researchers to improve our understanding of the design research field and implications for conducting design research. The manuscript will be submitted to *Educational Designer* in Spring 2011.

One concept paper that came from this study was published in December 2010 in Educational Media International. The title of the paper is "The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners." The manuscript is included in Appendix H.

References

Alavi, M., & Dufner, D. (2005). Technology-mediated collaborative learning: A research perspective. In S. R. Hiltz & R. Goldman (Eds.), *Learning together online: Research on asynchronous learning networks* (pp. 191-213). Mahwah, NJ: Lawrence Erlbaum Associates.

Allen, I. E. & Seaman, J. (2008, November). Staying the course: Online education in United States. Retrieved May 30, 2009 from http://www.sloan-c.org/publications/survey/pdf/staying_the_course.pdf

Barab, S., Squire, K., & Dueber, W. (2000). A co-evolutionary model for supporting the emergence of authenticity. *Educational Technology Research and Development, 48*(2), 37-62.

Bennett, S. (2004). Supporting collaborative project teams using computer-based technologies. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 1 - 27). Hershey, PA: Information Science Publishing.

Boote, D. N., & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher 34*(6), 3–1.

Brandon, D. P., & Hollingshead, A. B. (1999). Collaborative learning and computer-supported groups. *Communication Education, 48*, 109-126.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Bruffee, K. A. (1999). *Collaborative learning: Higher education, interdependence, and the authority of knowledge* (2 ed.). Baltimore, MD: The Johns Hopkins University Press.

Davies, G., & Stacey, E. (Eds.). (2003). *Quality education @ a distance*. Boston: Kluwer Academic Publishers Group.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.). Collaborative-learning: Cognitive and Computational Approaches (pp.1-19). Oxford: Elsevier.

Duke, N. K., & Beck, S. W. (1999). Education should consider alternative forms for the dissertation. *Educational Researcher, 28*(3), 31–36.

Gibson, C. C. (2000). Distance education for lifelong learning. In A. L. Wilson & E. R. Hayes (Eds.), *Handbook of Adult and Continuing Education* (pp. 423-437). San Francisco: Jossey-Bass.

Graham, C. R., & Misanchuk, M. (2004). Computer-mediated learning groups: Benefits and challenges to using groupwork in online learning environments. In T. S. Roberts (Ed.),

Online collaborative learning: Theory and practice (pp. 181-202). Hershey, PA: Information Science Publishing.

Gunawardena, C. N., & McIsaac, M. S. (2004). Distance Education. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology* (pp. 355-395). New York: Macmillan Library Reference.

Harasim, L. (1990). Online education: An environment for collaboration and intellectual amplification. In. L. Harasim (Ed.), *Online education: Perspectives on a new environment* (pp. 39-66). New York: Praeger.

Herrington, A., & Herrington, J. (2005a). What is an authentic learning environment? In A. Herrington & J. Herrington (Eds.), *Authentic learning environments in higher education* (pp. 1-13). Hershey, PA: Information Science Publishing

Herrington, A., & Herrington, J. (Eds.). (2005b). *Authentic learning environments in higher education*. Hershey, PA: Information Science Publishing.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development. 48*(3), 23-48.

Herrington, J., Reeves, T. C., & Oliver, R. (2006). Authentic tasks online: A synergy among learner, task and technology. *Distance Education, 27*(2), 233-247.

Herrington, J., Reeves, T. C., & Oliver, R. (2010). A guide to authentic e-learning. New York: Routledge.

Herrington, J., Reeves, T. C., Oliver, R., & Woo, Y. (2004). Designing authentic activities in web-based courses. *Journal of Computing in Higher Education, 16*(1), 3-29.

Jonassen, D. H., Lee, C., B., Yang, C, -C., & Laffey, J. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (pp. 247-270). New York: Cambridge University Press.

Kirschner, P. A. (2004). Design, development, and implementation of electronic learning environments for collaborative learning. *Educational Technology Research & Development, 52*(3), 39-46.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Mbilinyi, L. (2006). Degrees of Opportunity: Adults' views on the value and feasibility of returning to school. Retrieved November 19, 2007, from http://www.degreesofopportunity.org/inc/degrees_opportunity_report.pdf

McConnell, D. (2005). Examining the dynamics of networked e-Learning groups and communities. *Studies in Higher Education, 30*(1), 25-42.

McConnell, D. (2006). *E-Learning groups and communities.* Berkshire: The Society for Research into Higher Education & Open University Press.

McLoughlin, C., & Luca, J. (2002). A learner-centered approach to developing team skills through web-based learning and assessment. *British Journal of Educational Technology, 33*(5), 571-582.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). San Francisco: Jossey-Bass.

Reeves, T. C. (2003). Storm clouds on the digital education horizon. *Journal of Computing in Higher Education*, *15*(1), 3-26.

Reeves, T. C., Herrington, J., & Oliver, R. (2002). Authentic activities and online learning. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality conversations: Research and Development in Higher Education* (Vol. 25, pp. 562-567). Jamison, ACT: HERDSA.

Reeves, T. C., Herrington, J., & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research & Development, 52*(4), 13-65.

Reeves, T. C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 97-116.

Roberts, T. S. (Ed.). (2004). O*nline collaborative learning: Theory and practice*. Hershey, PA: Information Science Publishing.

Roberts, T. S., & McInnerney, J. M. (2007). Seven problems of online group learning (and their solutions). *Educational Technology & Society*, *10*(4), 257-268.

Roehler, L. R., & Cantlon, D. J. (1997). Scaffolding: A powerful tool in social constructivist classrooms. In K. Hogan & M. Pressley (Eds.), *Scaffolding student learning: Instructional approaches and issues* (pp. 6-42). Cambridge, MA: Brookline Books.

Smith, R. O. (2005). Working with difference in online collaborative groups. *Adult Education* Quarterly, 55(3), 182-199.

Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006) *Educational design research*. London: Routledge.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

CHAPTER TWO

A CONCEPTUAL FRAMEWORK FOR ONLINE COLLABORATIVE GROUP WORK IN HIGHER EDUCATION[1]

[1] Oh, E., & Reeves, T. C. To be submitted to *Journal of Asynchronous Learning Network*

Abstract

The paper aims to discuss the conceptual framework for online collaborative group work in higher education. First, the paper discusses the meaning of collaborative learning as well as collaborative group work. Second, various theoretical foundations of collaborative group work are discussed from two perspectives: how learning occurs and how people work together. Third, collaborative group work is more specifically examined in the context of using online environments and authentic learning tasks. Finally, a model of online collaborative group work for higher education adult learners when they are engaged in complex authentic learning tasks is presented to help future researchers and instructors teaching online courses in colleges and universities using collaborative group work and complex authentic learning tasks as primary pedagogies.

Background

Research has long supported the effectiveness of collaborative learning as a pedagogical strategy in higher education (Bruffee, 1999). Although various theoretical and research traditions interpret and practice collaborative learning differently (Dillenbourg, Baker, Blaye, & O'Malley, 1995), collaborative learning has been advocated for its benefits such as higher satisfaction, increased higher-level thinking, and greater cohesion among participants (Brandon & Hollingshead, 1999; McConnell, 2005). Broadly speaking, collaborative learning can be seen as "a situation in which two or more people learn or attempt to learn something together" (Dillenbourg, 1999, p. 2). Isalas (2004) defines collaborative learning as "a process of social construction of knowledge that takes place in the context of communities of inquiry" (p. 302). This process of social construction of knowledge involves "mutual engagement of participants in a coordinated effort to solve a problem together" (Roschelle & Behrend, 1995, p. 70). During the mutual engagement and problem solving, students establish a shared understanding and a convergence of knowing (Benbunan-Fich, Hiltz, & Harasim, 2005) through meaningful discourse and productive interaction (Bernard, Rojo de Rubalcava, & St-Pierre, 2000).

The advocates of online learning have claimed that virtual environments possess advantages that support collaborative learning such as offering opportunities and settings for social and educational interactivity to establish a "collective intelligence" (Harasim, 1990, p. 45). Advances in Information and Communications Technology (ICT) provide ever more powerful affordances to support collaborative learning in online environments (Alavi & Dufner, 2005), and collaborative learning has been promoted as an effective pedagogical approach in online learning (McConnell, 2006; Roberts, 2004) to improve the quality of distance education and overcome its weaknesses (e.g., the sense of isolation reported by many online learners).

However, using such an approach does not guarantee that collaborative learning will actually occur. That is, collaborative learning is neither a learning mechanism nor a prescriptive method to elicit learning. Rather, Dillenbourg (1999) argues that "the words 'collaborative learning' describe a situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms, but there is no guarantee that the expected interactions will actually occur" (p.7). As a result, despite its known strengths, many college instructors often view the challenges of implementing collaborative learning online as formidable (Roberts & McInnerney, 2007). Therefore, it is critical to help instructors and designers to understand collaborative learning more fully by considering the characteristics and components in their specific learning environments in regard to design and implementation of courses.

A careful review of current online collaborative learning literature shows that numerous studies have explored the interaction and collaborative discourse among participants mediated by technologies, and have examined the knowledge construction resulting from online discussion activities (e.g., Garrison & Anderson's (2001) model of community of inquiry, Gunawardena, Lowe, & Anderson's (1997) interaction analysis model, and Harasim's (2002) model of conceptual change). Studies investigating online discourse are meaningful in that they reveal how learners interact with each other, what types of discourse actually facilitate students' learning in online learning environments, and what strategies can be used to enhance students' interactions and learning. However, considering characteristics of adult learners and their specific goals for education and life, collaborative learning employing group work, particularly group work based on authentic tasks, should be more closely examined. For adult learners, group work is a fundamental collaborative learning approach that enables an effective and meaningful

learning experience because learners not only discuss concepts and processes but also must enact these ideas to produce a real life outcome they are likely to perform in their professional, if not personal, lives. While research studies focusing on online collaborative learning have increased (Roberts, 2004), studies of online collaborative group work per se remain scant (McConnell, 2006). There is a clear need for more theoretical and empirical contributions to help practitioners understand what actually happens and how successful collaborative group learning can be fostered using complex authentic tasks in online environments (Graham & Misanchuk, 2004; McConnell, 2000).

Collaborative Learning and Collaborative Group Work

Although collaborative learning has a long history in educational practice, and many scholars have defined and studied it, collaborative learning is still quite a complex and ambiguous phenomenon. According to Dillenbourg (1999), in his theory of collaborative learning, four elements— *situation, interactions, processes and effects*—and their interrelationships characterize collaborative learning. For instance, in more collaborative situations, students tend to have added symmetrical characteristics in their actions, expertise and so on, are inclined to share common goals, and are likely to have more flexible, unstable (i.e., changing roles and task from time to time) and low (i.e., interdependent) division of labor. Collaborative learning involves interactions that can influence peers' cognitive development. Ideally, it may also foster productive negotiability among peers. Shared authority among peers during the learning process and outcome phase is an important characteristic of collaborative learning. In collaborative learning, students experience processes such as *internalization* (Vygotsky, 1978), *appropriation* (Rogoff, 1990), and mutual modeling through learning activities. The fourth element of Dillenbourg's (1999) theory, effects, does not necessarily define

collaborative learning itself. Rather, collaborative learning results in various effects and, from divergent perspectives, researchers attempt to measure and define the effects of collaborative learning (i.e., conceptual change, increased interaction, and increased self-regulation).

Among collaborative learning strategies, collaborative group work is distinctive, and it is widely used in adult education (Smith, 2005). Collaborative groups are "small, interdependent, and heterogeneous groups that construct knowledge (Vygotsky, 1978) through the resolution of ill-structured problems (Jonassen, 2000) to achieve consensus and shared classroom authority (Bruffee, 1999)" (Smith, 2005, p. 183). Use of collaborative group work can help adult learners in many areas including mastery and retention of material, quality of reasoning strategies, process gains, and transferring of learning (McConnell, 2006). However, although instructors actively encourage students' engagement and interaction in group tasks, not all groups work in an effective collaborative manner and construct shared knowledge while they work. For various reasons, as they work together, groups create different levels of interdependence and engage in various kinds and levels of interaction. Hathorn and Ingram (2002) argue that collaborative groups should have 1) a group goal, 2) equal participation, 3) interaction, 4) interdependence, 5) independence from teacher, and 6) synthesis of information. Similarly, a range of factors influence group work as well. Graham (2002) identified six factors, based on a review of the literature, that impact how effective learning groups work: 1) group size, 2) group heterogeneity, 3) positive interdependence, 4) accountability, 5) development of group skills, and 6) development of group norms. More specifically related to online collaborative learning, Zhang and Ge (2006) identified four core factors that create dynamics in the process: 1) team task, 2) team development, 3) communication media, and 4) peer relationship. How these variables mutually interact and create dynamics among them eventually determines the process and quality

of students' collaboration. In addition, the factors influencing processes and outcomes of collaboration can change from environment A to environment B. By considering these factors and optimizing the potential dynamics among them, the instructor should help students to create the most positive interdependence (Johnson & Johnson, 2009) facilitating students' collaboration in groups. In addition, instructors need to be aware of the uniqueness of their own learning environments and the potential influence of these unique characteristics on their students' collaborative group work. For example, an online course in which students are graded on a curve versus one in which grades are based on mastery of a given set of objectives will likely engender different approaches to collaborative group work.

Theoretical Foundations of Collaborative Group Work

Perspectives on Learning

The theoretical foundations of collaborative group work have been influenced by multiple traditions. In regard to how learning occurs, collaborative group work is rooted in three primary theoretical perspectives that have influenced collaborative learning in general: 1) socio-constructivist perspectives, 2) sociocultural perspectives, and 3) situated cognition and its related principles.

Socio-constructivist perspectives

A socio-constructivist perspective begins with the beliefs that learners are the center of the learning process and learning is seen as an active process of constructing knowledge rather than acquiring static knowledge representations transmitted by instructors or instructional materials (Driscoll, 2000; Duffy & Cunningham, 1996; Fosnot & Perry, 2005). In this perspective, the instructor's primary role is that of a facilitator who helps learners construct

knowledge from the learning experience in context rather than transmitting prepackaged content to learners (Duffy & Cunningham, 1996).

The work of the Swiss developmental psychologist Jean Piaget contributed to an understanding of this view. Even though much of his work focused on the cognitive development of the individual mind, Piaget also stressed the importance of peer experiences because he believed that cognitive and affective/social development cannot be separated (Lisi & Golbeck, 1999; Piaget, & Inhelder, 1969). Piaget claimed that social interaction with peers (e.g., symmetrical relationship) or adults (e.g., parents, asymmetrical relationship) influences children's cognitive and moral development. When children interact with peers, they may experience socio-cognitive conflicts that provoke a change in their current cognitive systems through the processes of *assimilation—filtering or modification of the input*—and *accommodation—modification of internal schemes to fit reality* (Piaget, & Inhelder, 1969, p. 6). When children experience *disequilibrium* in their cognitive systems, they desire and endeavor to reach a balance—*equilibrium*—between assimilation and accommodation, "the desired state for intellectual functioning" (de Lisi, & Golbeck, 1999, p. 12). This process of adjusting their own cognitive systems—*equilibration*—is the process through which children reconstruct meaning "from one equilibrium point to another equilibrium point" (de Lisi, & Golbeck, 1999, p. 12).

Piaget's work, particularly the equilibration model, inspired later researchers (i.e., neo-Piagetians, the Genevan School) who have made contributions by applying his theory to peer learning research (Dillenbourg, et al., 1995; Koschmann, 1996a; Lisi & Golbeck, 1999). These researchers are interested in how social interaction with peers affects individual development, such as children's socio-moral reasoning, and logical and spatial reasoning (i.e., mathematics and science education) (de Lisi, & Goldbeck, 1999). Collaborative learning researchers whose

studies are grounded in a socio-cognitive perspective have been interested in individual learners in learning groups, how each of these distinct students "make meaning, discover problems, and resolve problems within their individual minds" (de Lisi, & Goldbeck, 1999, p. 36). Researchers examined individual students' development through various collaborative learning interventions and investigated how these interventions facilitated and possibly enhanced individual student's learning outcome in quality as compared to that of students in control groups (Dillenbourg, et al., 1995).

Sociocultural perspectives

Scholars working within a sociocultural perspective consider knowledge construction and cognitive development as a social and cultural process (Duffy & Cunningham, 1996; Fosnot & Perry, 2005). That is, learners can actively construct knowledge and make meaning not only through interaction between new and prior knowledge within their individual minds, but also through interaction with others in the learning environment, especially with peers and instructors, when they mutually engage in culturally organized activities (Duffy & Cunningham, 1996).

The sociocultural perspective has also been significantly shaped by the work of Vygotsky (1978) who emphasized the importance of social, cultural and historical contexts for human development, thinking and learning. He also emphasized the importance of signs and tools, such as language, which mediate social interaction and individual activity within their environments (Hogan & Tudge, 1999; Vygotsky, 1978). The environments impact human behavior, development, thinking and learning, and humans acquire those as "personal property" (Vygotsky, 1994, p. 352) in the environment. "In the process of development the child not only masters the items of cultural experience but the habits and forms of cultural behavior, the cultural methods of reasoning" (Vygotsky, 1994, p. 57). However, at the same time, by using signs and

tools humans not only acquire their understanding of the environment in which they live, but they also have an impact on their environments (Hogan & Tudge, 1999).

Regarding the difference between socio-constructivist and sociocultural perspectives, Piagetians are interested in individual change or cognitive development through social interaction, and social interaction was regarded as "a catalyst for individual change, often dependent upon individual development" (Dillenbourg, et al., 1995, p. 192). In contrast, Vygotskians are interested in the social activity learners are involved in and the "causal relationship between social interaction and individual cognitive change" while holding the view that "inter-psychological processes are themselves internalized by the individuals involved" (Dillenbourg, et al., 1995, p. 192).

While many concepts and ideas from sociocultural theory have influenced collaborative learning, the Zone of Proximal Development (ZPD) is the most widely used conceptual framework grounding studies on collaboration (Hogan & Tudge, 1999). ZPD is "the distance [between] the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). Based on the notion of a ZPD, interactions with peers and scaffolding from the instructor play critical roles in children's learning and development. While the ZPD has many implications for collaborative learning and educational practice, Vygotsky also noted the importance of children's individual characteristics, such as genetic (biological) or maturational aspects, in their development (Bonk, & Kim, 1998; Wertsch, 1991). Children have their own unique attributes even though those attributes are greatly influenced by social and cultural factors. Collaborative learning or scaffolding from adults can certainly enhance children's development and capabilities to their proximal level, but

it cannot empower children infinitely because children's individual intellectual potential confines their performance (Hogan & Tudge, 1999).

In collaborative learning contexts, once students learn to solve new levels of problems and enhance their performance to the extent of their ZPDs by interacting with other competent students in the culture, they gradually operate a self-regulatory process that transfers and transforms those new skills, knowledge, and capacities into their individual minds. This internalization is "the process of taking new information that was experienced or learned within a social context and developing the necessary skills or intellectual functions to independently apply the new knowledge and strategies" (Bonk & Cunningham, 1998, p. 36). Therefore, from Vygotsky's perspective, learning occurs at a dual level: first, it occurs on an interpersonal (between people) level through social interaction; then, it is *transformed into* the intrapersonal (inside one's mind) level through self regulatory reflection (Duffy & Cunningham, 1996; Vygotsky, 1978).

Appropriation or *participatory appropriation* also captures how learning occurs in sociocultural perspectives (Rogoff, 1990). Participatory appropriation illustrates the "dynamic, active, mutual process involved in people's participation in cultural activity" (Rogoff, 1995, p. 153).

> The concept of participatory appropriation refers to how individuals change through their involvement in one or another activity, in the process becoming prepared for subsequent involvement in related activities. With guided participation as the interpersonal process through which people are involved in sociocultural activity, participatory appropriation is the personal process by which, through engagement in an activity, individuals change and handle a later situation in ways prepared by their own participation in the previous situation. This is a process of becoming, rather than acquisition… (Rogoff, 1995, p. 141).

Children are involved in appropriation as they participate in social and cultural activities; by actively engaging in a common activity and using cultural objects to establish shared thinking

and understanding, at the same time, they are already constantly and actively constituting and adjusting their own thinking and understanding at the individual level. Therefore, it is an ongoing process of blending and constituting internal and external worlds rather than a bidirectional exchange between the two (Rogoff, 1990). In Vygotsky's view, children's development is based on their internalization, which they accomplish by appropriating what they experience during a social activity and incorporating it into their existing knowledge and skills. Children learn first externally in their social activities and then internalize what they learn to their interior mind; thus, boundaries exist between children's external and internal worlds. However, in Rogoff's view, children's development is a constant and ongoing process of blending and constructing their internal and external worlds through participation. Children are already processing what has been and is being shared during an activity. Therefore, when an individual is involved in similar activities in the future, he or she will solve problems based on his or her appropriated knowledge and understanding constructed during previous sociocultural activities—and subsequently expanded on, rather than using the same level of co-constructed knowledge and understanding he or she gained as a result of a past activity (Rogoff, 1990, 1995).

Researchers whose studies are grounded upon sociocultural perspectives have been interested in investigating social interaction processes that elicit learning and dialogue that mediates social activity and interaction in learning contexts (Dillenbourg, et al., 1995). For instance, with the rapid and expanding development of Information and Communications Technology (ICT) and online learning programs, many researchers conducted studies such as investigating computer-supported collaborative environments that facilitate students' meaningful discourse to construct learning (e.g., Koschmann, 1996b; Koschmann, Hall, & Miyake, 2002), instructors' facilitation of students' active interaction that enables them to have meaningful

discussions (e.g., Anderson, Rourke, Garrison, & Archer, 2001), and various scaffolding strategies to enhance their discussions (e.g., Choi, Land, & Turgeon, 2005).

Situated cognition and its related principles

Another theory that significantly contributes to the understanding and practice of collaborative group work is the theory of situated cognition and its related principles. In theories of situated cognition, learning is interpreted as *enculturation* into communities. That is, knowledge and learning are situated in the social practices of a community (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; Wenger, 1998). Therefore, learning is "an integral and inseparable aspect of social practice" (Lave, & Wenger, 1991, p. 31). Wenger (1998) claims that learning takes place through social participation in communities of practice. In other words, learning occurs through engagement in activities, which are rooted in the culture and history of the community. Through "engagement in actions and interactions," people learn the norms, values, language and tacit conventions used by a distinctive community, and negotiate meaning in the community (Wenger, 1998, p. 13). Additionally, for the members of the community, practice is "the source of coherence of a community" as well as "a learning process" (Wenger, 1998, p. 49). When people first join the community, they observe and participate in these practices as peripheral members. However, as they engage in a wider range of different tasks and gain more experience and knowledge in the community, their identity and involvement are transformed to become more active and central and make more significant contributions to the community (Lave & Wenger, 1991; Wenger, 1998). In essence, from a situated cognition perspective, learning is legitimate peripheral participation in the social practices of specific communities of practice (Lave & Wenger, 1991).

The emphasis on participation in the social practices of a community of practice distinguishes this perspective on learning from those of other theoretical traditions that emphasize social or/and cultural aspects of learning. That is, for instance in Vygotsky's zone of proximal development and internalization, while there is emphasis on socialness, "the social character of learning mostly consists in a small 'aura' of socialness that provides input for the process of internalization viewed as individualistic acquisition of the cultural given" (Lave & Wenger, 1991, p. 48). In comparison, situated cognition theory, where learning is perceived as participation in the social practices of a community, has a more holistic view about learning. That is, people act and interact with other people in the situated ongoing practices in, and perhaps with, their socially and culturally structured world, thereby negotiating and constituting meanings through their activities and interaction (Lave & Wenger, 1991).

Therefore, from a situated cognition perspective, for learning to be meaningful, the nature of learning activities should be authentic. Authentic activities are "the ordinary practices of the culture" (Brown et al., 1989, p. 34) and they are "the only way they [learners] gain access to the standpoint that enables practitioners to act meaningfully and purposefully" (p. 36). Thus, learning activities should be situated in and framed by the real context and culture in which they are used. Cognitive apprenticeship is one of the methods that can reflect this type of practice, allowing enculturation to a community and interaction among novices and experts, and new and existing community members. Instructors as experts in the domain facilitate the learning process and help students to become exposed to and involved in the practices and culture of the community (Brown et al., 1989).

In sum, socio-cognitive, sociocultural, and situated cognition perspectives contribute to the understanding of how learning occurs in collaborative group work contexts. While

differences exist across these major foundations, the fundamental theoretical assumptions are the following. First, learners are major actors in the learning process (Driscoll, 2000; Duffy & Cunningham, 1996; Fosnot & Perry, 2005). Learners possess autonomy, intrinsic motivation, and metacognitive strategies to exert control over their learning process and approaches. Second, learning is an active process and is constructed through social interaction among participants (Driscoll, 2000; Duffy & Cunningham, 1996; Fosnot & Perry, 2005). The authority of knowledge is shifted from an instructor to a group of learners, and knowledge evolves and is co-constructed through their negotiation (Bruffee, 1999). Third, the role of the instructor changes to that of a facilitator who supports and provides various types of scaffolding during the learning process (Driscoll, 2000; Duffy & Cunningham, 1996; Fosnot & Perry, 2005). Also, an instructor provides a model of expertise through coaching and mentoring, and presents opportunities to connect students to the communities of practice (Brown et al., 1989). Fourth, diverse expertise is valued, and differences among learners' abilities bring synergy into both individual and group learning processes (Baker, Hansen, Joiner & Traum, 1999; Dillenbourg, et al., 1995). To produce this outcome, learners involved in collaborative group work should actively engage in the learning process and establish interdependence with each other (Baker et al., 1999). Fifth, learning activities should be authentic, situated in the context and the culture of the communities (Brown et al., 1989; Herrington, Reeves, & Oliver, 2010; Lave and Wenger, 1991). Sixth, based on the notion of a ZPD, the level of collaborative learning activities also should be beyond a learner's autonomous problem-solving capabilities, but the synergy developed through interactions among learners and scaffolding provided by the instructor enables a group of learners to accomplish the learning activities (Baker et al., 1999; Hogan & Tudge, 1999). Seventh, internalization (Vygotsky, 1978), or participatory appropriation (Rogoff, 1995) through

self-regulatory reflection, is critical for learners' individual development, and it eventually or simultaneously contributes to successful group learning. Eighth, a learning environment should be able to function as an authentic learning community (Brown et al., 1989; Lave & Wenger, 1991)

Theories about Groups

Along with theoretical perspectives on learning, theories about groups influence collaborative group work. Generally, group theorists do not necessarily focus on learning situations or collaborative aspects of learning; rather, they are interested in how people work together, no matter whether groups are collaborative or cooperative in nature. Among many theories across different disciplines and contexts, this paper will focus on social interdependence theory to better understand students' group work in learning contexts because the theory is the essential foundation on which cooperative learning has been established and developed. Additionally, its application is one of the most successful cases of applying social and educational psychology in educational practice (Johnson & Johnson, 2009).

Social Interdependence Theory

Social interdependence theory has a long history as a conceptual and foundational framework in group learning research and practice (Johnson & Johnson, 2009). Social interdependence theory is influenced by the Gestalt school of psychology in the early 1990s. For more than a century, researchers have been developing the theory and conducting studies in many areas by investigating the effects of a variety of dependent variables on social interdependence (Johnson & Johnson, 2006; 2009). The theory is based on the assumptions that

> (a) the essence of a group is the interdependence among members (created by common goals) that results in the group being a "dynamic whole," so that a change in the state of any member or subgroups changes the state of any other member or subgroup, and that

> (b) an intrinsic state of tension within group members motivates movement toward the accomplishment of the desired common goals (Johnson & Johnson, 2006, p. 93).

Therefore, social interdependence is established 1) "when individuals share common goals" and 2) "each person's success is affected by the actions of the others" (Johnson & Johnson, 2007, p. 406). According to social interdependence theory, social interdependence influences people's actions, psychological processes, interaction patterns, and outcomes in groups (Johnson & Johnson, 2009). The starting point and the process of establishing social interdependence share some perspectives with concepts of *common ground* and *grounding.* Common ground includes the "mutual understanding, knowledge, beliefs, assumptions, presuppositions and so on" (Baker et al., 1999, p.33) that already exist among people as they communicate and interact with each other. Grounding is "the process by which agents augment and maintain such a common ground" (p.33). That is, social interdependence will be established and strengthened through the process of grounding as members of a group create, maintain, and augment the common grounds for their group through active interaction and negotiation (Baker et al., 1999).

There is both positive and negative interdependence. Positive interdependence is related to cooperation or collaboration among group members, whereas negative interdependence is related to competition among them. Positive interdependence exists in a group work situation in which members perceive that learning and performance goals can be achieved when they work together well. Thus, the ways goals are structured are highly related to how group members interact with each other, and eventually to their learning and performance outcomes. Strong positive interdependence is likely to elicit active participation and *promotive interaction*, thereby resulting in better learning and performance outcomes.

Simply having membership in a group is not sufficient to accomplish quality team outcomes and productivity; successful collaborative group work requires a high level positive interdependence and strong common grounds among group members. Many researchers argue that positive interdependence among group members has many benefits for group learning including 1) producing better learning, performance outcomes, and greater productivity; 2) facilitating more frequent higher level reasoning; 3) showing stronger individual accountability as well as encouraging and supporting each other's efforts to achieve a shared goal; 4) establishing stronger mutual trust and effective communication exchanges; and 5) creating a stronger perception of the sense of the group's unity and bonding (Johnson & Johnson, 2007; 2009).

In sum, to support and optimize students' collaborative group work, it is crucial to understand how people work together and influence each other's learning and performance, as well as how learning occurs and is understood. Social interdependence theory explains the fundamental and psychological issues and phenomenon (e.g., group dynamic, trust, individual accountability) that students encounter when they work together. Even for adult learners, research studies indicate that they still need to learn group skills or how to work as a group in different learning environments such as online (Dirkx & Smith, 2004; Roberts and McInnerney, 2007). Therefore, to enhance students' collaborative group work, instructors need to incorporate strategies to foster students' stronger social interdependence, such as structuring activities to achieve shared goals, forming groups of an appropriate size by considering the scope of the task, encouraging positive interdependence by explaining the social skills and commitment expected, monitoring students' group work, providing modeling and assistance on students' group work

skills and processes, and incorporating assessment methods that will address a group's functionality and productivity (Johnson & Johnson, 2009).

Use of Online Environments and Authentic Learning Tasks for Collaborative Group Work

Collaborative group work can be used in diverse learning situations, and it is important for designers and instructors to understand and consider the uniqueness of the learning contexts that influence and even characterize students' collaboration and dynamics within a group. In this section, we will continue to discuss the specifics of online settings as learning environments where collaborative group work occurs and is supported, and the use of authentic learning tasks as the focus of group collaboration.

Investigating online learning environments in relation to collaborative group work is important for several reasons. First, online learning options have been increasing very rapidly in higher education institutions due to their potential to fulfill the educational needs of adults seeking life-long learning by increasing access to opportunities for professional development (Allen & Seaman, 2008; Gibson, 2000; Gunawardena & McIsaac, 2004) Second, collaborative learning holds much promise for enhancing the quality of current online pedagogy by augmenting interactivity among participants in online environments (Woo & Reeves, 2008), helping learners be more engaged (Shea & Bidjerano, 2009), providing opportunities to work on more complex, ill-structured learning tasks (Herrington, Reeves, & Oliver, 2010), and establishing a sense of belongingness within the learning community (Palloff & Pratt, 1999). Third, online environments provide technological affordances and features that more effectively support collaborative learning (de Jong, Veldhuis-Diermanse, & Lutgens, 2002; Garrison & Anderson, 2003; Han & Hill, 2007; Harasim, 1990; Roberts & McInnerney, 2007).

In any learning environment, language plays a critical role, particularly for those in which collaborative group work is used as a pedagogical strategy. From the perspectives of learning theories emphasizing social and cultural interaction, group participation, and authentic learning environments, language is a semiotic tool that mediates learning activities and thinking (Baker et al., 1999). In online environments, communication among participants is mediated via technologies and also serves as an essential means for collaborative learning. Online communication takes place both asynchronously and synchronously by using technological tools (Romiszowski & Mason, 1996). In the early days of distance education, technology enabling weak forms of delayed communication (e.g., postal mail) acted as a simple delivery system, making possible self-dependent education that was at best modestly individualized.

However, the development of digital technologies has brought a change in distance education, primarily by enabling active online dialogue and collaboration (Gunawardena & McIsaac, 2004). Currently, as the use of Web 2.0 technologies (e.g., Wiki, YouTube, Twitter, and Blog) is increasing, these tools make possible student collaboration in a more participatory culture (Herrington, et al., 2010) and enrich their online learning experience by supporting new collaborative learning activities that enhance "knowledge creation and sharing" (Dede, 2009, p. 260). Therefore, these innovative tools are more than communication tools enabling interaction among participants online similar to the manner in which it occurs in face-to-face environments; rather they are cognitive tools (Jonassen & Reeves, 1996; Kim & Reeves, 2007). Put another way, by using innovative technologies in online teaching and learning, students can work collaboratively to accomplish objectives such as sharing knowledge through critical discussions, building interdependence, reflecting on their own and their groups' learning processes, producing group outcomes, and utilizing multiple resources to accomplish authentic tasks. As

more emerging technologies become available for online education, the kinds of activities and modes through which we collaborate will continue to evolve.

However, due to the unique nature of the online learning environment in which students' language (semiotic tools) must depend on technology (material tools) for learning and collaboration to occur, research studies indicate that online learners often encounter various challenges to their accomplishing tasks together (McConnell, 2006; Roberts & McInnerney, 2007). For instance, when technical problems occur, opportunities for communication, collaboration, and learning in general can be greatly diminished and can also cause much frustration among students (Ragoonaden, & Bordeleau, 2000). Salmon's (2000) Model of Teaching and Learning Online shows that collaborative knowledge construction and development necessitate a higher level of interactivity among participants, which is not necessarily automatically satisfied in this learning environment through technological affordances. In addition, social interactions online tend to take more time due to the nature of asynchronous tools (Bernard, & Lundgren-Cayrol, 2001; Ragoonaden, & Bordeleau, 2000). For example, it usually takes more time for online students to establish presence, common ground, and social interdependence than for those enrolled in face-to-face contexts (Paulus, 2009). Moreover, when communication among students happens mainly in an asynchronous manner, delayed communication among group members makes it difficult for them to work together and make progress, and can eventually discourage the group. It may also be more time-consuming to articulate, reach consensus, and work on tasks in online environments. In addition, misunderstandings can easily occur in online environments when students mostly communicate through text only without the facial expressions and nuance associated with their primary language and/or cultural group.

Small online groups also experience socio-emotional challenges such as questions of authority and interdependency (Dirkx & Smith, 2004; Smith, 2008a). For instance, the essence of collaborative learning is shifting authority from the instructors to members within the groups (Bruffee, 1999). Also, developing interdependency is critical to co-constructing knowledge or achieving shared goals. However, unlike students in face-to-face environments, online students do not have direct, physical access to and guidance from their instructors and cannot depend on them as knowledge authorities or facilitators in the group process. Although instructors facilitate online classes to an extent, students ideally learn to acknowledge each other as sources of authority and develop interdependency among each other to achieve goals. This process is often new to students; therefore, some can feel unsettled or uncomfortable. At times, tensions among group members can arise if someone develops a feeling of inequity in terms of questions of authority among members or has a fear of the loss of her or his own voice and identity; additionally, students become frustrated when some in their group do not contribute as much as others. Due to the physical distance among participants and the fact that they have to communicate via online technologies, all these processes—whether there is explicit conflict or not, can be very challenging, especially since online students are likely to have insufficient opportunities to get to know each other well (Dirkx & Smith, 2004).

Based on a literature review, Graham and Misanchuk (2004) identified three major challenges associated with computer-mediated group work: 1) creating groups, 2) structuring learning activities and 3) facilitating group interactions. While all these factors are noteworthy, in particular more caution is needed when forming online groups. When creating groups, instructors should decide on an appropriate size by considering the different time zones of students, scope of the project, and student differences in time availability. If these are not

carefully considered, group communication and collaboration can be very limited and can act as a starting point for frustration and eventual disaster for the groups. Also, it is not easy to form groups that reflect an appropriate range and variety of heterogeneity among group members. Differences among group members should have synergistic, not impeding, effects. When forming groups, instructors should decide which heterogeneous characteristics among group members would be most important for promoting and establishing a positive synergy in the group work process.

In the same vein, Roberts and McInnerney (2007) describe seven widely acknowledged problems with online group learning: "1) student antipathy towards group work, 2) the selection of the groups, 3) a lack of essential group work skills, 4) the free-rider, 5) possible inequalities of student abilities, 6) the withdrawal of group members, and 7) the assessment of individuals within the groups" (p. 257). Most of these challenges are difficult factors in face-to-face collaboration; however, they can cause even more daunting consequences for online students. In light of these challenges, online learning incorporating collaborative group work requires more carefully planned design and overt facilitation from the instructor to guide learners more effectively to learn and work together (Paulus, 2009). However, although practitioners have proposed numerous guidelines for online learning (Palloff & Pratt, 1999; Shank, 2007; Watkins, 2005), few are based upon rigorous research.

In any learning environment, learning tasks or activities are the essential part of the learning experience (Herrington, et al., 2010). In online learning environments where adult learners work collaboratively in groups, the nature of tasks is very important. For example, when adults pursue further learning, they tend to have specific objectives and reasons. For most adults, the paramount goal for learning is improving their real-life problem-solving abilities and/or job

specific skills. While there are many learning tasks learners can work on in collaborative learning environments, the actual or perceived relevance of learning tasks is critical for adult learners. One way to enhance the relevance of online learning experiences for adults is to design them in ways that mirror real-world tasks (Herrington et al., 2010).

As previously mentioned, authentic tasks situated in the context and culture for which they have been developed and in which they will provide extrinsic motivation (Bernard & Lundgren-Cayrol, 2001) are essential for learners to have a meaningful experience (Barab, Squire, & Dueber, 2000; Bennett, 2004; Brown et al., 1989; Herrington & Herrington, 2005a, 2005b; Herrington, Reeves, & Oliver, 2006, 2010; Herrington, Reeves, Oliver, & Woo, 2004; Reeves, Herrington, & Oliver, 2002). These authentic learning tasks can be conceptualized as ill-structured problems typically encountered in communities of practice, requiring a higher level of interdependence and facilitating social construction of knowledge among learners (Brown et al., 1989). Previous research has shown that authentic tasks have the capability to motivate students to become more active, interactive and reflective in their learning process, eventually helping students gain a deeper understanding of the subject and experience more satisfactory learning (Woo & Reeves, 2007).

Due to the nature and scope of the tasks, collaborative group work is a common and necessary pedagogical approach for students to work on authentic tasks (Jonassen, Lee, Yang & Laffey, 2005). Through working with others on these tasks, students will experience not only engagement in the real-life practices people in the community of practice would perform but also exposure to and engagement with the authentic experience of collaboration, just as they must team up to achieve certain goals in their everyday work lives. Although use of authentic learning tasks can add a certain level of challenge to both instructor and students in online environments,

in truth, authentic learning can be "best executed with powerful computer-based, participatory tools-this is e-learning at its best" (Herrington, et al., 2010, p. 15). Synergies exist among learner, task, and technology in authentic learning environments (Herrington et al., 2006). In particular, technology can support tasks so that students can have rich "opportunities for the design and specification of the task in terms of resource access, enriched communications concerning research and inquiry, and cognitive tools for building the solution products" (Herrington et al., 2006, p. 243). For example, students who work as groups on authentic tasks in online learning environments could immerse themselves in simulations or virtual realities they would not easily experience in face-to-face environments and thereby collaborate on solving complex, ill-structured problems, real cases, or projects using emerging participatory technologies.

In sum, the design of authentic tasks and use of authentic activities embedded in a pedagogical framework that motivates students and encourages active learning, such as case-based (Bennett, Harper, & Hedberg, 2001), project-based (Bennett, 2004), and problem-based learning (Jonassen, 1997, 2000, 2002), can guide the design and implementation of effective, meaningful online collaborative group work (Herrington, et al., 2004; Herrington, et al., 2006, 2010).

A Model for Online Collaborative Group Work for Adult Learners in Higher Education

Although some research studies have discussed influential factors in collaborative learning or online collaborative learning, or have conducted studies focusing on a few factors, the manner in which these factors promote or inhibit the performance of collaborative groups online is not sufficiently understood, particularly when adult learners are collaborating with each other within a complex, authentic problem-solving situation. Some models describe collaborative learning or online collaborative learning too broadly, thereby limiting their application when the

complexity and uniqueness of the actual learning environment that a specific instructor plans and facilitates are considered. In addition, there are insufficient conceptual models to guide research and practice in this area; thus, a model capable of providing a holistic view to guide practice and research focused on online collaborative group work for adult learners in higher education is needed. This model should explain the complex online group work processes when adults strive to collaborate and complete authentic tasks by describing how various factors influence online collaborative group work and then identifying the strategies or scaffolding needed to optimize learners' meaningful collaboration.

Figure 2.1 presents a model for online collaborative group work for adult learners in higher education in which learners work together on authentic, complex tasks, cases, or projects. This is a logic model (Frechtling, 2007) illustrating 1) inputs, 2) processes, 3) outputs and 4) outcomes of collaborative group work of adult learners in online learning environments and presenting the relationships among those four elements. The model has been developed based upon a synthesis of the literature and the findings of a multi-year design research study on online collaborative group work. The model is strong, but by no means perfect. It can be used to guide design and implementation of online courses using collaborative group work and authentic learning tasks as primary pedagogical approaches, and as a starting point for further research.

Although the specific learning and/or performance goals of collaborative groups will vary, depending on the nature of the courses, the general goals collaborative groups should achieve when working on authentic tasks are twofold: 1) a successful task outcome and 2) substantial learning. For authentic tasks, learners often work with clients; therefore, a successfully accomplished task that will satisfy clients' needs is a critical goal learners should achieve. In any formal learning environment, instructors design different types of activities so

that individual learners accomplish substantial content learning. A fundamental assumption of the model for collaborative group work is that student collaboration contributes to their learning. Therefore, if students truly collaborate on the tasks, substantial learning should occur. Learning activities and tasks should be designed and implemented to optimally support learners to achieve learning and performance goals on both group and individual levels. A fundamental advantage of incorporating authentic tasks into learning environments is that assessments of students' performance and learning are built into the tasks and thus can be used to determine substantial learning at both the group and individual levels (Herrington et al., 2010).

Insert Figure 2.1 here.

Then, how do we know that students work effectively in groups? There are a limited number of studies that report the key characteristics or work patterns of effective teams, or the qualities of effective collaboration in online or computer-supported learning situations (e.g., McConnell, 2000; 2006; McLoughlin, 2002). The model presented in Figure 1 includes additional positive indicators or negative detractors of online collaborative groups working on authentic learning tasks than are previously identified in the literature.

There are several positive indicators of when groups are working together functionally and effectively. First, as evidence of their learning, students working in groups should produce high quality deliverables, i.e., products that would normally be developed in the context of completing a given task. When group work is used, the task's scope tends to be too large for one person to complete. However, when groups do not work well, the final outcomes are likely to be disjointed and unorganized. The quality of the deliverables can be evaluated by the instructor's rubrics.

Second, communication within the group must be clear, transparent and interactive (McConnell, 2000, 2006; McLoughlin, 2002). Communication behaviors such as frequency of interaction, participants' responsiveness, and participants' tone or communication styles influence online students' perceptions of mediated presence (Russo & Campbell, 2004). Therefore, groups should establish communication systems with which every group member can feel comfortable and through which they can actively participate and interact with each other. Also, group members should have a sense of clarity and activeness in their communications and interactions within their groups.

Third, the documentation that groups produce in the process of accomplishing tasks should be clear. Students exchange multiple versions of project documents as they work on authentic learning tasks, which usually require a long-term commitment. Unsystematic communication and poor documentation make it difficult for group members to keep track of and share their progress in completing a task. Groups working effectively and harmoniously tend to have very organized and systematic document management within their groups.

Fourth, group member use of technological tools should be appropriate. Each tool provides different affordances for communication and collaboration. Also, although ever more sophisticated technology is increasingly ubiquitous in the 21st Century, not everyone in a group may be technologically savvy or have sufficient online learning or group work experience. Therefore, explicit orientation and modeling regarding available tools and their appropriate use should be provided. If possible, at least one member of each group should have prior online learning experience or significant technological proficiency. By assigning students to groups in this manner, group members who are less experienced with technology or online learning can learn from their more experienced peer(s) about how to communicate and work together online.

Fifth, the workload should be fair and balanced. Ensuring that each group member assumes responsibilities is a primary grounding strategy (Paulus, 2009). Group members should allocate and share equally the workload inherent in a substantive task (McLoughlin, 2002). Ideally, there should be no free-riders or social loafing; however, if groups have free-riders, the free-riders should not outnumber the committed and hard-working group members.

Sixth, as a result of a fair and balanced workload, group members should share a sense of mutual contribution. Noticing and understanding each other's contribution is an important element of the grounding process (Paulus, 2009). All group members should view everyone in the group as responsible for task completion, exhibit authentic levels of commitment to the work, and perceive each other's willingness and actual commitment to contribute.

Seventh, for collaboration to occur, students should have substantive discussions of task and content among themselves rather than merely communicating only to divide and conquer the tasks. As language is a primary semiotic tool for meaning making or learning, without substantive discussion, it is impossible to enhance common ground on collaborative tasks, establish interdependence to make positive progress, and achieve group goals.

Eighth, the leadership of the group and the management of people, time and deliverables, should be effective (McLoughlin, 2002). As authentic tasks require extensive communication with clients and among group members and involve a longer time commitment, effective leadership and project management skills are fundamental elements for successfully completing the tasks. It is preferable to have a leader for each group, and he or she should be able to delegate the workload appropriately and monitor the individual progress frequently enough to prevent delays. Procrastination and last minute work often cause a high level of anxiety or even de-motivation among group members. Effective groups usually have a clear plan of the manner in

which they will execute the work and by what date they should accomplish the sub-tasks required for the overall task completion.

Finally, there should be a method for successful negotiation and conflict resolution if any disagreements arise during group work. It would be best if group members could easily reach a desirable level of agreement. However, if a disagreement or conflict occurs, group members should be able to resolve it successfully in an honest and respectful manner. Successful negotiation and conflict resolution can be possible with a perception of the development of a positive interdependence based on group members' support for each other and mutual trust in each other's efforts to achieve a shared goal (Johnson & Johnson, 2000; 2009; McConnell, 2000; 2006; McLoughlin, 2002).

In contrast to these positive indicators of effective group work are the negative indicators of ineffective and nonfunctional group work. These include low quality deliverables, lack of communication and interaction, unclear documentation, inappropriate use of tools, free-riders/social loafing, lack of understanding of others' contributions, superficial division of tasks, ineffective leadership and project management, and unsuccessful negotiation and conflict resolution.

In terms of factors influencing collaborative group work, as previously mentioned, the factors identified in the literature provide neither a holistic view of online collaborative learning nor a sufficient focus on collaborative group work with authentic tasks, a practice that is theoretically more meaningful for adult learners. Also, those influencing factors arise in different stages of an online course, such as design and implementation stages. The design of an online course does not necessarily guarantee a successful implementation for effective group work. Moreover, without proper design, successful implementation is very difficult. Since the

instructor's role is very important in implementing and facilitating the course activities in online learning environments, designers and instructors need to focus on different kinds of factors at various stages.

First, we need to remember that individual students' characteristics influence collaboration. These are factors inherent in the learning environments that neither instructors nor designers can easily change. However, instructors can identify each student's characteristics at the beginning of the course and use them as information when assigning groups. As previously mentioned, forming groups with appropriate heterogeneity is an important factor (Graham, 2002; Graham & Misanchuk, 2004) for creating positive dynamics among group members (Johnson & Johnson, 2007; 2009). Potential factors would include individual students' prior online learning experience, educational and professional background, technology proficiency, location, language proficiency, prior learning about a subject, culture, motivation, collaborator traits, gender, and aptitude. A practical method for instructors to identify these individual differences would be to conduct an online survey to elicit student profiles at the beginning of the course. Based on the collected information, the instructor can assign groups appropriately by having these prioritized heterogeneous student characteristics in mind.

Second, appropriate application of technology affordances is a critical factor in supporting effective group work because 1) students learn through meaningful interaction and discourse (Bennett, 2004) and 2) the kinds of communication group members can engage in are also determined by the technology affordances their online learning environments can offer. Communicating with each other online to learn and accomplish a group project can be very challenging for many students. The more "user-friendly" the online communication technology is the greater the possibility that student communication and achievement will be easier. In the

design stage, designers and instructors should consider the available technologies and, ideally, consider the goals and types of activities they would like to incorporate to support students' collaborative group work. In addition, they also need to think about the aspects of specific technologies that could be used in unique ways to promote students' communication and work processes. During the implementation phase, instructors should provide students with an explicit orientation to available tools and guidance (e.g., modeling, tutorial) in how to use them for individual learning and group work.

Third, there are important factors designers and instructors should consider to support students' successful group work experiences during the design stage, such as opportunities for meaningful collaboration, quality of instruction, structure of the overall course, and task selection. First, they should consider a variety of opportunities that will allow meaningful collaboration (Jonassen, Lee, Yang, & Laffey, 2005) in terms of learning activities. Primary pedagogies instructors plan to use and the types of learning activities instructors ask students to engage in influence students' collaboration. Second, the quality of instruction supported by developing quality instructional and learning materials is important. Some examples of these supporting materials and activities in online learning environments can be reading additional resources and lecture notes, watching pre-recorded lectures and multimedia interactive learning module simulations, engaging in practice activities, quizzes, and discussion topics, and so on. These materials should be designed and developed in ways that can be effectively used in online learning environments and support students' learning and collaborative tasks.

In the design stage, structuring courses is also very important, even though courses can evolve and be revised during implementation. Structuring involves specifying timelines, contents, activities, tools, facilitating strategies for students' group work (e.g., group

composition, group size, initial scaffolding), assessment methods and rubrics, and so on. In particular, the ways goals and learning activities are aligned will influence the manner in which group members interact with and establish interdependence among each other, and eventually affect their learning and performance outcomes (Johnson & Johnson, 2009). In addition, this type of planning will help instructors avoid creating too heavy a workload for themselves, reduce students' anxiety about learning and working online, and help students facing already busy schedules to be more engaged in and more willing to invest the time needed for learning during the subsequent implementation stage.

One very important aspect to consider during the design stage is creation of the learning task (Collis, 1998). The nature of the task is critical to successful group work. "Meaningful collaboration necessitates a meaningful task" (Jonassen et al., 2005, p. 257). Although online collaboration can occur in many forms employing many different tasks, the nature of the tasks significantly influences the quality and direction of collaborative learning and shapes learners' experience. The tasks also influence the potential interdependence among learners during the learning process (Graham & Misanchuk, 2004). Tasks for collaborative group work should challenge students' critical thinking, yet motivate their active participation to produce a better project outcome and facilitate both individual and group accountability (McLoughlin, 2002). Meaningful and complex authentic tasks will tend to encourage adult learners toward in-depth collaboration (Jonassen et al., 2005) and intensive engagement (Herrington et al., 2010). Many online learning activities in current online learning courses are often limited to discussion activities in which students are asked to respond to questions the instructors or their peers post and then reply to each other's opinion. While this type of discussion task might contribute to students' collaborative knowledge construction, these types of tasks would not require students

to establish a high level of interdependence among each other (Graham & Misanchuck, 2004) and often students might not engage as much with each other in these tasks compared with the level of engagement they have when asked to accomplish authentic tasks. In addition to task characteristics, when thinking about designing tasks designers and instructors also need to consider the extent of task ownership and control they will give learners and the amount of guidance learners will receive (Kirschner, Martens, & Strijbos, 2004). Finding the right balance between allowing autonomy as learners struggle with a difficult task and providing them with scaffolding and guidance is one of the greatest challenges instructors face.

Fourth, during the implementation stage, factors such as opportunities for group development, establishment of a learning community, facilitation of communication, support of the group work process, and timely support and quality feedback are very important in assisting students' online collaborative group work. First of all, for students to collaborate most effectively, they should have sufficient opportunities for group development. For groups to work well, the members should have opportunities to get to know each other and develop their identities as individuals within the group and as a group. Establishing positive interdependence among group members has many benefits for group work such as better learning and performance outcomes, greater productivity, stronger individual accountability, encouragement of each other's contributions and efforts, stronger mutual trust, more effective and frequent communication, and stronger group unity and bonding (Johnson & Johnson, 2007; 2009). Students need time and opportunity to learn how to work as a group and to learn about each other in terms of expectations in commitment and quality of outcomes, schedule availability, preferred communication styles, professional and educational backgrounds, work styles, and other personal characteristics. This is important because it is part of the grounding process. Through it,

members establish their identity as a group, adjust themselves to fit into the group by negotiating their expectations with those of others, and build a common understanding and assumptions regarding the process and outcome.

In particular, consideration of emotional factors such as a sense of safety (Dirkx & Smith, 2004; Smith, 2005, 2008a, 2008b) and perception of wellbeing in their collaborative group work (McConnell, 2006) is important in promoting collaboration, but compared with cognitive factors, these emotional and psychological elements are often neglected. According to Bruffee (1999), collaborative groups should accomplish a consensus and shared classroom authority. Therefore, sharing authority as a group-as-a-whole (Bennis & Shepard, 1956; Smith 2005; 2008b) and perceiving safety in sharing each other's authority can help to build consensus within groups and eventually assist in accomplishing learning tasks collaboratively. When groups work together, however, each student has her or his own opinions, perspectives, experiences, and personality that she or he brings to the group work situation. Smith (2005) argued that learners tend to struggle between the "tension generated by their desire to be a part of the group and their fear of being rejected by the group" (Smith, 2005, p. 183). Instructors should help learners feel safe and build mutual trust when they collaborate within their groups so that they can freely offer their opinions to group members, appreciate others' points of view, and build a shared understanding and synthesis of knowledge through discussion.

In addition, for students to establish a positive interdependence, they should first recognize and appreciate the value of their collaboration. Collaboration generally requires a greater time commitment, and for a variety of reasons, some students prefer individual work. For collaboration to be successful in both process and outcome, it is critical for instructors to facilitate learning activities and tasks with their students and help them understand the benefits

and importance of what they are asked to do as a group, in relation to their individual goals and the need for successful collaborative group work, to achieve common goals. During the process, they also should feel that their opinions and work are valued and supported by the other members of their group (McConnell, 2006); this kind of satisfaction and sense of well-being is also achieved by a sense of safety, positive interdependence through group development, and a strong learning community.

The goals of collaborative groups are to construct a shared understanding and successfully produce a group outcome. Building a shared understanding of those with whom they work, how they should work as a group, and what they are to accomplish together proceeds to constructing a shared understanding at the cognitive level, thereby producing the task outcome. In the early stages of group work, instructors should guide students and facilitate their group meetings so that they will have an opportunity for group development.

During the implementation stage, building a learning community is also a critical contribution to successful online collaborative group work because it helps students interact more with each other, while also potentially fostering better collaboration (Jonassen et al., 2005; Kreijns & Kirschner, 2004). For the past decade, numerous studies in this field have uncovered the value of online communities in educational settings (Wang, Sierra, & Folger, 2003). Building learning communities is essential because doing so provides a strong, sustaining learning environment to support the cognitive dimension of collaborative group work. In a learning community, group members interact with each other, exchange ideas, debate, and negotiate these concepts so that they will construct knowledge reflective of the members' different perspectives and move the group toward achieving their common interests (Fisher, Tucker, & Silverberg, 2004-2005). In this sense, Palloff and Pratt (1999) assert that "the learning community is the

vehicle through which learning occurs online" (p. 29). Moreover, it facilitates collaborative group work by supporting the social emotional dimension of learners and learning environments. Many researchers and theoreticians argue that collaborative learning is more than a cognitive process because learning is a co-construction of knowledge in which learners engage in the socio-cultural practices of the community (Garrison & Anderson, 2003). Kreijins and Kirschner (2004) criticized the common assumption that sociability automatically emerges during the collaborative learning process and argued for the importance of social interaction that is "the key in collaborative learning" and "the mechanism through which critical thinking, mutual understanding, and deep learning are possible" (p. 233). When a learning community is established, learners feel a sense of belongingness despite distance among participants; they also engage in a more critical, interactive, and reflective discourse regarding a shared goal as they construct a common understanding in their groups and/or as an entire class. Therefore, ideally, a learning community should be developed at both group and whole class levels. Instructors need to consider both the cognitive and social aspects of learning (Garrison & Anderson, 2003; Kreijns & Kirschner, 2004; Palloff & Pratt, 1999) and facilitate and use different activities and strategies to promote sociability and build learning communities in online learning environments.

Another important element is facilitating communication among group members. As mentioned earlier, communication in an online environment can be very challenging despite the great potential that emerging participatory technology tools can contribute. Effective and prompt communication among group members is a key contributing factor for successful collaborative group work. Without effective communication and active interaction, there is no effective group development (Paulus, 2009), sense of learning community (Palloff & Pratt, 1999), substantial learning (Tallent-Runnels et al., 2006), and meaningful collaboration (Dillenbourg, 1999) in

online environments. Although researchers emphasize that intimacy and immediacy are the essence of active online communication (Tu & McIssac, 2002), they do not occur naturally in groups simply because they are assigned to work together. Students have different technology proficiencies, expectations or perceptions about "immediacy" in communication, and motivations for engaging in group work. Therefore, in addition to providing technology for communication, during the course, instructors need to guide students to communicate strategically and actively with each other to make progress on their group tasks by employing various strategies such as providing strong instructor presence in various ways, helping groups have more frequent and deeper collaboration opportunities through meaningful communication, and modeling optimal communication behaviors, styles, and methods.

To optimize collaborative group work, scaffolding the group work process is important as well. As students learn about new areas by conducting authentic projects as groups, projects themselves can often be cognitively challenging to students. In online learning environments, when students need to work on large scope authentic group projects in online learning environments without the physical presence of others, the easiest way for them to conduct a project is to divide tasks with each person taking charge of completing assigned tasks. However, this approach can result in a lack of cohesiveness with respect the final quality of the project and a lack of learning about parts on which students did not work. The group process works much better when the instructor helps students to have ongoing substantial discussions on their project, although this may involve task divisions at an individual level.

Working on a large-scale authentic project requires significant coordination and project management. Not every group is naturally successful in this area. Groups working with clients often encounter issues with time management because of various real world issues, their own

procrastination, or ineffective leadership. When instructors assist groups to coordinate and monitor their group work process, both individual accountability and establishment of a positive interdependence in the collaboration process can be enhanced (Wang, 2009). Therefore, instructors need to help students to learn about effective project management by providing guidance for effective group work strategies, monitoring group work progress to provide prompt support and avoid procrastination, and having opportunities for students to discuss the group work process in discussion forums, and checking in with them frequently.

As students work in groups, timely support and quality feedback is a very important aspect that the instructor should provide. During group work, students may encounter difficulty with many aspects including group dynamics, tasks, and relationships with clients. For a variety of reasons, they may or may not share these issues with their instructors. Since instructors are not physically present, they not only would need to emphasize their availability and willingness to support students, but also more directly approach them to identify individual or group problems. To facilitate this process, instructors would need to develop an effective and efficient communication system that would not be too demanding on students, but would allow frequent communication with them. In addition, guiding students with quality feedback on their processes and gradually emerging outcomes is important since collaborative groups often work on complex, authentic tasks for real clients. For example, formative assessments such as instructors' reviewing drafts of group outcomes will reduce student anxiety on final tasks, ensure a certain level of quality in group outcomes, and help students learn more deeply about the learning tasks by providing an opportunity for revisions of work.

Fifth, human factors such as strong group leaders, responsive clients and facilitator roles are important. Group leader roles in online collaborative group work are critical. Leadership can

be assigned at the beginning, emerge during the process, or even rotate among group members. Typically, without having face-to-face meetings, online group work on authentic tasks requires much facilitation in the group work process because it requires more organization, management, and communication for effective and efficient coordination. Additionally, in group work tasks in school environments, not having explicit leaders within groups often results in "leaderless" situations (Markulis, Jassawalla, & Sashittal, 2006, p. 148). Therefore, it is wise to have an explicitly designated group leader for each group in the early stage. Peer leadership can be characterized as facilitation of group process rather than possession of authority, as based on an organizational hierarchy characteristic of corporate settings. Peer leadership certainly influences group dynamics (Markulis et al., 2006) and team performance. By having designated leaders facilitate communication and interaction among group members and create positive group interdependence, online groups can minimize risks such as unequal workloads, a lack of commitment from certain members, member conflict and tension, dysfunctional communication, ineffective project management, procrastination, and other negative factors. In online learning environments, it is also helpful if selected or volunteered leaders have prior experience in online learning environments, group work, and/or online technology so that they can easily lead group members and facilitate the work process online.

When working on many authentic tasks, students not only work on their own in groups but also usually collaborate with clients. Students need to identify clients' needs clearly. Students often require substantial information from their clients to make further progress on projects. Even though facilitators can help to some extent, client responsiveness and the degree to which they are interested in the students' project are critical. Instructors need to be certain that clients have explicit needs for students' help, have a passion about the projects, and are cooperative in

working with and supporting students. In relationships with clients, instructors can begin by modeling appropriate ways for the groups to communicate and work with the clients. Once groups begin their projects and build initial rapport with clients, instructors need to gradually transfer more empowerment to students by coaching them, especially the group leaders, and facilitating the relationship between students and clients if students have difficulty working with them.

The online instructor also plays a critical role in collaborative group work, even though collaborative group work is a learner-centered approach having pedagogical goals of active knowledge construction among learners and shifting classroom authority to students in groups. Many researchers have emphasized the significance of the instructor's role and overt facilitation and moderation of students' learning in an online learning environment (Anderson, Rourke, Garrison, & Archer, 2001; Bonk, Kirkley, Hara, & Dennen, 2001; Bonk, Wisher, & Lee, 2004; Conrad & Donaldson, 2004; Garrison & Anderson, 2001; Maor, 2003; Paulus, 2009; Spector, 2007). Although the literature discusses the role of online instructors in general, research regarding the kinds of roles facilitators should play and the kinds of scaffolding they should provide to support adult learners' online collaborative group work is scant. Thus, more supporting research is needed in this area. In adult education in general, Fenwick (2003) claims that the instructor should act as facilitator of the learning process, catalyst fostering engagement in problem solving situations, coach or mentor guiding the learning processes, and assessor of students' learning experience. Similarly, online instructors need to motivate students to engage in learning through modeling and mentoring learning, managing the online learning environment, and promoting interaction (Berge, 2007). That is, online instructors' roles have shifted from subject matter experts to mentors, coaches, facilitators, to becoming those "who provides

leadership and wisdom in guiding student learning" (Berge, 2007, p. 74). Having extensive explicit and tacit knowledge about the content and project is critical for monitoring and mentoring the students and their group work process. However, in terms of structuring collaborative group work involving authentic tasks, instructors need to play multiple roles such as "mentors," "advisors," "supporters," "tutors," and "models" (Levin-Rozalis & Rosenstein, 2003, pp. 253-255). Modeling is an especially important strategy with which online instructors can guide students in terms of effective learning and online communication (Berge, 2007). In addition to subject matter knowledge, instructors using collaborative group work also need to have knowledge about group dynamics and incorporate facilitating strategies regarding ways to create the groups, structure learning activities to support group projects, and facilitate group interactions (Graham, 2002; Graham & Misanchuk, 2004).

Implications for Future Research

Based on a review of the literature, there is a clear need to add to the body of research and to enhance actual practice in the area of collaborative group work in online learning environments. Although the potential benefits are great, it is not an easy task for designers and instructors to design and implement courses using authentic tasks and collaborative group work. Working within online learning environments may promote as well as hinder collaborative group work. However, multiple theoretical foundations and years of research in many areas such as collaborative learning, project-based learning, authentic learning tasks, adult education, and learner's engagement strongly and consistently support the notion of using collaborative groups as a pedagogical approach.

Making effective collaborative group work happen is not about developing a simple curriculum to teach in an online learning environment. As illustrated in Figure 1, it involves consideration of multiple factors in design and implementation, and even inter-relationships and

dynamics among those factors. Research in collaborative learning and online collaborative learning has evolved from understanding collaborative learning as a prescriptive method to elicit effective learning and measure its effectiveness to understanding different aspects of collaborative learning as learning mechanisms (Dillenbourg et al., 1995; Dillenbourg & Traum, 2006). From the perspective of educational practice, it is encouraging that there has been a shift and evolution in the research agenda in this area; educators can have more confidence that collaborative learning can be used, interpreted, and carried out differently in diverse contexts, disciplines and learning environments.

However, much work remains in this area. For collaborative group work to be able to take further steps and enhance the effectiveness of online teaching and learning, researchers should focus on the specifics of learning environments and disciplines that uniquely characterize collaborative group work. Instead of merely testing theories and interventions or understanding and interpreting the mechanisms, we need theories and designs that will actually work and bring changes in different settings in diverse disciplines. Even with positive research findings and strong theoretical support, in reality online instructors and students continue to struggle with collaborative group work or collaborative learning. Why is that?

Designing and implementing online courses in higher education using collaborative learning is often based on broad generalizations from the literature without considering the uniqueness of the learning contexts. First, our research in this area should be conducted in strong collaboration with practitioners in various settings and disciplines to optimize practices in online collaborative group work. Second, researchers should aim not only for optimizing practice and conducting research, but also generating design principles and strategies with context-rich descriptions based upon their empirical studies. By doing so, we will better and more deeply

understand collaborative learning as a mechanism and will positively change our practices in online collaborative group work. As researchers, we can use a design research approach (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006) to make these things possible.

In that sense, the proposed model illustrated in Figure 2.1, informed by a thorough literature review and a rigorous two-year multi-phased design research study, is an attempt to characterize collaborative learning focusing on collaborative group work of adult distance learners who will work on authentic, complex, and ill-structured tasks for clients during a semester long course. As noted above, this model is not a perfect model by any means. Instead, this model should be viewed as a prototype that can provide a basis for further development and research. To refine and more effectively use the model, additional studies with predictive, interpretive, and design goals are needed. Additional research may yield more specific knowledge and guidelines for identifying even better strategies for design and implementation of effective online environments that more fully support learners' collaborative group work. Multivariate studies that investigate the systematic relationships among the components of the model as a whole are especially recommended (Cooley & Lohnes, 1976).

References

Alavi, M., & Dufner, D. (2005). Technology-mediated collaborative learning: A research perspective. In S. R. Hiltz & R. Goldman (Eds.), *Learning together online: Research on asynchronous learning networks* (pp. 191-213). Mahwah, NJ: Lawrence Erlbaum Associates.

Allen, I. E. & Seaman, J. (2008, November). Staying the course: Online education in United States. Retrieved May 30, 2009 from http://www.sloan-c.org/publications/survey/pdf/staying_the_course.pdf

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing environment. *Journal of Asynchronous Learning Networks* ,5 (2).

Baker, M., Hansen, T., Joiner, R., & Traum, D. (1999). The role of grounding in collaborative learning tasks. In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 31–63). Oxford: Pergamon.

Barab, S., Squire, K., & Dueber, W. (2000). A co-evolutionary model for supporting the emergence of authenticity. *Educational Technology Research and Development, 48*(2), 37-62.

Benbunan-Fich, R., Hiltz, S. R., & Harasim, L. (2005). The online interaction learning model: An integrated theoretical framework for learning networks. In S. R. Hiltz & R. Goldman (Eds.). *Learning together online: Research on asynchronous learning networks* (pp. 19-37). Mahwah, NJ: Lawrence Erlbaum Associates.

Bennett, S. (2004). Supporting collaborative project teams using computer-based technologies. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 1 - 27). Hershey, PA: Information Science Publishing.

Bennett, S., Harper, B., & Hedberg, J. (2001). *Designing real-life cases to support authentic design activities.* Paper presented at the Meeting at the Crossroads. Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education, Melbourne, Australia.

Bennis, W. G., & Shepard, H. A. (1956). A theory of group development. *Human Relations, 9,* 415-437.

Berge, Z. L. (2007). Motivate and manage: Key activities of online instructors. In J. M. Spector (Ed.), *Finding your online voice: Stories told by experienced online educators* (pp.73-82). Mahwah, NJ: Erlbaum.

Bernard, R. M., & Lundgren-Cayrol, K. (2001). Computer conferencing: An environment for collaborative project-based learning in distance education. *Research and Evaluation in Education. 7*(2-3), 241-263.

Bernard, R. M., Rojo de Rubalcava, B., & St-Pierre, D. (2000). Collaborative online distance learning: Issues for future practice and research. *Distance Education. 21*(2), 260-277.

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered constructivist, and sociocultural components of collaborative educational learning tools. In C. J. Bonk & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy,* apprenticeship, and discourse (pp. 22-50). Mahwah, NJ: Lawrence Erlbaum.

Bonk, C. J., & Kim, K. A. (1998). Extending sociocultural theory to adult learning. In M. C. Smith & T. Pourchot (Ed.), *Adult learning and development: Perspectives from educational psychology* (pp. 67-88). Mahwah, NJ: Lawrence Erlbaum Associates.

Bonk, C. J., Kirkley, J., Hara, N., & Dennen, V. (2001). Finding the instructor in post-secondary online learning: Pedagogical, social, managerial, and technological Locations. In J. Stephenson (Ed.), Teaching and learning online: Pedagogies for new technologies (pp. 76-98). London: Kogan Page.

Bonk, C. J., Wisher, R. A., & Lee, J. (2004). Moderating learner-centered e-learning: Problems and solutions, benefits and implications. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 54-85). Hershey, PA: Information Science Publishing.

Brandon, D. P., & Hollingshead, A. B. (1999). Collaborative learning and computer-supported groups. *Communication Education, 48*, 109-126.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Bruffee, K. A. (1999). *Collaborative learning: Higher education, interdependence, and the authority of knowledge* (2nd ed.). Baltimore, MD: The Johns Hopkins University Press.

Choi, I., Land, S., & Turgeon, A. (2005). Scaffolding peer-questioning strategies to facilitate metacognition during online small group discussion. *Instructional Science, 33*, 367-379.

Collis, B. (1998). WWW-based environments for collaborative group work. *Education and Information Technologies, 3*, 231-245.

Conrad, R.-M., & Donaldson, J. A. (2004). *Engaging the online learner: Activities and resources for creative instruction*. San Francisco: Jossey-Bass.

Cooley, W. W., & Lohnes, P. R. (1976). *Evaluation research in education*. New York: Irvington Publishers.

Dede, C. (2009). Technologies that facilitate generating knowledge and possibly wisdom. *Educational Researcher. 38*(4), 260-263.

de Jong, F., Veldhuis-Diermanse, E., & Lutgens, G. (2002). Computer-supported collaborative learning in university and vocational education. In T. D. Koschmann, R. Hall & N. Miyake (Eds.), *CSCL2: Carrying forward the conversation* (pp. 111-128). Mahwah, NJ: Lawrence Erlbaum Associates.

de Lisi, R., & Golbeck, S. (1999). The implications of Piagetian theory for peer learning. In A. O'Donnell & A. King (Eds.), *Cognitive perspectives on peer learning*. Mahwah, NJ: Lawrence Erlbaum Associates.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.). *Collaborative-learning: Cognitive and Computational Approaches* (pp.1-19). Oxford: Elsevier.

Dillenbourg, P., Baker, M., Blaye, A. & O'Malley, C. (1995). The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds.). *Learning in Humans and Machine: Towards an interdisciplinary learning science* (pp. 189-211). Oxford: Elsevier.

Dillenbourg, P. & Traum, D. (2006). Sharing solutions: Persistence and grounding in multimodal collaborative problem solving. *The Journal of the Learning Sciences, 15*(1), 121–151

Dirkx, J. M., & Smith, R. O. (2004). Thinking out of a bowl of spaghetti: Learning to learn in online collaborative groups. In T. S. Roberts (Ed) *Online collaborative learning: Theory and practice* (pp. 132-159). Hershely, PA: Information Science Publishing

Driscoll, M. P. (2000). *Psychology of learning for instruction* (2 ed.). Boston: Allyn & Bacon.

Duffy, T., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 170-198). New York: Macmillan Library Reference.

Fenwick, T. (2003). *Learning through experience: Troubling orthodoxies and intersecting questions.* Malabar, FL: Krieger.

Fisher, M., Tucker, D., & Silverberg, D. (2004-2005). Quality issues of group work and leadership emergence in e-learning: Case study. *Journal of Educational Technology Systems. 33*(4), 367-384.

Fosnot, C. T., & Perry, R. S. (2005). Constructivism: A psychological theory of learning. In C. T. Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice* (2nd ed., pp. 8-38). New York: Teachers College Press.

Frechtling, J. A. (2007) *Logic modeling methods in program evaluation*. San Francisco: Jossey-Bass.

Garrison, D. R., & Anderson, T. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education, 15*(1), 7-23.

Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st century: A framework for research and practice*. London and New York: Routledge-Falmer.

Gibson, C. C. (2000). Distance education for lifelong learning. In A. L. Wilson & E. R. Hayes (Eds.), *Handbook of Adult and Continuing Education* (pp. 423-437). San Francisco: Jossey-Bass.

Graham, C. R. (2002). Factors for effective learning groups in face-to-face and virtual environments. *Quarterly Review of Distance Education, 3*, 307-319.

Graham, C. R., & Misanchuk, M. (2004). Computer-mediated learning groups: Benefits and challenges to using groupwork in online learning environments. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 181-202). Hershey, PA: Information Science Publishing.

Gunawardena, L., Lowe, C., & Anderson, T. (1997). Interaction analysis of a global on-line debate and the development of a constructivist interaction analysis model for computer conferencing. *Journal of Educational Computing Research, 17*(4), 395-429.

Gunawardena, C. N., & McIsaac, M. S. (2004). Distance Education. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology* (pp. 355-395). New York: Macmillan Library Reference.

Han, S., & Hill, J. R. (2007). Collaborate to learn, learn to collaborate: Examining collaborative learning supported by asynchronous discussion. *Journal of Educational Computing Research, 36*(1), 89-123.

Harasim, L. (1990). Online education: An environment for collaboration and intellectual amplification. In. L. Harasim (Ed.), *Online education: Perspectives on a new environment* (pp. 39-66). New York: Praeger.

Harasim, L. (2002). What makes online learning communities successful?: The role of collaborative learning in social and intellectual development. In C. Vrasidas & Glass, G. V. (Eds.). *Distance education and distributed learning* (pp. 181-200). Greenwich, CO: Information Age.

Hathorn, L. G., & Ingram, A. L. (2002). Online collaboration: making It work. *Educational Technology, 42*(1), 33-40.

Herrington, A., & Herrington, J. (Eds.). (2005). *Authentic learning environments in higher education.* Hershey, PA: Information Science Publishing.

Herrington, J., Reeves, T. C., & Oliver, R. (2006). Authentic tasks online: A synergy among learner, task and technology. *Distance Education, 27*(2), 233-247.

Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.

Hogan, D., & Tudge, J. (1999). Implications of Vygotsky's theory for peer learning. In O'Donnell, A., & King, A. (Eds.), *Cognitive Perspectives on Peer Learning.* (pp. 39-65). Mahwah, NJ: Lawrence Erlbaum Associates.

Islas, J.R.L. (2004). Collaborative learning at Monterrey Tech-Virtual University. In T.M. Duffy & J.R. Kirkley (Eds.), *Learner-centered theory and practice in distance education* (pp. 297–320). Mahwah, NJ.: Lawrence Erlbaum Associates, Inc.

Johnson, D. W., & Johnson, F. (2006). *Joining Together: Group Theory and Group Skills*, 9th ed. Boston, MA: Allyn & Bacon.

Johnson, D. W., & Johnson, R. T. (2007). Cooperation and the Use of Technology.In J. M. Spector, M. D. Merrill, J. J. G. van Merriënboer, & M. Driscoll. (Eds.) *Handbook of research on educational communications and technology* (pp. 402-423). Mahwah, NJ: Lawrence Erlbaum Associates.

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher. 38*(5), 365-379.

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1)65-94.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63-85.

Jonassen, D. H. (2002). Engaging and supporting problem solving in online learning. *Quarterly Review of Distance Education, 3*(1), 13.

Jonassen, D., & Reeves, T.C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (pp. 693–719). New York: Macmillan.

Jonassen, D. H., Lee, C., B., Yang, C, -C., & Laffey, J. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (pp. 247-270). New York: Cambridge University Press.

Kim, B., & Reeves, T. C. (2007). Reframing research on learning with technology: In search of the meaning of cognitive tools. *Instructional Science*, *35*(3), 207-256.

Kirschner, P. A., Martens, R. L., & Strijbos, J.-W. (2004). CSCL in higher education? A framework for designing multiple collaborative environments. In J.-W. Strijbos, P. A. Kirschner & R. L. Martens (Eds.), *What we know about CSCL* (Vol. 3, pp. 3-30). Norwell, MA: Kluwer Academic Publishers.

Koschmann, T. (1996a). Paradigm shifts and instructional technology: An introduction. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 1-24). Mahwah, NJ: Lawrence Erlbaum Associates.

Koschmann, T. (1996b). *CSCL: Theory and practice of an emerging paradigm* (Ed). Mahwah, NJ: Lawrence Erlbaum.

Koschmann, T., Hall, R., & Miyake, N. (2002). *CSCL2: Carrying forward the conversation*. (Eds.) Mahwah, NJ: Lawrence Erlbaum.

Kreijns, K., & Kirschner, P. A. (2004). Designing sociable CSCL environments. In J.-W. Strijbos, P. A. Kirschner & R. L. Martens (Eds.), *What we know about CSCL* (Vol. 3, pp. 221-243). Norwell, MA: Kluwer Academic Publishers.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Levin-Rozalis, M., & Rosenstein, B. (2003). A mentoring approach to the one-year evaluation course. *American Journal of Evaluation, 24*(2), 245-259.

Lisi, R. D., & Golbeck, S. L. (1999). Implications of Piagetian theory for peer learning. In A. M. O'Donnell & A. King (Eds.), *Cognitive perspectives on peer learning* (pp. 3-38). Mahwah, NJ: Lawrence Erlbaum Associates.

Maor, D. (2003). The teacher's role in developing interaction and reflection in an online learning community. *Educational Media International, 40*(1-2), 127-137.

Markulis, P. Jassawalla, A. R., & Sashittal, H. (2006). The impact of leadership modes on team dynamics and performance in undergraduate management classes. *Journal of Education for Business. 81*(3). 145-150.

McConnell, D. (2000). *Implementing computer supported cooperative learning*. London: Kogan Page.

McConnell, D. (2005). Examining the dynamics of networked e-Learning groups and communities. *Studies in Higher Education, 30*(1), 25-42.

McConnell, D. (2006). *E-Learning groups and communities.* Berkshire: The Society for Research into Higher Education & Open University Press.

McLoughlin, C. (2002) Computer supported teamwork: An integrative approach to evaluating cooperative learning in an online environment. *Australian Journal of Educational Technology*, 18(2), 227-254.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom*. San Francisco, CA: Jossey-Bass Publishers.

Paulus, T.M. (2009). Online but off-topic: Establishing common ground in small learning groups. *Instructional Science, 37*(3), 227-245.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child.* New York: Basic Books.

Ragoonaden, K., & Bordeleau, P. (2000). Collaborative learning via the Internet. *Educational Technology and Society. 3*(3). 1-16

Reeves, T. C., Herrington, J., & Oliver, R. (2002). Authentic activities and online learning. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality conversations: Research and Development in Higher Education* (Vol. 25, pp. 562-567). Jamison, ACT: HERDSA.

Roberts, T. S. (Ed.). (2004). O*nline collaborative learning: Theory and practice*. Hershey, PA: Information Science Publishing.

Roberts, T. S., & McInnerney, J. M. (2007). Seven problems of online group learning (and their solutions). *Educational Technology & Society*, *10*(4), 257-268.

Rogoff, B. (1990). *Apprenticeship in thinking*. New York: Oxford University Press.

Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation and apprenticeship. In J.V. Wertsch, P. Del Rio, & A. Alvarez (Eds.), *Sociocultural studies of the mind* (pp.139-163). Cambridge: Cambridge University Press.

Romiszowski, A. J. & Mason, R. (1996). Computer-mediated communication. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 438-456). New York Macmillan Library Reference.

Roschelle, J., & Teasley, S. D. (1995). The construction of shared knowledge in collaborative problem solving. In C. O'Malley (Ed.), *Computer-supported collaborative learning* (pp. 69-100). Berlin: Springer-Verlag.

Russo, T. C., & Campbell, S. (2004). Perceptions of mediated presence in an asynchronous online course: Interplay of communication behaviors and medium. *Distance Education, 25*, 215–232.

Salmon, G. (2000). *E-moderating: The Key to Teaching and Learning Online*. London: Kogan-Page.

Shank, P. (2007). *The online learning idea book: 95 proven ways to enhance technology-based and blended learning*. San Francisco: Pfeiffer.

Shea, P. & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. *Computers & Education*, *52*(3), 543-553.

Smith, R. O. (2005). Working with difference in online collaborative groups. *Adult Education Quarterly, 55*(3), 182-199.

Smith, R. O. (2008a). Adult learning and the emotional self in virtual online contexts. *New Directions for Adult and Continuing Education. 120*. 35-43.

Smith, R. O. (2008b). The paradox of trust in online collaborative groups. *Distance Education.* 29(3). 325-340.

Spector, J. M. (Ed.). (2007). *Finding your online voice: Stories told by experienced online educators*. Mahwah, NJ: Lawrence Erlbaum Associates Publisher.

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Lui, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research, 76*(1), 93-135.

Tu, C-H., & McIssac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education. 16*(3). 131-150.

Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006) *Educational design research*. London: Routledge.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wang, M., Sierra, C., & Folger, T. (2003). Building a dynamic online learning community among adult learners. *Education Media International, 40*(1), 49-61.

Wang, Q. (2009). Design and evaluation of a collaborative learning environment, C*omputers & Education, 53,* 1138–1146

Watkins, R. (2005). *75 e-learning activities: Making online learning interactive*. San Francisco: Pfeiffer.

Wenger, E. (1998*). Communities of practice: Learning, meaning, and identity.* Cambridge, UK: Cambridge University Press.

Wertsch, J. V. (1991). A sociocultural approach to socially shared cognition. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 85-100). Washington, DC: American Psychological Association.

Woo, Y., & Reeves, T. C. (2008). Interaction in asynchronous web-based learning environments: Strategies supported by educational research. *Journal of Asynchronous Learning Networks*, *12*(3), 179-194.

Woo, Y., & Reeves, T. C. (2007) Meaningful interaction in web-based learning: A social constructivist interpretation. *The Internet and Higher Education, 10*(1), 15-25.

Zhang, K., & Ge, X. (2006). The dynamics of online collaborative learning: Team task, group development, peer relationship, and communication media. In A. D. de Figueiredo & A. A. Afonso (Eds.), *Managing learning in virtual settings: The role of context* (pp. 98-116). Hershey, PA: Idea Group

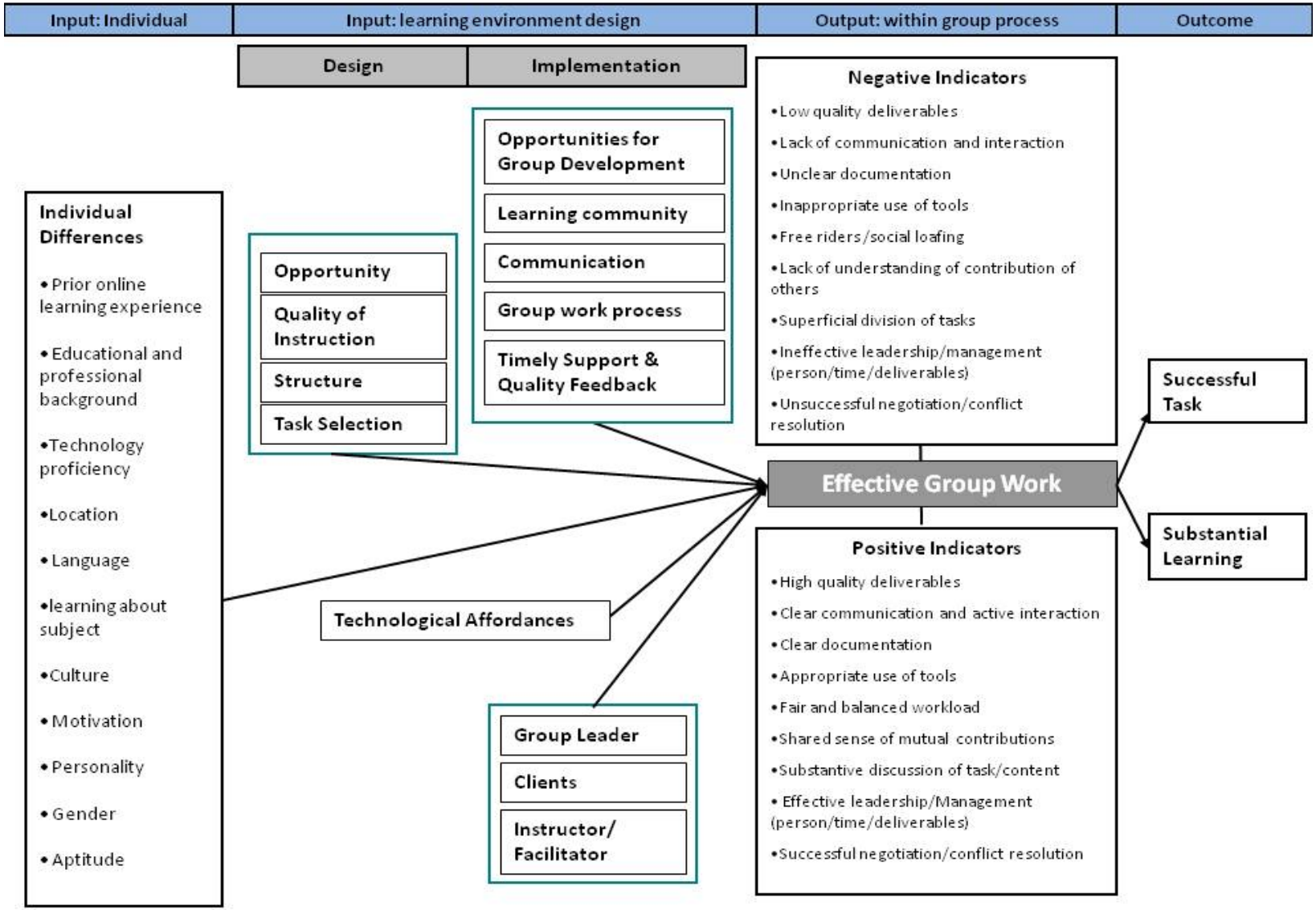


Figure 2.1. A model for online collaborative group work for adult learners

CHAPTER THREE

TEACHING AN ONLINE GRADUATE LEVEL EVALUATION COURSE: SUPPORTING COLLABORATIVE GROUP WORK[2]

[2] Oh, E., & Reeves, T. C. Submitted to *The American Journal of Evaluation*, 04/20/2011

Abstract

The purpose of this paper is to present a case to instructors of evaluation courses regarding the design and implementation of an online graduate level evaluation course employing both an authentic evaluation project and collaborative group work. The paper asserts the need for and feasibility of an optimal design for such an online evaluation course by examining the current practices of teaching evaluation and contemporary adult learning principles and strategies. The paper also presents a design framework evolved from three iterations of an iterative process of design, course implementation, and redesign of this online evaluation course as a part of an educational design research study. The design framework includes seven design principles, associated design and implementation strategies, and enacted course components and interventions.

Introduction

Evaluation is a professional field that can bring benefits to various disciplines by helping practitioners and organizations make better decisions (Reeves & Hedberg, 2003) and improve "efficiency, quality, and effectiveness" (Stufflebeam, 2001, p. 447) in their areas of concern. Accordingly, in many disciplines such as education and public health, interest in how to train competent evaluators and teach evaluation courses has burgeoned. Although there is not yet a large body of information regarding effective strategies for teaching evaluation (Febey & Coyne, 2007; Preskill, 2000), researchers and professionals in evaluation have initiated discussions about teaching evaluation in the professional literature (e.g., *American Journal of Evaluation, New Directions for Evaluation*) and within a major professional association (the Teaching of Evaluation Topical Interest Group in the American Evaluation Association). Efforts to share successful teaching experiences to produce more qualified evaluators help other evaluation professionals in higher education improve design and implementation of their own evaluation courses.

Although evaluation workshops and commercial training are available, most qualified evaluators are educated at the graduate level in institutions of higher education. There are whole Masters and doctoral level programs devoted to evaluation, but more commonly graduate students enrolled in other programs, e.g., a Masters degree program in Instructional Systems Design or a Ph.D. program in Educational Psychology, enroll in individual program evaluation courses. Traditionally, these evaluation courses are implemented in face-to-face environments rather than in online or blended settings.

However, online and hybrid (or blended) courses have become primary delivery trends for higher education learners in many other disciplines (Allen & Seaman, 2008; Bonk &

Graham, 2006; Harasim, 2000; Wang & Reeves, 2007). Indeed, online or blended evaluation courses are increasingly necessary for many adult learners who have situational obstacles (e.g., location, time) that prevent them from enrolling in traditional face-to-face evaluation courses. Of course, online learning environments create a structure of learning and teaching that is significantly different from a face-to-face learning environment (Kearsley, 1998; Reeves, 2003). Designers and instructors of online courses must consider pedagogical strategies that take advantage of the environmental affordances and characteristics of these increasingly popular learning modalities.

There is a lack of discussion in the literature on how online evaluation courses can or should be designed, implemented and supported. Indeed, there is limited conversation concerning a pedagogical framework of any kind in the evaluation teaching literature (Oliver, Casiraghi, Henderson, Brooks, Muslow, 2008; Trevisan, 2004). Only a few articles discuss the learning theories and principles that are the foundations of chosen instructional strategies.

When the pedagogical framework (or instructional design) of graduate level evaluation courses is discussed, a pedagogical principle frequently used in teaching evaluation courses is the integration of experiential learning strategies. Experiential learning strategies often incorporate a collaborative learning component, more specifically collaborative group work; however, the topic has not yet been discussed extensively in the literature. Simply forming groups and giving them a task to complete together does not guarantee effective work among course participants (Dillenbourg, 1999). Supporting collaborative group work is an essential part of an experiential learning approach in evaluation courses because it is the means that enables and influences students' learning experience. Moreover, in relation to teaching online evaluation courses, instructors need to understand better how to support students' work processes and learning

experiences when participants are at a distance and communication is mediated primarily or perhaps exclusively via technology. Fortunately, sample cases describing what has been successful in traditional face-to-face learning environments reveal creative ideas and instructional design principles that can be transferred into online learning environments.

In light of the aforementioned needs, the purpose of this paper is threefold. First, it examines the current state-of-the-art practices in teaching evaluation including the underlying adult learning principles and strategies. Second, it explores collaborative group work in online learning environments as a major pedagogical strategy that can maximize the effectiveness of teaching evaluation in this setting. Third, it proposes a design framework for an optimal online learning environment for teaching evaluation courses by introducing the case of an online E-Learning Evaluation course. Discussing these three areas will help instructors and expert evaluators contemplate the current status of evaluation course design, clarify the emerging needs for online evaluation courses, and present a suitable and reusable pedagogical approach for teaching online graduate level evaluation courses.

The State of the Art of Teaching Evaluation in Higher Education

Evaluation is an applied field; therefore, the most important goal for evaluation education is to prepare students to be competent professional evaluators who possess a balanced theoretical and practical knowledge as well as the skills to conduct successful evaluation projects. Professional evaluators need to possess a variety of competencies requiring in-depth knowledge (e.g., theories, methodology) and professional skills (e.g., interpersonal skills among evaluators, clients and stakeholders; capacity to make professional judgments in dynamic situations) (King, Stevahn, Ghere, & Minnema, 2001; Lee, Wallace, & Alkin, 2007). Due to the applied nature of evaluation, people who write about teaching evaluation often advocate pedagogical practices that

can foster effective application and transfer of evaluation knowledge and skills, in particular authentic learning activities and environments (Alkin & Christie, 2002; Febey & Coyne, 2007; Gredler & Johnson, 2001; Hurley, Renger, & Brunk, 2005; Lee, Wallace, Alkin, 2007; Trevisan, 2002).

Trevisan (2004) conducted a literature review on evaluation pedagogy based on 18 articles (1965 to 2003) and summarized the major strategies employed. He identified four key approaches: "simulation, role-play, single-course projects, and practicum experiences" (p. 258). Other methods the literature discusses in contrast with traditional instruction involving lectures, readings, and exams are case teaching (Patton, 2005; Patton & Patrizi, 2005) and problem-based learning (Lee, Wallace, Alkin, 2007). Although the manner in which instructors use these approaches differs, the primary commonality is that these strategies elicit active participation of and interaction among learners and provide opportunities for learners to be exposed to authentic evaluation contexts. Even though the degree of authenticity in which students engage varies across the approaches, these methods mirror real-world evaluation by encouraging students to apply abstract knowledge in diverse and dynamic evaluation situations, training them to think like professional evaluators by engaging in realistic learning activities, and/or having students work in groups to conduct evaluations for real clients. In addition to the four aforementioned approaches, other strategies to promote greater interaction and engagement in learning about evaluation have been employed. As in many fields, students in evaluation courses must learn theories, methodologies, and fundamental content knowledge. Although some instructors still rely upon traditional didactic lectures, others incorporate activities such as case-based discussions and debates, or use a variety of methods such as interactive and collaborative games to encourage students' engagement with the often complex content (Febey & Coyne, 2007).

Other instructors employ rich cases (Patton, 2005; Patton & Patrizi, 2005) as ways to teach multiple perspectives and help students develop deeper insights regarding evaluation.

In light of the growing need in many disciplines for knowledgeable evaluators, there should be more research focused on teaching evaluation. Even though some instructors share their evaluation teaching state-of-the-art practices through publications, conference presentations, and workshops, they tend to describe what they did without validating why and how the strategies used were effective (Trevisan, 2004). The data in these reports tended to be limited to the results of course evaluations and students' comments regarding their satisfaction. Furthermore, discussion of the theoretical framework underpinning the pedagogical strategies used in these courses is scant (Oliver, Casiraghi, Henderson, Brooks, & Muslow, 2008; Trevisan, 2004). Ideally, the learning theories underlying the pedagogical dimensions used in teaching evaluation would be based on and validated with multiple research studies and subject to in-depth discussions among educational scholars. Designing and teaching courses based on such theoretical rationales would allow instructors to perform evidence-based teaching rather than craft-based teaching. If authors shared their evaluation teaching practices based on results of more rigorous forms of research or in-depth synthesis of theories, other instructors would receive more meaningful guidance on how to design and teach their evaluation courses.

There are numerous theories about how people learn and how they should be taught (cf. Bransford, Brown, & Cocking, 2000). One way to begin identifying a comprehensive underlying theoretical framework in the teaching evaluation literature is to consider the following adult learning principles, all of which are viable when designing and teaching evaluation courses: 1) authentic learning tasks, 2) collaborative group work, 3) multiple significant instructor roles, and 4) reflective learning and practice.

First, experiential learning rooted in the philosophical tradition of John Dewey or the learning-by-doing approach has been widely adopted to teach evaluation (Alkin & Christie, 2002; Merriam & Brockett, 1997; Trevisan, 2004). As mentioned earlier, examples of experiential approaches include simulation, role-play, single course projects, and practicum experiences. In the literature, given that the degree of authenticity, complexity, and structure of tasks vary, these approaches enable learners to learn by planning, conducting, and reporting an evaluation to connect practical skills and theoretical knowledge. Learning through engagement in authentic evaluation activities provides a more meaningful learning experience for emerging professional evaluators because real-life evaluation projects require actual problem-solving experience along with the need to deal with the dynamics, dilemmas, and interactions encountered in evaluation contexts. At the same time, learners should practice real-world evaluation tasks under conditions in which instructors can carefully guide and protect them. By grappling with ill-structured and complex ordinary evaluation settings of the kind they face in their evaluation profession, adult learners will have a greater opportunity to maximize their retention and transfer of evaluation knowledge from the classroom to authentic situations (Brown, Collins, & Duguid, 1989; Herrington & Herrington, 2005). Also, a learning-by-doing approach to understanding evaluation allows students to interact socially and intellectually with each other as they engage in learning.

Second, collaborative group work is an important pedagogical strategy that enables experiential learning. Conducting an evaluation of significant scope usually requires a group effort. Given that many evaluation courses incorporate some kinds of authentic tasks, collaborative group work is a necessary and natural pedagogical approach (Jonassen, Lee, Yang & Laffey, 2005), and indeed, collaborative group work has been widely used as an integral way

for learners to practice evaluation (Trevisan, 2004). The advantages of using collaborative groups include increasing learner motivation, developing critical and problem solving skills, enhancing problem articulation, and learning how to interact and work with each other (Bruffee, 1999; Harasim, 2002; Haythornthwaite, 2006; Smith, 2005). Adult learners have diverse and rich professional experiences and different types of expertise (Kiely, Sandmann, & Truluck, 2004; Merriam & Brockett, 1997; Merriam, Caffarella, & Baumgartner, 2007). Rather than providing students with conventional didactic lectures regarding abstract theories and methodologies, offering opportunities that enable them to bring their prior experience and expertise into the learning environment is important. Having them engage in meaningful discourse (e.g., discussion, critique, debate) through which they co-construct substantial knowledge is effective for most adult learners. Although collaborative group work is commonly used and its strengths as a pedagogical strategy are well-known, the teaching evaluation literature rarely discusses this approach in depth, either with respect to how this approach can be used as a pedagogical framework for teaching evaluation or how instructors can support students' collaborative groups to produce better learning outcomes in experiential learning situations. As a means to enrich the experiential learning experience of students, collaborative group work should be reviewed and discussed in the context of evaluation courses that use diverse authentic learning tasks.

Third, the instructor's roles should be redefined in the context of evaluation courses. Instructor roles are much more complex and demanding in authentic learning environments than those of the *sage on the stage* found in traditional instruction. Fenwick (2003) proposed a framework of educator roles in adult education: facilitators of the learning process, catalysts fostering engagement in problem-solving situations, coaches or mentors guiding learning processes, and assessors of students' learning experience. As students complete authentic

evaluation activities, instructors should 1) facilitate the problem solving process and carefully plan the activities and resources, 2) foster students' engagement in evaluation contexts and help develop group dynamics that enable them to collaborate smoothly with each other, 3) guide their learning processes as mentors and closely supervise their work procedures to perform professionally, and 4) assess the learning outcome as expert evaluators and provide formative feedback during the work process to help students be more reflective and achieve better learning.

The teaching evaluation literature specifically emphasizes the importance of mentoring in evaluation courses (Gredler & Johnson, 2001; Levin-Rozalis & Rosenstein, 2003; Trevisan, 2004). Evaluation course instructors should be expert evaluators who have accumulated extensive explicit as well as tacit knowledge of how to conduct successful evaluations. Levin-Rozalis and Rosenstein (2003) argue that learners acquire instructors' tacit knowledge through mentoring, thereby making it their own explicit knowledge. Eventually, through internalization learners transform this explicit knowledge into tacit knowledge. To make this process possible, faculty should constantly reflect on their own evaluation and teaching practice and make an effort to reconceptualize their tacit knowledge in explicit form so that students can effectively learn from them.

Another important responsibility mentors should assume is to create a safe environment in which students are protected from the results of their mistakes while at the same time they can learn from them (Levin-Rozalis & Rosenstein, 2003). This can be challenging, especially if clients for these evaluations have unrealistic expectations regarding high quality evaluations planned, conducted, and reported by novices. In such cases, the instructor may have to step in and correct serious student errors before clients are provided with final evaluation reports. Levin-

Rozalis and Rosenstein (2003) also argue that during evaluation courses, mentors should play multiple roles such as advisors, supporters, masters, and tutors.

Fourth, reflective learning and practice are vital and fundamental means for adult learners' professional development (Merriam et al., 2007; Morgan, Rawlinson, & Weaver, 2006; Rose & Devonshire, 2004; Trevisan, 2004). Reflection is an integral part of experiential learning because authentic experience and reflection together promote substantial learning in professional domains (Kelly & Kaczynski, 2008). Reflection is a metacognitive activity that allows opportunities for students to "examine beliefs, goals, and practices, to gain new or deeper understandings" (York-Barr, Sommers, Ghere, & Montie, 2001, p. 6). When students reflect on their learning and practices, they consciously "seek to critically analyze and problematise" (Morgan et al., 2006, p. 168) their performance and the process that they used. This reflective practice helps students arrive at more thoughtful solutions (Merriam et al., 2007) to many challenges and problems in their evaluation practice. Additionally, reflection is important in collaborative group work because students learn not only through interacting with others, but also by internalizing what they experience through reflection (Vygotsky, 1978). That is, students transform the explicit knowledge they gain from others into tacit knowledge through internalization (Levin-Rozalis & Rosenstein, 2003). Reflective learning also contributes to students' self-regulation, autonomy, and professional development (Morgan et al., 2006).

The literature addresses a number of difficulties and challenges that both instructors and students encounter in the process of teaching evaluation courses, especially when using different kinds of experiential learning approaches. Although much attention is given to the *experiential nature* of evaluation learning, discussion on other principles is insufficient in the literature. When evaluation instructors use an experiential learning approach, the three aforementioned

principles are intertwined with the experiential learning approach and influence students' learning processes and outcomes. Accordingly, more discussion is needed regarding how instructors can use these principles to effectively enhance teaching and learning about evaluation.

Online Teaching and Learning of Evaluation

Online learning has been receiving much attention in higher education and student enrollment has rapidly increased (Allen & Seaman, 2008). In modern society, adults need to pursue life-long learning, and online learning has certainly become a pragmatic way to achieve it. Online learning allows learners to pursue their professional development with convenience and autonomy (Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw & Liu, 2006), both of which are distinctive requirements of adult learners. While there has been a plethora of practice and research in online teaching and learning over the past two decades, what constitutes best practices for online evaluation courses has not been widely discussed in the literature and professional associations. This condition has perhaps come about because it is not easy to enact what has been the prevalent pedagogy of experiential learning used in many face-to-face courses in new online environments in which communication and interaction are mediated via technologies and have to occur at a distance. In addition, communication and interaction skills between peer evaluators and clients encompass core soft skills that novice evaluators must learn; however, online learning environments not only require students to communicate and interact with each other at a distance, but also learn how to communicate and interact positively as evaluators at a distance.

Regardless of the potential challenges for teaching and learning that online learning environments might impose, online evaluation courses are needed to fulfill the needs of various

disciplines and provide access to people who aspire to be professional evaluators. According to Tallent-Runnels and colleagues' (2006) literature review of teaching courses online, online students in carefully designed and implemented courses learned "significantly more, and more effectively, than those in online courses where teaching and learning activities were not carefully planned" (p. 116). Of course, this is equally true in face-to-face courses, but it appears even more valid in online courses because, whereas the instructor in a traditional face-to-face course can sometimes repair 'on the fly,' a poorly planned online course may be more difficult to revamp in real time. Thus, the challenge for designers and instructors for online evaluation courses in higher education is how to adopt and adapt pedagogical approaches successfully used to teach evaluation in face-to-face environments and apply them in online environments. Designers and instructors must investigate and determine how to overcome the physical and emotional distances among participants and take advantage of the unique strengths online activities and tools can bring to effective learning environments. Online evaluation classes can be successfully designed, developed, and implemented on many levels (i.e., satisfaction, learning) with proper pedagogies, innovative tools, and thoughtful facilitation by instructors. Partlow and Gibbs (2003) conducted a Delphi study with a panel of constructivist theorists and instructional technology experts regarding relevant pedagogical principles that should be used in Internet-based distance courses. They found that many experts agreed that *1) Project-based learning tasks, 2) Collaborative and cooperative small group work, and 3) Tasks that require higher-order cognitive skills* are the three principal approaches that online instructors need to consider for learners to have a quality experience. These are certainly methods that many successful instructors in face-to-face evaluation courses have long employed and thus instructors in online evaluation courses should also be able to use them.

Collaborative Group Work in Online Learning Environments

In the context of designing and teaching online evaluation courses, discussion regarding online collaborative learning, especially collaborative group work, is meaningful and appropriate in many ways. First, as previously mentioned, collaborative learning and group work are very important pedagogical principles for teaching evaluation; they are the means through which students can learn by working on authentic evaluation projects. Second, many researchers in online education have advocated the strengths of collaborative learning in online learning environments (de Jong, Veldhuis-Diermanse, & Lutgens, 2002; Garrison & Anderson, 2003; Han & Hill, 2007). Numerous studies have found that collaborative learning increases student satisfaction, facilitates higher-level thinking and development, and develops greater cohesion among participants (Brandon & Hollingshead, 1999; Harasim, 2002; McConnell, 2005). According to Kim and Bonk's survey study (2006), *The Future of Online Teaching and Learning in Higher Education,* 356 online instructors, representing more than 65% of respondents, believed and predicted that use of group problem-solving and collaborative tasks should be the pedagogies that instructors would incorporate in online courses in the following decade.

Supporting collaborative group work is important because group work requires a higher level of interdependence among group members during the work process (Graham & Misanchuk, 2004). Active interaction and seamless communication are critical to effective group work. Meaningful interaction and discourse among learners mediate learning in any learning environment, and certainly providing effective communication and interaction has been regarded as an essential element for success in online learning environments (Tallent-Runnels et al., 2006). In online learning environments, online technology offers various pedagogical and communicative benefits. Recently, emerging Web 2.0 tools (e.g., Wiki, YouTube, and Blog)

enable and encourage a participatory culture of learning and student collaborative learning activities (Dede, 2009; Herrington, Reeves, & Oliver, 2010). Innovative technologies not only provide ways of overcoming the isolation learners can easily experience in distance learning environments (Palloff & Pratt, 1999), but they also become important tools that support students' active discussion and negotiation of meaning to "establish intellectual convergence" (Harasim, 2002, p.183), enable them to conduct successful evaluation projects at a distance, and provide activities that enrich students' learning. However, technologies are only tools that can support learning indirectly. Learning is not primarily driven by technology, but rather by instructional methods and pedagogical strategies. In this regard, it is significant to think about how to design a pedagogically sound course to optimize student collaborative group work so that they conduct their evaluation projects through seamless and effective communication and interaction and finally acquire the balanced theoretical and practical knowledge, as well as the necessary skills, to conduct successful evaluation projects in their present and future professional work.

Effective Collaborative Group Work in an Online E-Learning Evaluation Course

The Course

The case presented here is a graduate level online E-Learning Evaluation course that has originally been offered as an Instructional Product Evaluation course in face-to-face environments for 15 years. The course was offered in the College of Education in a large university in the southeastern United States. The course has been well recognized in the home institution, as well as by other institutions. Instructional product evaluation is an important subject in the field of educational technology; however, many programs do not have the necessary resources and manpower to offer a course of this kind. The instructor decided to

develop an online version of the course to provide learning opportunities for more graduate students in the field.

The primary pedagogy used in the face-to-face course has always been "authentic learning tasks" (Reeves, Herrington, & Oliver, 2002), in which students work in small groups (two-four students) to plan, conduct, and report on an evaluation of an interactive instructional product for real clients. Although other learning activities have been incorporated into the course, learning by conducting authentic evaluation projects is the principal means to enabling a quality experience for students. Also, collaborative group work is an integral means for students to engage in authentic evaluation projects. Therefore, in this new online course, we focused how to optimize students' collaborative group work to successfully and effectively complete authentic evaluation projects.

The first online course was offered in Spring 2008, the second in Fall 2008, and the third in Spring 2009. For three semesters, in total, 33 students of 13 different nationalities from 13 institutions in five different countries completed the course. The course was 16 weeks long and was offered using Moodle, an open source learning management system, to give students in other institutions free full access. Although the instructor had at least one synchronous or face-to-face meeting with individual students, the course had to be offered primarily in an asynchronous manner because of the varying time zones among course participants. As mentioned previously, the students' main task during the semester was to work with their group members on evaluation projects for a real client. The course also included activities (e.g., reading, discussion, ice-breaking activity), access to resources (multimedia tutorial, Web-based resources, guides), and required posts to the course management system on a weekly basis.

The course design was refined through three iterations of design, implementation, and redesign based upon educational design research (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). The initial design was developed using principles from the literature on online collaborative group work. By completing three iterations, seven essential design principles that can optimize online collaborative group work in a graduate level online evaluation course were developed and refined. In this section, each design principle and its associated strategies that can help instructors who will teach evaluation courses are discussed. Additionally, the manner in which the course components and interventions were actually enacted, based on those design principles and strategies, are presented. Figure 3.1 is the screenshot of course design version 3.0, used in the Spring 2009 semester.

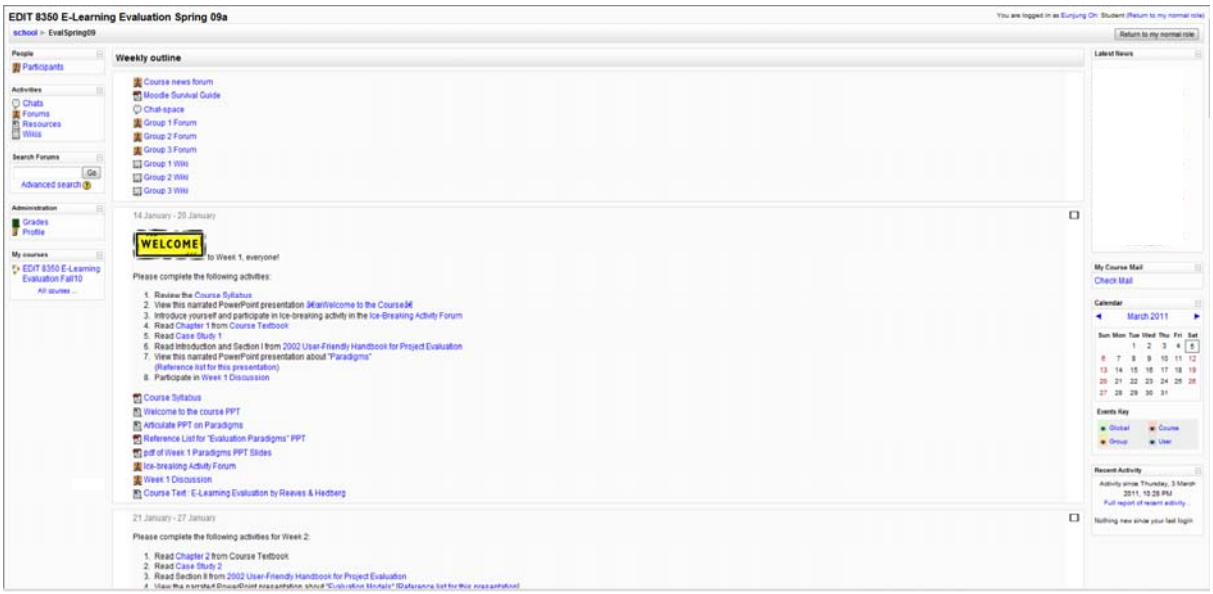


Figure 3.1. Course design version 3.0. (Spring 2009)

Seven design principles

Seven design principles guiding the course are the following: 1) Facilitate communication, 2) Establish a strong sense of community and help students have a sense of belongingness to their groups and the class, 3) Provide a variety of technology everyone can use,

4) Maximize opportunities for collaboration and scaffold the group work process, 5) Provide opportunities for establishing positive interdependence, 6) Enhance individual accountability, motivation, and engagement for active participation in group work, and 7) Facilitate individual student learning about evaluation. Each design principle had two to eight associated strategies to enact the course design and implementation using the design principle.

Facilitate communication. Effective and prompt communication among group members is the most important factor contributing to the success of online collaborative group work. That is, communication is the most fundamental means for successful learning (Tallent-Runnels et al., 2006), building social presence (Tu and McIssac, 2002) and a sense of community (Palloff & Pratt, 1999), developing common ground (Baker, Hansen, Joiner, & Traum, 1999; Paulus, 2009), and engaging in collaboration (Dillenbourg, 1999) and small group work (Paulus, 2009) in online learning environments.

In online learning environments, students may experience difficulty in communication on several levels: "contact (indicating they are willing and able to continue the interaction), perception (indicating they are willing and able to perceive the message), understanding (indicating they are willing and able to understand the message) and attitudinal reaction (indicating they are willing and able to react and respond, accept or reject the message)" (Paulus, 2009, p. 229) (cf. Baker, Hansen, Joiner, & Traum, 1999). Researchers claim that it usually takes more time for online students to establish presence, common ground, and social interdependence than for those enrolled in face-to-face classes (Paulus, 2009) because they do not have natural opportunities for communication unless they perform an action such as writing an email or arranging a meeting. Therefore, negotiating ideas, establishing common ground among group members, and making progress can be a time consuming process unless students know how to

communicate effectively with each other and are dedicated to prompt communication with each other. Despite the absence of facial expressions or the actual nuances inherent in verbal exchanges, intimacy and immediacy are two key criteria for effective online communication (Tu & McIssac, 2002).

In this online course in which students were from all over the world, students did not know or see their group members unless they were in the same program and were residents of the same city. As most of them met for the first time in the course, it was unrealistic to anticipate they would naturally communicate with each other actively and work together effectively and efficiently simply because they were assigned to work together in groups. To facilitate communication in the groups and the whole class, five strategies were executed. First, the instructor and course facilitators provided a strong presence through various methods such as active contributions to online discussions. Second, to help groups have more frequent and deeper collaboration opportunities (Dillenbourg, 1999), the instructor emphasized the importance of regular synchronous group meetings. Third, to elicit immediacy in online interactions (Tu & McIssac, 2002) within groups, the instructor focused on enhancing the quality and quantity of class discussions. Fourth, as an expert evaluator, the instructor modeled optimal communication behaviors, styles, and methods to students. Fifth, students were assigned to groups considering their time zones so that they could easily have synchronous meetings and reply to each other's emails in a less delayed manner. The first design principle, the associated design and implementation strategies, and actual enacted components and interventions are presented in Table 3.1.

Table 3.1

Design principle one: Facilitate communication

Principle	Design/implementation strategies	Enacted components/interventions
Communi-cation	▪ Provide strong instructor and facilitator presence in various ways	▪ Weekly announcement ▪ Weekly calendar activities posting ▪ Weekly questions and discussion (whole class) participation ▪ Participation in the first couple of group meetings ▪ Frequent check-in with groups ▪ Formative feedback on groups' draft outcomes ▪ Prompt answer to students' questions ▪ At least one Skype or F2F meeting with individual student during the semester
	▪ Emphasize the importance of regular synchronous group meetings	▪ In the "tips for the effective group work" guidance ▪ In the announcement of group assignment
	▪ Enhance the quality and quantity of course discussion	▪ Participation requirement in weekly discussion (assessment criteria) ▪ Instructor participation in and facilitation of discussion
	▪ Model optimal communication behaviors, styles, and methods	▪ In every communication with students ▪ Promptness, frequency, depth of thoughts, openness, intimacy, tool use, and manner
	▪ Assign groups considering time zones	▪ People in the similar time zone ▪ Information from participant information, ice-breaking activities, and student profile survey

Establish a strong sense of community and help students have a sense of belongingness to their groups and the class. Many researchers on online collaborative learning emphasize the importance of social interaction and relationships because they are prerequisites of successful collaboration (Kreijn & Kirschner, 2004). The course learning goals for students are to achieve substantial learning about evaluation and complete the evaluation project successfully, which are all cognitive level objectives. However, off-task interactions and non-task contexts can foster group work and learning as well (Paulus, 2009) by promoting the process of community building

and providing affective support (Kreijns, Kirschner, & Jochems, 2003). Successful collaborative group work requires strong positive interdependence among group members. Students cannot depend on each other unless they know each other and feel comfortable about those with whom they work. The establishment of social relationships among group members, once completed, positively contributes to the psychological and affective elements essential to group work. Students tend to have a larger sense of mutual trust to share ideas, greater spirit of collaboration, stronger sense of belongingness and community, and better group cohesion within groups.

In this course, both task and non-task opportunities and contexts were designed and incorporated so that students were encouraged to get to know each other and establish social relationships. First, once groups were assigned, in the initial group meetings students were guided toward getting to know each other and forming impressions of their co-members. The course facilitator joined the meeting and emphasized the development of good working and social relationships. Second, students were provided with social spaces and contexts throughout the semester, such as ice-breaking activities and personal participant pages, to share information about themselves. Third, the instructor encouraged a culture of knowledge sharing and open communication among enrollees so that students would feel comfortable sharing their reflections, ideas, and questions with others within their groups as well as in the whole class discussion forums. The second design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.2.

Table 3.2

Design principle two: Establish a strong sense of community and help students have a sense of belongingness to their groups and the class.

Principle	Design/implementation strategies	Enacted components/interventions
Sense of Community & Belonging-ness	▪ Guide the first group meeting to get to know each other, form impressions of co-members, and continue to promote the development of good working and social relationships	▪ In the announcement of group and project assignment ▪ In the "tips for effective collaborative group work" guidance ▪ Attended the first Skype group meeting
	▪ Provide social spaces and contexts throughout the semester	▪ Ice breaking activity ▪ Filling out personal information on participant page in the course management system ▪ Weekly Discussion forum ▪ Explicit encouragement of sharing general personal reflection in discussion forums ▪ Posted instructors' general reflection, thoughts, resources on evaluation area spontaneously
	▪ Establish culture of knowledge sharing and open communication	▪ In the "tips for effective collaborative group work" guidance ▪ With the instructor's active participation in weekly discussion and encouragement of students' sharing on their personal reflection and thoughts

Provide a variety of technology everyone can use. Technology in online collaborative groups plays unique and critical roles. Students' language in online learning environments can only have meaning when it is mediated via various technologies. Technology can diminish opportunities and motivation for meaningful learning and collaboration by causing frustration with technical problems and demands for more time and efforts (Bernard, & Lundgren-Cayrol, 2001; Ragoonaden, & Bordeleau, 2000). Or, technology can enrich learning and collaboration experiences by enabling student collaboration in a more participatory culture (Herrington, et al., 2010) and fostering "knowledge creation and sharing" (Dede, 2009, p. 260) opportunities and

methods among participants in online environments. Technology can either undermine or enrich learning and group work experience depending on how carefully instructors select appropriate technologies for different course activities and how effectively and proficiently students are able to use them for their learning and collaboration. When online courses require students to engage in complex problem solving tasks in a collaborative manner such as in this course, it is important for instructors offer a number of technologies that have different functionalities and affordances (Haythornthwaite, Kazmer, Robins, & Shoemaker, 2000) so that students' multi-faceted needs during the collaborative group work process can be optimally supported.

To provide a variety of technology that students can use, four major design and implementation strategies were used. First, the instructor provided group spaces and encouraged their use to help groups have private areas in which they can organize their work process. Second, as evaluation projects require intensive and extensive collaborative writing and editing efforts, groups were provided with writing and editing tools. Third, in terms of facilitating communication among group members, students were introduced to and used synchronous and asynchronous tools. Fourth, since students had different levels of technology proficiency, the instructor provided overt guidance for students to take advantage of the different tools in appropriate ways. The third design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.3.

Table 3.3

Design principle three: Provide a variety of technology everyone can use

Principle	Design/implementation strategies	Enacted components/interventions
Techno-logy	▪ Provide group spaces and encourage their use	▪ Group Wiki ▪ Group Forum
	▪ Provide group writing and editing tools	▪ Google Docs ▪ Group Wiki ▪ MS Word
	▪ Provide both synchronous and asynchronous tools	▪ Skype ▪ Group Wiki ▪ Group Forum ▪ Personal Email
	▪ Provide overt guidance for students to take advantage of the tools in proper ways	▪ Website guide on collaborative writing ▪ Website guide and video on Wiki ▪ Website guide on virtual meetings ▪ Moodle Survival Guide

Maximize opportunities for collaboration and scaffold group work process. For groups "to construct and maintain a shared conception of" (Roschelle & Teasley 1995, p.70) their evaluation project, it is important for the instructors of the evaluation courses to maximize opportunities for collaboration and scaffold the group work process. When groups work, they don't automatically and naturally engage in meaningful collaboration (Paulus, 2009; Roberts and McInnerney, 2007). Opportunities to optimize collaborative group work experience should be carefully designed and facilitated. Coordinating and monitoring the group work process is important for enhancing both individual accountability and establishing positive interdependence in the collaboration process (Wang, 2009).

Typically, when students work in groups, they employ cooperative and collaborative approaches. Online groups do not tend to work completely cooperatively or completely collaboratively, although they are likely to lean toward one approach more than the other. Considering efficiency with time, students often divide tasks, and each member is responsible for

completing his or her part. However, during the process, it is critical that group members have considerable discussions at a cognitive level to construct a common understanding on how their project should look, and what each person needed to contribute. Also, there should be a substantial and critical reviewing process to improve each other's portion and to make their entire project cohesive as well as successful.

In this evaluation course, to maximize opportunities for collaboration and continue scaffolding a positive group work process, several strategies were employed.

First, groups were assigned considering students' heterogeneous characteristics such as online learning experiences, online group work experiences, technology proficiency, and educational background. Second, once groups were assigned, students were asked to select a group leader to effectively manage communication among group members and with the client, and the project overall. To assist with the process, the instructor provided in advance guidance regarding the roles and responsibilities of the leader. Third, the instructor included a guide for effective group work based on his expectations and advice from previous students taking the course. Fourth, to monitor the group work process effectively and encourage transparent communication and regular synchronous meetings within groups, each group recorded meeting minutes and uploaded them to their Group Wikis. Fifth, the instructor provided task-centered scaffolding with consideration of groups' progress and challenges. For instance, groups knew what they were supposed to do each week based on the weekly calendar guide, and depending on the tasks they were working on, were provided with task-specific scaffolding (e.g., formative feedback on the draft evaluation plan). Sixth, the instructor structured course activities and workload considering the amount of work in different phases and the flow of the group project. Students worked on projects with real world time constraints. In some weeks, students could not make much progress

because they had to wait on responses from their clients or for potential participants to be recruited. In other weeks, students had to perform more intensive work on their group projects. These patterns existed across the groups and iterations, and the instructors need to consider them when designing and assigning weekly activities. Seventh, the instructor continuously monitored group development and dynamics and frequently checked on the progress of individual students. Group dynamics and development influenced much of the success and effectiveness of group work. The fourth design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.4.

Provide opportunities for establishing positive interdependence. Successful collaborative group work requires a higher level of positive interdependence (Brewer & Klein, 2006; Graham, 2002). Positive interdependence is established in a group work situation when members perceive that learning and performance goals can be achieved by their working well together (Johnson & Johnson, 2005; 2009).

Table 3.4

Design principle four: Maximize opportunities for collaboration and scaffold the group work process

Principle	Design/implementation strategies	Enacted components/interventions
Collaboration & Group work process	▪ Assign heterogeneous groups by considering factors such as time zones, online learning and online group work experiences, technology proficiency, and educational background	▪ Information gathered via the Student Profile Survey (Students completed this survey before the first week started.)
	▪ Have each group select a group leader and provide guidance regarding the leader role	▪ In weekly announcement and weekly activities calendar ▪ In the Team Leader guide ▪ In the Tips for successful online group work guide ▪ Joined the first group meetings
	▪ Provide guidance for effective group work	▪ In the Tips for successful online group work guide ▪ In weekly activities calendar ▪ Joined the first group meetings
	▪ Have groups upload meeting minutes to monitor group work progress	▪ In the announcement of group and project assignment ▪ Joined the first group meetings ▪ Groups uploaded on their Group Wikis
	▪ Provide task-centered scaffolding	▪ First group task: the overall project timeline ▪ In the whole class weekly discussion on issues/reflections/progresses in conducting evaluation projects ▪ In weekly activities calendar ▪ In weekly announcement ▪ Formative feedback on draft outcomes (e.g., plan, instrument and report) ▪ Frequent check-in ▪ Prompt mentoring and advice when necessary (e.g., issues with clients)
	▪ Structure course activities considering the workload of different phases and flow of group project	▪ Monitored the group work process ▪ In weekly activities calendar
	▪ Monitor group development and dynamics and throughout the semester frequently check in with the groups regarding their group work process	▪ Monitored meeting minutes ▪ Frequent check-in emails to individual students as well as groups ▪ One individual Skype or F2F meeting with students

One of the common frustrations in group work is social loafing, which results in an imbalanced workload and unfair contribution among group members. Positive interdependence helps prevent the social loafing phenomenon and reduces the probability of having free-riders in groups (Johnson & Johnson, 2009) because group members share an understanding that their project and group work cannot be successful without each other's contribution (Wang, 2009). In addition, researchers argue that positive interdependence among group members has many benefits for group learning including 1) producing better learning, performance outcomes, and greater productivity; 2) facilitating more frequent higher level reasoning; 3) showing stronger individual accountability as well as encouraging and supporting each other's efforts to achieve a shared goal; 4) establishing stronger mutual trust and effective communication exchanges; and 5) creating a stronger perception of the sense of the group's unity and bonding (Johnson & Johnson, 2009).

In this course, efforts to establish positive interdependence were achieved by discussing and negotiating each other's goals and expectations at the beginning of group work on specific activities such as preparing an outline of the evaluation plan. Through those early activities, group members built consensus on what they desired and envisioned as a group. Specific strategies are the following. First, the instructor guided students to have conversations regarding their expectations and goals during the first group meeting to establish an understanding of what they desired to achieve as a group Second, the instructor also emphasized the importance of positive interdependence among group members and collaboration for success of the project and satisfaction with themselves for the semester. Third, during the first meeting, after discussing expectations and goals, students were asked to establish ground rules the group members must keep throughout the semester in working together; they posted the list of rules on their Group's

Wiki. The fifth design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.5.

Table 3.5

Design Principle Five: Provide opportunities for establishing positive interdependence.

Principle	Design/implementation strategies	Enacted components/interventions
Positive interdepen-dence	▪ Guide students to have conversations regarding their expectations and goals	▪ In the Tips for successful online group work guide ▪ In the announcement of group and project assignment ▪ Joined the first group meetings
	▪ Emphasize the importance of positive interdependence and collaboration	▪ In the Tips for successful online group work guide ▪ In the announcement of group and project assignment ▪ Joined the first group meetings
	▪ Guide students to establish ground rules	▪ In the Tips for successful online group work guide ▪ In the announcement of group and project assignment ▪ Joined the first group meetings ▪ Asked groups to post ground rules in their Group Wikis

Enhance individual accountability, motivation, and engagement for active participation in group work. Students can learn about evaluation in the course by themselves; however, their projects must be completed collaboratively, and each individual student's contribution is important for the projects' success. Individual accountability is an important factor that influences the degree of collaboration (Hathorn & Ingram, 2002). As discussed above, helping students establish positive interdependence is useful to enhance individual accountability, motivation and active engagement in the project (Johnson & Johnson, 2009). However, additional strategies were specifically helpful. First, considering the scope of the course projects, three people were established as the ideal size for a group. Four person groups usually had one free-rider or less contributing member, and two people groups were frequently overwhelmed by

the workload. Second, using authentic evaluation projects with real-life relevance to these adult students helped their levels of motivation and engagement in group work because students had goals at an application level rather than pure learning goals. Third, the instructor incorporated a variety of assessment strategies including evaluating the outcome of the group project, as well as individual contributions to the group work success. Fourth, the instructor shared clear expectations regarding the quality of learning outcomes, time and effort commitments, and level of performance. Fifth, although the instructor encouraged autonomy of adult learners and considered flexibility in the process for authentic projects, he provided specific course structure and guidelines. The sixth design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.6.

Facilitate individual student learning about evaluation. In a similar vein of importance of individual accountability, motivation, and engagement in group work, individual learning about evaluation is also important because it is the individual student who contributes to and brings insights to group discussions. The quality of instruction and learning activities is a critical and fundamental aspect in building the quality of group performance by preparing students to conduct evaluation projects.

Table 3.6

Design Principle Six: Enhance individual accountability, motivation, and engagement for active participation in group work.

Principle	Design/implementation strategies	Enacted components/interventions
Individual accounta-bility, motivation, & engagement	▪ Assign three people per group	▪ Individual information gathered via the Student Profile Survey (Students completed this survey before the first week started.) ▪ In the announcement of group and project assignment
	▪ Use authentic evaluation projects that have real-life relevance to students	▪ One evaluation project per group ▪ Arrangement with clients ▪ Mentoring on establishing relationship and communicating with clients
	▪ Incorporate a variety of assessment strategies	▪ Project (60%) : evaluation plan, implementation and final reports ▪ Individual quizzes (20%) ▪ Individual participation (20%) : weekly discussion,
	▪ Share the instructor's expectations regarding learning outcomes, commitment, and performance	▪ Assessment rubrics for each assessment item ▪ In the first welcome message ▪ Formative and summative feedback on outcomes
	▪ Encourage student autonomy yet provide sufficient course structure and specific guidelines	▪ Clear deadlines, yet flexible with delays due to real-world challenges ▪ Specific weekly guidelines on group work in weekly activities calendar

Two strategies were employed to facilitate individual student learning about evaluation by considering the goal of optimizing group work. First, the instructor provided a course structure that encouraged and assessed both group and individual performance in terms of outcomes and participation. One aspect that differentiates collaborative groups from cooperative groups pedagogically is whether an instructor employs strategies to assess students' contribution and performance based on individuals or groups (Graham, & Misanchuk, 2004). It is useful to consider both approaches to fostering collaboration, establishing positive interdependence, and encouraging individual accountability. Second, the instructor provided diverse resources to

support individual learning about evaluation. Those resources were not only comprehensive in terms of their topics and types, but also varied in terms of their formats. Resources were offered throughout the semester in consideration of the process and progress of students‘ group work so that individual students could offer grounded and valid ideas and insights. The seventh design principle, associated design and implementation strategies, and enacted components and interventions are presented in Table 3.7.

Implications and Looking Forward

The principal goal of this paper is to present a research-grounded and applicable design framework for online evaluation courses based on three iterations of design and research processes. Authentic learning tasks (Herrington et al., 2010) and collaborative group work (Smith, 2005) were the primary pedagogical approaches used in the course, which have also been identified in the literature as important evaluation pedagogies. Careful review of the literature on teaching evaluation reveals a paucity of discussion on online evaluation courses although there is a rapidly increasing trend of online course development and enrollment in higher education institutions (Allen, & Seaman, 2008).

We hope the presented design case can help instructors and expert evaluators aspiring to design an online evaluation course as effective as the face-to-face courses they have been teaching successfully and those already teaching online who are seeking a better framework for their students in this new learning environment. Learning evaluation should be accomplished by doing authentic evaluation. It may seem to be, and actually is, quite challenging to make “doing evaluation” possible and meaningful in online environments. However, when instructors understand the uniqueness and strengths of online learning environments employing emerging

technologies and carefully design and implement courses, their students will have as meaningful learning experiences as prior students had in their face-to-face courses.

Table 3.7

Design Principle Seven: Facilitate individual student learning about evaluation.

Principle	Design/implementation strategies	Enacted components/interventions
Individual learning	▪ Provide a course structure encouraging and assessing both group and individual performance in terms of outcome and participation	▪ Individual tasks : most of weekly activities(textbook and case readings, quizzes, weekly discussion, multimedia modules and so on ▪ Group tasks: evaluation project (evaluation plan including instrument development, evaluation implementation, and evaluation report) ▪ Individual assessment (40%): participation (discussion as well as self and peer evaluation 20%), and three quizzes (20%) ▪ Group assessment (60%): evaluation plan (20%), and evaluation implementation and report (40%)
	▪ Provide diverse resources to support individual learning about evaluation	▪ Readings: textbooks, journal articles, case studies, website resources (e.g., usability testing, guiding principles for evaluators, qualitative data analysis) ▪ Pre-recorded PPT lectures : weekly topics, welcome to the course ▪ Technology guide: Moodle Survival Guide, video about Wiki, and websites about Wikis ▪ Multimedia tutorials: Online survey Flash module, E-Learning Usability Testing video Lab, Paper Prototype Usability Test video ▪ Group work guide: websites about virtual meetings, and collaborative editing, Team Leader guide, Tips for successful online group work guide ▪ Other guide: General advice about the E-learning Evaluation course ▪ Other resources: General advice about the PDFs on PPT lecture slides, PDFs on PPT lecture references, sample evaluation reports

References

Allen, I. E. & Seaman, J. (2008, November). Staying the course: Online education in United States. Retrieved May 30, 2009 from http://www.sloan-c.org/publications/survey/pdf/staying_the_course.pdf

Alkin, M. C., & Christie, C. A. (2002). The use of role-play in teaching evaluation. *American Journal of Evaluation, 23*(2), 209-218.

Baker, M., Hansen, T., Joiner, R., & Traum, D. (1999). The role of grounding in collaborative learning tasks. In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 31–63). Oxford: Pergamon.

Bernard, R. M., Rojo de Rubalcava, B., & St-Pierre, D. (2000). Collaborative online distance learning: Issues for future practice and research. *Distance Education. 21*(2), 260-277.

Bonk, C. J., & Graham, C. R. (Eds.). (2006). *Handbook of blended learning: Global Perspectives, local designs.* San Francisco, CA: Pfeiffer Publishing.

Brandon, D. P., & Hollingshead, A. B. (1999). Collaborative learning and computer-supported groups. *Communication Education, 48*, 109-126.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.

Brewer, S. & Klein, J. D. (2006). Types of positive interdependence and affiliation motive in an asynchronous, collaborative learning environment. *Educational Technology Research & Development, 54*(4), 331-354.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Bruffee, K. A. (1999). *Collaborative learning: Higher education, interdependence, and the authority of knowledge* (2 ed.). Baltimore, MD: The Johns Hopkins University Press.

Dede, C. (2009). Technologies that facilitate generating knowledge and possibly wisdom. *Educational Researcher. 38*(4), 260-263.

de Jong, F., Veldhuis-Diermanse, E., & Lutgens, G. (2002). Computer-supported collaborative learning in university and vocational education. In T. D. Koschmann, R. Hall & N. Miyake (Eds.), *CSCL2: Carrying forward the conversation* (pp. 111-128). Mahwah, NJ: Lawrence Erlbaum Associates.

Dillenbourg P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.). *Collaborative-learning: Cognitive and Computational Approaches* (pp.1-19). Oxford: Elsevier.

Febey, K., & Coyne, M. (2007). Program evaluation: The Board Game: An interactive learning tool for evaluators. *American Journal of Evaluation, 28*(1), 91-101.

Fenwick, T. (2003*). Learning through experience: Troubling orthodoxies and intersecting questions.* Malabar, FL: Krieger.

Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st century: A framework for research and practice*. London and New York: Routledge-Falmer.

Graham, C. R. (2002). Factors for effective learning groups in face-to-face and virtual environments. *Quarterly Review of Distance Education, 3*, 307-319.

Graham, C. R., & Misanchuk, M. (2004). Computer-mediated learning groups: Benefits and challenges to using groupwork in online learning environments. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 181-202). Hershey, PA: Information Science Publishing.

Gredler, M. E., & Johnson, R. L. (2001). Lessons learned from the directed evaluation experience. *American Journal of Evaluation, 22*(1), 97-104.

Han, S., & Hill, J. R. (2007). Collaborate to learn, learn to collaborate: Examining collaborative learning supported by asynchronous discussion. *Journal of Educational Computing Research, 36*(1), 89-123.

Harasim, L. (2000). Shift happens: Online education as a new paradigm in learning. *Internet & Higher Education, 3*(1-2), 41-61.

Harasim, L. (2002). What makes online learning communities successful?: The role of collaborative learning in social and intellectual development. In C. Vrasidas & Glass, G. V. (Eds.). *Distance education and distributed learning* (pp. 181-200). Greenwich, CO: Information Age.

Hathorn, L. G., & Ingram, A. L. (2002). Online collaboration: Making it work. *Educational Technology, 42*(1), 33–40.

Haythornthwaite, C. (2006). Facilitating collaboration in online learning. *Journal of Asynchronous Learning, 10*(1). Retrieved February 25, 2008, from http://www.sloan-c.org/publications/jaln/v10n1/v10n1_2haythornthwaite.asp

Haythornthwaite, C., Kazmer, M. M., Robins, J., & Shoemaker, S. (2000). Community development among distance learners: Temporal and technological dimensions. *Journal of Computer-mediated Communication, 6*. Retrieved on October 10, 2010 from http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2000.tb00114.x/full

Herrington, A., & Herrington, J. (2005). What is an authentic learning environment? In A. Herrington & J. Herrington (Eds.), *Authentic learning environments in higher education* (pp. 1-13). Hershey, PA: Information Science Publishing.

Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.

Hurley, C., Renger, R., & Brunk, B. (2005). Learning from a challenging fieldwork evaluation experience: Perspectives of a student and an instructor. *American Journal of Evaluation, 26*(4), 562-578.

Johnson, D. W., & Johnson, R. T. (2005). New developments in social interdependence theory. *Psychology Monographs, 131*, 285-358.

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher. 38*(5), 365-379.

Jonassen, D. H., Lee, C., B., Yang, C, -C., & Laffey, J. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *The Cambridge Handbook Multimedia Learning* (pp. 247-270). New York: Cambridge University Press.

Kearsley, G. (1998). Educational technology: A critique. *Educational Technology. 38*(2), 47-51.

Kelly, M. A., & Kaczynski, D (2008). Teaching evaluation from an experiential framework: Connecting theory and organizational development with grant making. *American Journal of Evaluation, 29*(4), 547-554.

Kiely, R., Sandmann, L. R., & Truluck, J. (2004). Adult learning theory and the pursuit of adult degrees. *New Directions for Adult and Continuing Education: Developing and Delivering Adult Degree Programs, 103*(Fall), 17-30.

Kim, K.-J., & Bonk, C. J. (2006). The future of online teaching and learning in higher education: The survey says ... *Educause Quarterly, 29*(4), pp. 22-30.

King, J. A., Stevahn, L., Ghere, G., & Minnema, J. (2001). Toward a taxonomy of essential evaluator competencies. *American Journal of Evaluation, 22*(2), 229-247.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A Review of the research. *Computers in Human Behavior, 19*, 335-355.

Kreijns, K., & Kirschner, P.A. (2004). Designing sociable CSCL environments: Applying interaction design principles. In J.W. Strijbos, P.A. Kirschner, & R.L. Martens (Vol. Eds.), *Computer-supported collaborative learning: Vol 3. What we know about CSCL and implementing it in higher education* (pp. 241-263). Boston, MA: Kluwer Academic Publishers.

Lee, J., Wallace, T. L., & Alkin, M. (2007). Using problem-based learning to train evaluators, *American Journal of Evaluation, 28*(4), 536-545.

Levin-Rozalis, M., & Rosenstein, B. (2003). A mentoring approach to the one-year evaluation course. *American Journal of Evaluation, 24*(2), 245-259.

McConnell, D. (2005). Examining the dynamics of networked e-Learning groups and communities. *Studies in Higher Education, 30*(1), 25-42.

Merriam, S. B., & Brockett, R. G. (1997). *The profession and practice of adult education*. San Francisco: Jossey-Bass.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). San Francisco: Jossey-Bass.

Morgan, J., Rawlinson, M., & Weaver, M. (2006). Facilitating online reflective learning for health and social care professionals. *Open Learning, 21*(2), 167-176.

Oliver, D. E., Casiraghi, A. M., Henderson, J. L., Brooks, A. M., & Muslow, M. (2008). Teaching program evaluation: Three selected pillars of pedagogy. *American Journal of Evaluation, 29*(3). 330-339.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom*. San Francisco, CA: Jossey-Bass Publishers.

Partlow K. M., & Gibbs, W. J. (2003). Indicators of constructivist principles in Internet-based courses, *Journal of Computing in Higher Education*, *14*(2), 68–97.

Patton, M. Q. (2005). Diverse and creative uses of cases for teaching. *New Directions for Evaluation. 105*. 91- 100

Patton, M. Q., & Patrizi, P. (2005). Case teaching and evaluation. *New Directions for Evaluation. 105*. 5- 14

Paulus, T.M. (2009). Online but off-topic: Establishing common ground in small learning groups. *Instructional Science, 37*(3), 227-245.

Preskill, H. (2000). Coming around again: Renewing our commitment to teaching evaluation. *American Journal of Evaluation, 21*(1), 103-104.

Ragoonaden, K., & Bordeleau, P. (2000). Collaborative learning via the Internet. *Educational Technology and Society. 3*(3). Retrieved June 16, 2009 from http://www.ifets.info/journals/3_3/ Ragoonaden, K., & Bordeleau, P. (2000). Collaborative learning via the Internet. *Educational Technology and Society* d11.html

Reeves, T. C. (2003). Storm clouds on the digital education horizon. *Journal of Computing in Higher Education, 15*(1), 3-26.

Reeves, T. C., Herrington, J., & Oliver, R. (2002). Authentic activities and online learning. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality conversations: Research and Development in Higher Education* (Vol. 25, pp. 562-567). Jamison, ACT: HERDSA.

Reeves, T. C., & Hedberg, J. (2003). *Interactive learning systems evaluation.* Englewood Cliffs, NJ: Educational Technology Publications.

Roberts, T. S., & McInnerney, J. M. (2007). Seven problems of online group learning (and their solutions). *Educational Technology & Society*, *10*(4), 257-268.

Roschelle, J., & Teasley, S. D. (1995). The construction of shared knowledge in collaborative problem solving. In C. O'Malley (Ed.), *Computer-supported collaborative learning* (pp. 69-100). Berlin: Springer-Verlag.

Rose, M., & Devonshire, E. (2004). Rethinking reflection: Using online reflective learning in professional practice for indigenous health workers. *Educational Media International, 41*(4), 307 – 314.

Smith, R. O. (2005). Working with difference in online collaborative groups. *Adult Education* Quarterly, 55(3), 182-199.

Stufflebeam, D. L. (2001). Interdisciplinary PhD. programming in evaluation. *American Journal of Evaluation, 22*(3), 445-460.

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Lui, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research, 76*(1), 93-135.

Trevisan, M. S. (2002). Enhancing practical evaluation training through long-term evaluation projects. *American Journal of Evaluation, 23*(1), 81-92.

Trevisan, M. S. (2004). Practical training in evaluation: A review of the literature. *American Journal of Evaluation, 25*(2), 255-272.

Tu, C-H., & McIssac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education. 16*(3). 131-150.

van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006) *Educational design research*. London: Routledge.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wang, C. M., & Reeves, T. C. (2007). The meaning of culture in online education: Implications for teaching, learning, and design. In A. Edmundson (Ed.), *Globalized e-Learning cultural challenges* (pp. 1-17). Hershey, PA: Idea Group.

Wang, Q. (2009). Design and evaluation of a collaborative learning environment, C*omputers & Education, 53,* 1138–1146

York-Barr, J., Sommers, W. A., Ghere, G. S., & Montie, J. (2001). *Reflective practice to improve schools: An active guide for educators*. Thousand Oaks, CA: Corwin Press.

CHAPTER FOUR

COLLABORATIVE GROUP WORK IN AN ONLINE COURSE: METHODOLOGY, FINDINGS, AND DISCUSSION

Introduction to Methodology

Educational research should contribute not only to the body of academic scholarship, but also to the "well-being" of people involved in educational settings by improving current educational practices (Hostetler, 2005, p. 16). In the area of online education for adult learners in higher education settings, a significant part of this well-being could be achieved through helping learners have more meaningful learning experiences that fulfill their academic and professional needs. Accordingly, the role of educational technology researchers includes improving the design of online education by integrating effective pedagogical approaches with optimal technologies that support the pedagogical dimensions (Reeves, Herrington, & Oliver, 2004).

Collaborative learning, which facilitates knowledge construction and active interaction among learners, has been recognized as a powerful pedagogical approach in traditional, online, and blended learning environments (Bernard, Rojo de Rubalcava, & St-Pierre, 2000; Garrison & Vaughan, 2008; Harasim, 1990; McConnell, 2006; Roberts, 2004). Moreover, using collaborative groups in online classes opens a door to many activities that not only require deeper thinking and productive engagement, but also that cannot be implemented otherwise. For example, for learners to work on authentic tasks, collaborative group work is a common and necessary pedagogical approach (Jonassen, Lee, Yang & Laffey, 2005). As a valuable means to enable more meaningful and deeper learning in online learning environments, it is important for educational researchers and practitioners in this area to better understand the characteristics of effective online collaborative group work with the ultimate aim of designing an optimized learning environment with various strategies that amplify the probability for positive collaborative interactions among group members to occur.

The purpose of this study is to optimize adult learners' collaborative group work (and ultimately learning) in an online learning environment. How successfully group members work together is crucial to producing better quality learning outcomes and meeting learners' needs. Both personal experience and research indicate that not all groups work well together online (Roberts & McInnerney, 2007). Therefore, it is important to investigate what makes some groups successful (effective/functional/cohesive) and others unsuccessful (ineffective/dysfunctional/ incohesive), and how an online learning environment that promotes more successful group work should be designed. The overall guiding question is "How can successful collaborative group work be supported in an online learning environment?" To establish a greater in-depth understanding of how effective groupwork can be supported within an online learning environment, the following more specific questions are asked:

1. What challenges do learners encounter when they work in groups in online learning environments?
2. What are the attributes of groups working well together and what are the attributes of groups not working well together? What makes them different from each other?
3. What supports or scaffolding do learners need during the group work process?

Design Research Approach

The primary research approach selected in this study is educational design research (van den Akker, Gravemeijer, McKenney and Nieveen, 2006). This section discusses the definition, characteristics and rationale for this approach.

Design research is defined as

> a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories. (Wang & Hannafin, 2005, p. 6)

As defined by Wang and Hannafin, design research aims to accomplish the dual goals of improving the educational practice in specific local settings and developing solid design principles and theories that capture the essence and patterns of teaching and learning in local settings and can be reused and applied in other settings. In design research, researchers and practitioners collaborate intensively to identify and define problems that hinder superior educational practice and outcomes; create prototype solutions based on existing design principles, theories, and the creativity of the design researchers; and gradually test and refine both the prototype solutions and design principles (Reeves, 2006).

According to van den Akker et al. (2006), educational design research is characterized as *interventionist, iterative, process-oriented, utility-oriented, and theory-oriented*. It is interventionist as it starts from the real needs and desire of practitioners and its outcome is to fulfill these needs and help these professionals improve their practice with designed and refined innovative interventions. It is iterative because design research goes through continuous cyclic processes of design, enactment, analysis and redesign to test and refine interventions and theories (Collins, 1992; DRBC, 2003). Design research is process-oriented because those who apply it recognize that it is important to understand the context thoroughly and improve the designed interventions continuously; thus, the design and research process has to be flexible depending on the needs prompted during the implementation and research processes. Design research is utility-oriented because the planned interventions must work in real settings. Design researchers focus on and refine designs and theories according to how designs function and interact with other factors in unique contexts (DRBC, 2003). Finally, design research is theory-oriented. An intervention is developed based on initial conjectured theories the researchers investigated. This intervention is tested and improved through an implementation and research process so that

researchers can further understand how the intervention works and hopefully improves teaching and learning. This process also helps researchers reflect upon the ways developed theories capture the essence of how learning occurs and clarify how students' learning should be supported. Through multiple iterations, researchers continuously refine these theories to be sharable and reusable so that they are strongly connected with contexts and provide design knowledge and implications to practitioners. Therefore, design research begins and ends with contributions to theory.

Rationale for Chosen Approach

Identifying the goal for which a research study is conducted is critical because the research objective is highly associated with the kinds of approaches the investigation employs (Reeves, 2000). The goal a researcher pursues guides all research processes and sub-activities he or she undertakes. Reeves (2000) proposed six research goals: 1) theoretical, 2) predictive/empirical, 3) descriptive/interpretivist, 4) critical/postmodern, 5) development/design, and 6) evaluation/action. Reeves (2006) asserted that educational technology is "first and foremost a design field" (p. 61). Although research pursuing other goals can be appropriate in the field of educational technology, a study driven by a development/design goal is likely to be more "socially responsible" (Reeves, 2000, p.19) because it not only helps practitioners solve the problems affecting their educational practice, but also produces design principles that contribute to the literature and educational practice in broader settings. Although other types of research goals are commonly pursued by educational technologists, Reeves (2006) argued that research studies pursuing those goals have not had sufficient impact on educational technology practice in large part because there is a weak link between theory and practice or because the descriptive knowledge produced by the researchers does not help to enhance teaching and learning

sufficiently (Maxwell, 2004). With these concerns in mind, educational design research has been advocated as an alternative approach to traditional research (van den Akker et al., 2006) to actually improve the effectiveness, impact, and/or efficiency of real world teaching and learning.

Design research can be a powerful approach when researchers intend to:

1. explore possibilities for creating novel learning environments
2. develop theories of learning that are contextually based
3. advance and consolidate design knowledge
4. increase the educational community's capacity for educational innovation.

(DBRC, 2003, p. 8)

Like many design research studies, the goals of this study are twofold. The first is to design and refine an online learning environment to optimize adult learners' collaborative group work while they work on authentic learning tasks. The second is to develop contributing design principles and a model for supporting online collaborative group work. In other words, the goals of the research are to contribute to the creation and extension of current knowledge on online collaborative group work and to design and sustain innovative learning environments that successfully support these collaborative activities (DBRC, 2003). The primary research question addressed in this study is how online collaborative group work can be best supported, particularly when students need to learn through collaborating on authentic learning tasks. To further investigate the primary research question, the researcher aims not only to understand what is happening during online collaborative group work, but also how it should be supported in online learning environments. The best way to achieve these goals and answer the research questions is through conducting design research.

There are not sufficient research studies and design theories to guide and support online collaborative group work in authentic learning environments, compared to the theoretical constructs that support collaborative group work in face-to-face environments. Designing online

learning environments using collaborative group work and authentic learning tasks has recently received attention (cf. Herrington, Oliver, Reeves, 2010); however, the collaborative group work aspects of online authentic learning designs have not been sufficiently discussed or synthesized in the literature as a theoretical framework or as offering sufficiently usable strategies for practitioners. Design research "provides a productive perspective for theory development" (Edelson, 2002, p. 119). Through design research, researchers have opportunities to enact, test and refine theories that can serve as both a theoretical framework and course of action to provide support for adult learners' online collaborative group work on authentic learning tasks.

By its very nature, design research is necessarily conducted in naturalistic settings. Instead of merely testing the effectiveness of an intervention or isolated variables in the area of online collaborative group work, design researchers deal with multiple variables during intensive collaboration with practitioners throughout iterative cycles of design, implementation, analysis and redesign. Design researchers engage directly in educational practice and the process of its improvement (Edelson, 2002) and deal with the dynamics and realness of educational practice while designing and implementing diverse interventions (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2004). Therefore, design research helps researchers improve their understanding of how students work together online in collaborative groups, clarify difficulties they experience, and identify how students' collaborative work should be supported. Therefore, the findings from the design and research process enable educational researchers to reduce the "credibility gap" between research and practice (DBRC, 2003, p. 5).

Research Context

The chosen context for this design research was the development of a new online course focused on "Instructional Product Evaluation," a course offered by the College of Education in a

large southeastern university in the USA. One professor, also an expert evaluator, had taught this graduate level class for more than 15 years previous to the onset of this study. Students in the course are Masters and doctoral adult learner students. They come from various backgrounds in terms of age, gender, work experience, academic development, culture and ethnicity.

The course has been successful and is well known not only in the home institution, but also at other institutions. Evaluation is an important subject in the field of education; however, few schools are able to offer this course because the resources and expertise necessary to develop and offer this kind of course are limited. This particular course had not been offered online before this design research project began. Indeed, there is a paucity of online courses focused on evaluation, especially within the context of evaluating educational or instructional technologies. For several years, the professor involved in this study had received requests for an online version of the course from faculty and students around the globe unaffiliated with the host institution.

In the evaluation course's face-to-face learning environment, the primary pedagogy has always been "authentic learning tasks" (Reeves, Herrington, & Oliver, 2002). In brief, students work in small groups (2-4 students), with real clients to plan, conduct, and report on an evaluation of an interactive instructional product. During this process, group work is integral to the fulfillment of the course and project objectives. Typically, design research begins with a need or goal defined by practitioners; here, the design research project was prompted by the practitioner's desire, in this instance the course instructor, to offer his face-to-face course online. The instructor stressed the importance of ensuring the following: that the course offered in an alternative format being as effective as the face-to-face version and that it being capable of using authentic learning tasks as a primary pedagogy. To provide an equivalent quality of learning experience, the design/practitioner research team (primarily two doctoral students and the

instructor) identified supporting students' group work on their evaluation projects as a major factor in making learning experiences successful.

To understand the research context better, it is important to discuss the initial conditions with which the project started. As mentioned earlier, use of authentic learning tasks, in this instance conducting evaluation projects as professional evaluators do, is the major pedagogical approach in this class. Students have real clients who have a need for evaluation of their instructional products; they communicate with their clients, propose evaluation plans, conduct actual evaluations, and write evaluation reports based on the data they collect. Students complete three primary tasks that are assessed for their course grade: three quizzes (individual assignments), evaluation plan document (group assignment), and final evaluation report (group assignment). Additional assessment is also based on self, peer, and expert assessment of participation in the course. The course duration is 16 weeks.

In the face-to-face version of the course, two or three readings were assigned each week. During the weekly three-hour class meeting, the instructor provided at least one lecture presentation covering different topics regarding evaluation, and during most class sessions, students were asked to work on exercise activities to practice certain aspects of evaluation, such as "meeting clients" or "making ethical decisions." During each semester, students also had an opportunity to go on a field trip to a usability lab in a large city near the home institution. For the evaluation projects, the instructor recruited clients usually from the local area so that students can actually meet them face-to-face. Most of the time, students were also able to collect data in face-to-face meetings. More information regarding a version of the face-to-face course can be found at http://it.coe.uga.edu/~treeves/edit8350/index.html .

The conditions of the face-to-face course were the starting points for this design research project, which was a part of the context analysis in the exploration stage. Although the course has been successfully implemented for a long time in a face-to-face learning environment through the instructor's pedagogically and strategically careful consideration for design and implementation, moving the learning environment online required a structure containing components different from the face-to-face environment. To make this transition from one environment to the other more successful in teaching and learning, a design research team was formed. A detailed description of the design research procedure is provided in the next section.

Design Research Procedure

In design research, the design and research processes are interwoven, and they influence each other synergistically (Wang & Hannafin, 2005). Thus, this research procedure includes both design and research processes. To investigate the questions aforementioned, adapting the stages that Bannan-Ritland (2003) presented in her Integrative Learning Design model, the design research proceeded in four stages: 1) exploration, 2) enactment 3) implementation, and 4) dissemination. Figure 4.1 presents the overall process of this design research project.

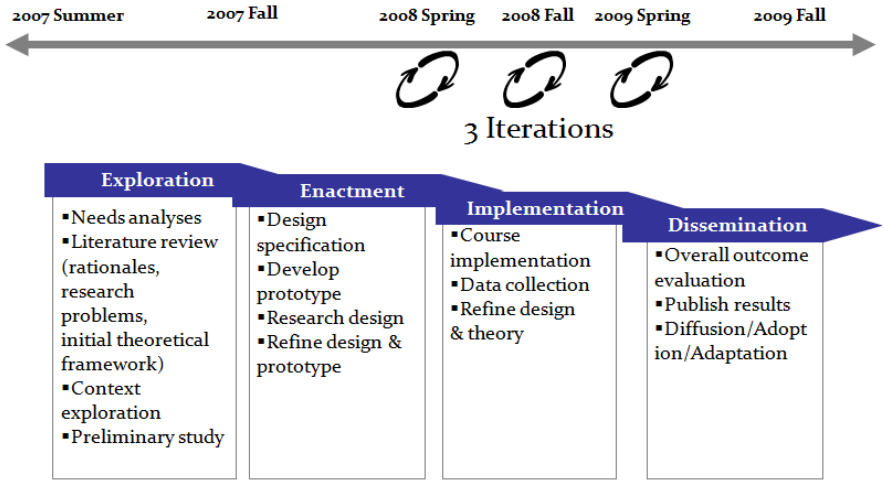


Figure 4.1. The overall process of this design research.

As illustrated in Figure 4.1, the overall project lasted for two years from summer 2007 to spring 2009. The four stages often overlapped with each other because activity in previous stages often influenced activity in later stages and proceeded in a cyclic manner. Thus, these four stages did not progress in a linear fashion.

Exploration stage (Summer 2007 - Fall 2007)

The exploration stage was from summer 2007 to fall 2007. The major activities in this stage were identifying the needs of the study and establishing a rationale for the chosen approach to designing the learning environment. To conduct the context analysis and preliminary study, the researcher participated in the Fall Semester of 2007 version of the face-to-face class as a co-instructor. By doing so, the researcher identified the overall course structure, process, learning activities, materials and related issues. In addition, the researcher carried out observations of the weekly class and group meetings, and conducted interviews with students in the class to understand their experience and incorporate their suggestions into the design of the new online course.

A needs assessment was conducted to identify the current status of online evaluation courses in higher education institutions. The design research team selected 18 institutions in North America (U.S. and Canada) and Australia whose educational technology or instructional technology programs are well-known. Then we reviewed the school websites to look for graduate level evaluation courses—either product evaluation or program evaluation courses—offered there. Next, we contacted the department heads, program coordinators, or course instructors depending on the institutions' situations. Finally we compiled and summarized the information gathered. Based on the data collected about evaluation courses provided by the

schools of education and related programs, the designers contacted the program coordinators or instructors via email to collect more detailed information pertaining to the following questions:

- What are the primary instructional strategies and learning activities used in the course?
- What are the primary assessment methods used in the course?
- Is the course offered online, hybrid (blended), or face-to-face? If the course is either online or hybrid (blended), what kinds of learning management systems (e.g., Blackboard, Moodle, Sakai) are used?
- Do you think an online graduate level course about instructional product evaluation would be of interest to students in your program or college?

In addition, syllabi of certain courses were collected when the instructors were willing to share them. All the information gathered about each school and each course was compiled using standardized tables. Background information offered by the faculty was also examined. Through careful analysis and synthesis, the designers derived preliminary findings and drew three primary conclusions: First, the need for an evaluation course focusing on instructional products clearly exists because students interested in evaluation, evaluation pertaining to instructional technology in particular, desire to develop a wide array of evaluation skills and experience for their future career. However, because of financial, instructional, logistic, and administrative limitations, this need has not been adequately met in the most of the higher education institutions contacted. Second, although evaluation courses with various concentrations were provided at multiple institutions of higher learning, few of these courses were accessible to an audience beyond the locally registered students. There is not only a lack of face-to-face evaluation courses, but there are even fewer online evaluation courses. Therefore, the provision of an online instructional

product evaluation course would be not only beneficial but also necessary in order to extend the opportunity to learners worldwide having similar interests. Third, although instructors used various instructional and learning strategies including both individual and group-based activities, use of authentic learning tasks, particularly in online learning environments, were not found. Accordingly, there is a need for design and investigation of an online instructional product evaluation course to use authentic evaluation projects and support collaborative group work for students to complete these tasks. The executive summary of the needs analysis can be found in appendix C.

While exploring the initial context and the status of evaluation courses in higher education, a literature review was conducted regarding collaborative group work, online collaborative learning, teaching evaluation, and online collaborative group work. Based on this review, the researchers came to understand the state-of-the-art of teaching evaluation courses, established the initial rationales for the importance of using collaborative group work in online learning environments, and constructed the initial theoretical framework that would guide both course design and research. Design principles to specify how to support collaborative group work and enact the design of the course were also synthesized during this process. The five principles guiding the initial design were: 1) Establish a sense of community, 2) Enhance individual motivation and engagement, 3) Maximize the benefits of collaboration, 4) Enhance individual accountability into group projects, and 5) Provide a variety of technology that everyone can use. In the enactment stage, these five initial conjectured principles were further discussed among the members of the researcher/practitioner team and transformed to the strategy level.

Enactment stage (Fall 2007 – Spring 2008)

In the enactment stage, based on the design principles and strategies derived from the literature and from students' voices from the prior study conducted in the last face-to-face course, researchers and practitioners had intensive discussions to articulate the design specifications, construct the course prototype, and design the overall research plan. Many meetings with the practitioner (instructor) were held to refine design ideas regarding ways to transform design principles and strategies into implementation by discussing and specifying the overall course structure, course schedule, learning activities, assessments, and instructional materials. We also explored potential course management systems and chose Moodle as an open source course management system, to allow students in other institutions to participate in the course without limitations. Compared to other course management systems, Moodle is well-known for its strengths in supporting students' collaboration and interaction (Cole & Foster, 2007).

We also recruited more team members who could support the technical parts of the course management system in development and implementation and who could help with the design of instructional materials such as multimedia instructional modules on selected topics (e.g., creating a survey). The prototype course design was modified through multiple meetings and tests. The instructor wrote a new version of the course textbook to make it more appropriate from evaluation practitioners' perspectives and to allow the textbook to be accessible at no charge to students. The instructor and the design researchers also selected relevant weekly readings, created pre-recorded weekly lectures, developed rubrics and assessment strategies, and discussed more specifics of the learning activities.

In addition to designing the overall course structure and learning environments and planning logistics, the design research team members also intensively discussed how students'

collaborative group work could be supported through different course requirements, learning activities, and technology tools. Based on the five design principles mentioned above, specific strategies related to each principle capable of supporting students' online collaborative group work more effectively were discussed and articulated during project meetings. These strategies specify learning activities, individual facilitation strategies for students' group work and eventual learning, and course requirements. Those design principles and related strategies are summarized in table 4.1. The first design iteration of the course was established based on these principles. In the Moodle course management system, the instructor set up e-mail, group wikis, group forums, and group chatting rooms to facilitate students' collaboration. Overall learning activities required by the course included readings, discussions, evaluation case studies, ice-breaking activities, pre-recorded PowerPoint presentations, and an evaluation project conducted by each group.

Table 4.1

Design principles and strategies used for the first iteration

Principles	Strategies
Establish a sense of community	▪ Facilitate ice breaking activities to get to know each other ▪ Share learner profile and pictures ▪ Establish culture for knowledge sharing and open communication
Enhance individual motivation and engagement	▪ Use authentic evaluation projects that have real-life relevance to students ▪ The presence of instructor and course facilitators throughout the course activities ▪ Scaffold students carefully during the project to prevent their feeling of isolation and helplessness
Maximize the benefits of collaboration	▪ Assign heterogeneous groups considering professional academic and cultural background and gender ▪ Model the optimal communication behaviors ▪ Monitor group development and group work process ▪ Facilitate group interaction

Table 4.1

Design principles and strategies used for the first iteration (continued.)

Principles	Strategies
Enhance individual accountability into group projects	▪ Use weekly reading discussion forum to help students construct sufficient content knowledge and become knowledgeable for evaluation projects ▪ Select a group leader ▪ Incorporate a variety of assessment strategies (e.g., peer, process, and self assessment) ▪ Provide means for private communication with Instructor
Provide a variety of technology that everybody can use	▪ Provide group space ▪ Provide group writing and editing tool ▪ Provide both synchronous and asynchronous tools ▪ Guide students to take advantage of the technologies in proper ways

Implementation Stage (Spring 2008 – Spring 2009)

In the implementation stage, researchers and practitioners (i.e., instructor, technical advisor, and developer) communicated and worked closely with each other while the course was being offered so that prompt interventions could be carried out when necessary. During the implementation stage, on the whole three design research activities were performed by the design researchers: course implementation, data collection, and design and theory refinement for the following iteration.

The course was implemented three times to different students over three semesters sequentially (Spring 2008, Fall 2008 and Spring 2009). The major criteria for design and implementation refinement during these three iterations were twofold: 1) the quality of students' learning outcomes such as their evaluation plans, final reports, and individual quizzes; and 2) the quality of students' group work and their level of satisfaction with their group work. (Another member of the design research team focused on enhancing the degree to which students in the

course engaged in successful self-regulated learning.) The major focus of design, implementation and refinement of design, and implementation of individual iterations are discussed in detail in each iteration section before findings are addressed.

During all three implementation iterations, data collection was conducted to refine the course design and the initial development of design principles to better support collaborative group work. Considering the learning activities chronologically, the research process can be divided into three phases: pre-group work, during-group work, and post-group work.

The pre-group work phase occurred before the groups were formed. In this phase, most of the investigation focused on students' academic and professional backgrounds, prerequisite knowledge regarding evaluation, and their previous group work experience. A students' evaluation skill inventory and a students' profile survey were used for both course implementation and research purposes. Also, the researcher invited students to participate in the research and conducted the initial interviews to get to know these students better.

The technical definition of the during-group work phase began at the point the groups were formed and continued to the time they completed the evaluation project. During this stage, students developed an evaluation plan, conducted the evaluation, and reported the results of this evaluation. Along with the ongoing monitoring of students' group work process during this stage, the team and process assessment was conducted. To identify students' progress and support their group work, interviews with individual students were conducted after their evaluation plans were submitted, which was their first group assignment. These interviews focused on characteristics and work styles of the groups, and any initial challenges encountered during the first group work.

In the post-group work phase, student artifacts such as evaluation reports, self and peer assessments, instructor feedback, and course evaluations from the course implementation were collected. After the course was finished, a third round of interviews were conducted to investigate students' overall group work experience and identify better strategies for supporting group work. Throughout the three iterations of the course, there were several meetings with the instructor; after the course, the researcher conducted a formal semi-structured interview with him. In this stage, all the data collected were used by the researchers and the instructor to make decisions about the kinds of interventions to provide and whether to introduce them in the same iteration that the data were collected or in the next iteration. Findings from these data were also used to elaborate the overall design framework of the course and the design principles to support the course.

Table 4.2.

Data collection during implementation phase.

Phase(Weeks)	Focus	Primary data collection
Pre-group work (W1-3)	Background information Prerequisite knowledge & experience	Student Profile Survey Evaluation skills inventory First student interviews
During-group work (W3-16)	Characteristics and work styles of the groups Initial challenges Initial understanding of the project and members Group work process	Evaluation plan Instructor feedback Interaction among members (i.e., E-mails, Wikis, Group forums) Team and process assessment Second student interviews (Informal) Instructor interviews
Post-group work (After W16)	Overall experience/reflection Group work process Critical factors for success Suggestions for improvement	Evaluation report Instructor feedback Interaction among members Self/Peer evaluation Third student interviews Instructor interview

Dissemination Stage (Spring 2009 -present)

The dissemination stage focused on summarizing and evaluating the overall outcome of the design research over three semesters in terms of its contribution to practice. This stage also involved distribution through articles and conference papers on the theoretical framework, design, results of the study, and reflection. In addition to resolution of issues in the local context, an important aspect of design research is its scalability within a broader context. By sharing the processes and outcomes of the project through publications and presentations, we began to realize the goal of contributing to the online group work literature and practice, especially in the domain of evaluation education. For the broader context beyond the domain, information from the project can be useful for those who design and teach online courses using authentic, complex learning tasks and collaborative groups in graduate school settings.

Role of the researcher

As is common in many design research projects (Bannan-Ritland, 2003; van den Akker, 1999), I played dual roles of researcher and designer. In the fall semester of 2007, I supported the instructor and students as a co-instructor. As researcher, I collected data for the development of the online course. From spring semester 2008 to 2009, during the three iterations, I functioned as course facilitator, designer, and researcher with another doctoral student, who also carried out the same roles as I did but was interested in a different area of research, self regulation. As course facilitator, I was involved by interacting with students via different tools including e-mail, Google groups, and Skype, and by monitoring their participation in the course using a Moodle student activity report and their weekly postings. I also sent out announcements, and posted learning materials and resources. Working as a course facilitator helped me in my role as researcher to establish rapport with the students, observe the overall learning process more

easily, and "develop an insider view of what is happening, the emic perspective" (Patton, 2002, p. 268).

Approach to Research Design

Design research is not a single research method on its own; rather, it is a paradigm or genre for exploring and answering research questions (Kelly, 2006). The techniques and methods for design research have not yet been well established (Joseph, 2004), and design researchers typically incorporate multiple data collection methods borrowed from multiple research traditions, depending on the goals of the research project and its needs during the research process (Edelson, 2002; Wang & Hannafin, 2005). Design research is quite open-ended in its nature and requires researchers to be flexible in the process of selecting data collection methods and even in asking research questions from iteration to iteration. However, it is important to discuss the research tradition and methodology within which this particular study is grounded, especially in relationship to the specific research goal and questions. This discussion should clarify why certain data collection and analysis methods were used in this study.

Case Study

With the focus on group work, the case study approach was nested within the overall design research study. According to Yin (2006), case study is a relevant empirical inquiry used when reseachers want "to examine, in depth, a 'case' within its 'real-life' context" (p. 111). Merriam (1998) also defined a qualitative case study as "an intensive, holistic description and analysis of a single instance, phenomenon, or social unit" (p. 21). Case study is the most appropriate choice when the purpose of the research has a "descriptive or explanatory" nature for "understanding of people and events" (Yin, 2006, p. 112). In education, case studies deal with

"specific issues and problems of learning practice" that can be identified and explained (Merriam, 1998, p. 34).

The case study method was applied in this design research project for several reasons. First, case study is a suitable design when a researcher is particularly interested in understanding the process and asks "why" and "how" types of questions (Merriam, 1998). In this study, the ultimate goal of the project is to design an optimal learning environment to support students' online collaborative group work in the context of teaching evaluation. However, to reach the development goal, understanding students' challenges and their group work process is critical. Understanding how they work and why certain groups work well and others do not work well are important parts of this project to enable the design researcher to support students better in their group work. In terms of the nature of the research problem and the questions asked by the researcher, adopting case study as the fundamental research method was logically sound.

Second, case study in education is useful when a researcher is interested in investigating educational innovation (Merriam, 1998). Even though the purpose of case study is not to improve the educational practice in general, case study allows a researcher to deeply investigate and understand a case in real-life situations, and results of case studies typically provide a rich description of a complex phenomenon, presenting readers with many insights as they might try to understand the phenomenon, possibly seek to improve similar educational processes and outcomes, and perhaps conduct further research in the area.

Third, the characteristics of case study—*particularistic, descriptive and heuristic* (Merriam, 1998, p. 29)—sync up well with the characteristics of design research. Both case study and design research study particular and specific situations or phenomena. As the focus of a case study is a case, design research's focus is a specific educational problem in a specific local

setting. Design researchers intend to produce contextual knowledge through their research. In addition, case study provides rich, vivid and thick descriptions of their investigation as a part of its research outcomes, and this provides the information to guide the iterative design and redesign efforts required for successful design research. The heuristic aspect is important in both case study and design research in education because findings in these approaches when applied to educational innovation should present knowledge – such as what happened, why it happened, what worked or failed, and what alternatives should be chosen – and help readers extend their understanding and augment the prospective applicability to their situations (Merriam, 1998). Finally, case study generally allows flexibility in selection of methods.

The case in this study can be defined as adult learners' collaborative group work in an online evaluation course. By examining what really happens when adult learners work online as a group to accomplish authentic evaluation projects, how they work together, and what creates challenges and problems, the researcher aimed to identify and design a better and more supportive learning environment for these learners' collaboration.

Participants and Recruiting Procedures

In case study, typically the method by which participants are purposefully recruited is especially critical to examining the case. In this study, the context was given because the project originated from the needs of the practitioner; thus, there were limitations for selecting participants within the course during the three iterations. To investigate the group work process, students who enrolled and worked in groups and the instructor who supported the group work process and assessed the students' learning outcome were the primary potential research participants. At the beginning of each course iteration, an invitation email describing the purpose of the project and the kinds of activities research participants would need to do was sent to

students. Data were only collected from students who showed an interest in participating. The recruitment letter is in Appendix D. Over the three iterations, 33 students took the course, and 23 of these students agreed to participate in the study. For each of the iterations, detailed information about participants based on the students' profile survey and evaluation skill inventory survey are described in the findings section.

Data Collection Methods

In this study, data were collected using four primary methods: 1) interviews, 2) surveys, 3) archival data, and 4) online observations (see Table 4.3). By using and analyzing multiple data sources, the researcher tried to achieve a thorough understanding of students' collaborative group work process when they worked on evaluation projects online.

Table 4.3.

Data collection methods and sources for all three iterations.

Data Collection Methods	Data sources	Iteration One	Iteration Two	Iteration Three
Interviews	Students: Pre-group work	√√√	√√√	√√√
	Students: During- group work	√√√	√√√	√√√
	Students: Post- group work	√√√	√√√	√√√
	Instructor: Informal conversational meetings	√√√	√√√	√√√
	Instructor: formal, after semester	√√√	√√√	√√√
Surveys	Evaluation Skills Inventory	√√	√√	√√
	Student Profile Survey	√√	√√	√√
	Assessment of Team and Process	√√	√√	
	Peer and Self evaluation	√√	√√	√√
	Course evaluation		√√	√√
Archival data	Individual Quiz Results		√√	√√
	Evaluation Plan and Feedback	√√	√√	√√
	Evaluation Report and Feedback	√√	√√	√√
	Course materials	√	√	√
Observations	Weekly discussion	√	√	√
	Group meetings			√
	E-mails	√	√	√
	Wiki	√	√	√
	Group Work Forum	√	√	√

√√√: Major data sources
√√: Secondary data sources
√: Supplementary data sources
Empty cell: No use of data collection methods

The alignment of research questions and methods is illustrated in Table 4.4.

Table 4.4

Alignment between research questions and data collection methods.

Research Questions	Interviews	Surveys	Artifacts	Observations
1. What challenges do learners encounter when they work in groups in online learning environments?	√√√	√√	√√	√
2. What are the attributes of groups working well together and what are the attributes of groups not working well together? What makes them different from each other?	√√√	√√	√	√
3. What supports or scaffolding do learners need during the group work process?	√√√	√√	√√	√

√√√: Major data sources
√√: Secondary data sources
√: Supplementary data sources

Figure 4.2 depicts the overall research process for each semester.

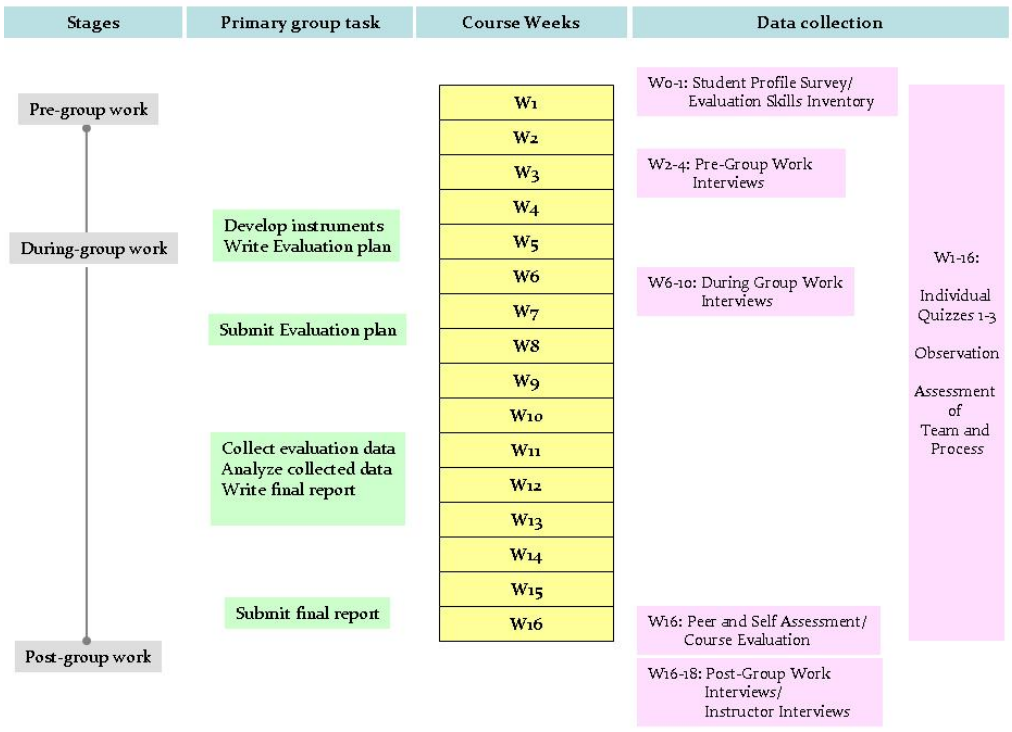


Figure 4.2. Overview of research process.

Interviews. For all iterations, in-depth qualitative interviews were conducted with both the students and the instructor. Regarding the student interviews, except for the first iteration, three interviews were conducted for each iteration: one at the beginning of the semester, one after his or her group submitted its evaluation plan, and one after all participants finished all coursework. For the initial iteration, the first interview was conducted after evaluation plans were submitted, and it included the information asked at the beginning of the semester as well as the questions asked after submitting the evaluation plans during the other two iterations. The second interview in the first iteration was conducted after all participants had finished the coursework.

The purpose of the student interviews was to understand their satisfaction, engagement, work process, and challenges in their group work experience, and to obtain their suggestions for improvement of the design and implementation. The interviews were semi-structured. However, due to the nature of the semi-structured interview protocol, the researcher was flexible in her explorations (Patton, 2002). The interview protocols used for each iteration can be found in Appendix E. Student interviews were conducted through three different media, depending on student preference: Skype chat, telephone, or in-person (in case of students at the home institution). Most interviews were conducted via Skype using the voice chat option because many students took the course at a distance, and some students at the home institution preferred to have online interviews. When interviews were conducted, two interviewers—both who are design researchers with research interests in different areas: group work and self-regulation—were present for all interviews except those carried out via telephone. After one interviewer finished an interview, the other asked the interview questions related to her research interest. All the interviews were recorded using a digital recorder and transcribed using an MS word

application. In-person interviews were conducted in the office space shared by the two design researchers. Phone interviews were conducted at each researcher's home, and these conversations were also recorded using a digital recorder. These in-depth interviews on student participant perspectives were critical and primary resources for refining the course design and associated design theories.

The interviews with the instructor, who was the practitioner and major collaborator in this project, were primarily of two kinds. First, "informal conversational interview[s]" (Patton, 2002, p.342) were conducted in individual or project meetings. The informal conversational interviews were frequently carried out with flexibility in terms of time, place, duration and topic. During these interviews, the practitioner and the design researcher discussed design or implementation decisions as the course was implemented. The second type was a formal semi-structured interview using "the interview guide" (Patton, 2002, p.343). This formal interview with the instructor was conducted every iteration after the semester ended. The interviews were conducted in his office with the two primary design researchers present. The interviews were recorded using a digital recorder and transcribed with an MS office word application. During the interview, the researcher asked the instructor for his reflections on the course and students' performance, and his suggestions for promoting students' group work for the following iteration. Table 4.5 summarizes the interviews conducted for this study.

Table 4.5.

Interview schedule and focus.

Interviews	Schedule and focus
Interview 1: Pre-group work phase	Before the group formation (Week 2~4) ▪ Background information ▪ Previous group work experience ▪ Preference for group learning vs. individual learning ▪ Typical roles/preference during the group work
Interview 2: During-group work phase	After submission of the evaluation plan (flexible, depending on clients' situation, but mostly Week 6~10) ▪ Initial understanding of the project ▪ Perception about the group members ▪ Challenges encountered ▪ Reflection on the initial group work process ▪ Any necessary support from the instructor
Interview 3: Post-group work phase	After submission of evaluation report (After Week 16) ▪ Overall reaction to the entire group work experience (e.g., satisfaction, productivity, engagement) ▪ Overall challenges encountered (i.e., culture, decision making, negotiation) ▪ Perception about learning gains through group work ▪ Factors for (un)successful group work ▪ Suggestions for design and implementation improvement (i.e., strategies, resources, instructor)
Formal Interview with the Instructor	After the semester (After Week 16, after final grading finished) ▪ Personal beliefs and perspective about collaborative group work ▪ Overall reflection on the course and students' learning process including group work ▪ Reflection on facilitation strategies ▪ Suggestions for design refinement

Surveys

Multiple survey instruments were employed throughout the course. All the surveys were conducted using Survey Monkey (http://www.surveymonkey.com). The surveys were administrated to collect data relevant to the research questions; however these surveys served additional purposes. First, the surveys were used for course implementation purposes. For

example, the Evaluation Skills Inventory and Student Profile Surveys were needed to understand the characteristics of individual students in terms of their backgrounds, preferences, and prior knowledge. Second, some surveys served as assessment tools for students. For instance, the Peer and Self assessment was not only used for collecting data to identify group work process, but also for students to assess their own and others' contributions to and in their group work process. Third, surveys were used for facilitating group work. For instance, an assessment of each team and its process was conducted during the second iteration to identify students' group work progress and their perceptions about their group. More specific details regarding the surveys conducted are outlined in Table 4.6. The survey instruments include brief open-ended, rating, and multiple choice questions. These multiple surveys were designed in a way to triangulate with interview data. Appendix F includes these survey instruments.

Table 4.6.

Survey data.

Survey data	Schedule and focus
Evaluation Skills Inventory	▪ Prior to the course ▪ To identify students' evaluation related skills
Student Profile Survey	▪ Prior to the course ▪ To identify students' personal and professional backgrounds and to gather information for forming groups
Assessment of Team and Process	▪ One time upon needs, usually between evaluation plan writing and evaluation report writing processes ▪ To monitor the group work process and dynamics, and to identify challenges encountered
Peer and self assessment	▪ After submission of evaluation report ▪ To identify the contribution of each group member and to increase each individual's commitment to group work ▪ To identify students' overall reflection on the group work experience and individual perceptions regarding his or her contribution to the group work

Table 4.6.

Survey data. (continued.)

Survey data	Schedule and focus
Course evaluation	▪ After submission of evaluation report ▪ To identify students' overall satisfaction and thoughts about learning activities, material, instructor, assignment, and so on

Archival data

Archival data were collected throughout the implementation of the three iterations. It consisted of the instructor's course materials and messages, student group artifacts such as evaluation plans and reports, and individual students' quiz results. Table 4.7 outlines the archival data and their specific focus in this design research.

Table 4.7

Archival data.

Archival data	Sources and focus
Instructor's course materials and messages	▪ Syllabus, rubrics, readings, resources, and instructor e-mails and announcement to students, feedback on project ▪ Evidence of the evolution of the design and implementation of the course over three semesters
Student evaluation plan and report	▪ Evaluation plan and evaluation report. ▪ Evidence of the quality of group project outcomes
Student individual quizzes	▪ Evidence of the quality of individual student learning about evaluation

Observations

Observation of online class activities and students' online group work process is not easy. In this study, observation data were not the primary data sources since it was not a synchronous course. Also, each group had different ways of interactions that they preferred to use. For instance, some groups preferred an email exchange, and others prefer to use a group forum. In

addition, not every student agreed to participate. In this situation, using observation data as the primary source is not realistic since the researcher cannot follow all the interactions that will occur 24/7 in multiple locations. However, observation data can be used for supplementary data to give the researcher and the instructor suggestions regarding how individual students are committed to the course and their group work, how these groups work and what kinds of support and facilitation are needed in each group. Examples of these observation data are students' interaction in weekly discussions, Group Forum, Emails, Wiki, Google Docs, and Skype group meetings. Overall observation data were particularly helpful information when conducting interviews and analyzing surveys, archival data and interview data by validating and supplementing those data (see Table 4.8).

Table 4.8.

Observation data.

Observation data	Sources and focus
Student interaction	▪ Messages in group forum, e-mails, group Wikis, Google docs, and Skype meetings, weekly discussion ▪ Evidence of individual student participation level, group work process and member interaction within groups

Data Analysis

As a variety of data was collected from multiple sources, the amount of data was massive, and the data analysis process was very complicated, requiring intensive and collaborative efforts among researchers. For analysis, four tools were used: MS Word, MS Excel, Survey Monkey and NVivo 8.0. Interviews were transcribed in MS word and transferred to NVivo. Survey results were first organized in Survey Monkey using the data analysis function, and downloaded and managed using MS Excel. Archival data and observation data were managed in MS Word.

Since one purpose of this design research is eventually to establish substantive design principles for online collaborative group work, most qualitative data were analyzed using techniques borrowed from grounded theory perspectives (Charmaz, 1998; Glaser & Strauss, 1967; Merriam, 1998; Strauss & Corbin, 1998). More specific procedures are the following. First, I transferred all files to NVivo and saved them under three different project names: Iteration One, Iteration Two, and Iteration Three. Second, within each project category, files were organized in folders such as first interviews, second interviews, third interviews, instructor interviews, surveys, assessment, and so forth. Third, I analyzed one first interview with open coding (Corbin & Strauss, 2008). Those initial open or thematic codings were first saved in Free Node in NVivo. While I was reviewing and coding the interview, I also opened survey results and the learning outcomes generated by participants and, for triangulation purposes, made comparisons between participants' comments with their response in those surveys. Then, I revised the code names if necessary. While I was analyzing and coding the interview, I also used the Annotation function in NVivo to write memos within each interview file. Those memos were written to record insights and thoughts during the analysis that could help when writing findings, and to record related incidents during class and interaction observations or comments from other participants' interviews. Fourth, after completing open coding of one interview, I revisited all the generated codes, categorized them, and organized them under higher categories according to the research questions. During this process, I created Tree Nodes and relocated all the tentative codes saved in Free Nodes. During this process, if there was redundancy among generated codes, some codes were combined. Within the Tree Node function, while refining codes, a hierarchy was created. Fifth, I began working on the first interview of another person in the same group by repeating the process in steps three and four. Once I finished with all participants in one group, I

analyzed the interview data and then moved on to participants in the second group so that I could more easily compare each group members' experiences and opinions. By repeating this process, themes emerged from the generated open codes. I grouped codes considering their characteristics, combined them if there were much overlap or redundancy and organized the hierarchies of codes. Sixth, after completing the first interviews of the first iteration, I moved to the second set of interviews sets in the first iteration and repeated the process. At the end of analysis in each iteration, major categories and sub-categories were inductively derived as they emerged, according to the research questions. These findings were used to refine course design along with implementation and design principles in the subsequent iterations.

Establishing trustworthiness of data

To ensure the validity and reliability of findings, different strategies were used. First, for the purpose of triangulation, multiple methods were used to collect data from several sources (McKenney, Nieveenm & van den Akker, 2006; Merriam & Associates, 2002; Patton, 2002). In addition to my activities, two peer researchers were involved in the entire project. As noted earlier, one of these researchers collected data and examined the course in reference to her interests in self-regulated learning. Many survey instruments were co-developed, and interviews were conducted with both these two researchers were present. Results were also shared among the researchers and with the instructor. Second, the researchers' engagement in the study and observations of the research context was long-term (Lincoln & Guba, 1985; Merriam, 1998), continuing from the project's inception through the three iterations of implementation and observation. Even though different students enrolled in the course, prolonged engagement in research and design gave researchers opportunities to understand the research context more deeply by examining it from different angles. Third, the researcher strove to remain aware of the

potential effects of her biases and reflections upon her perspectives and positions as a researcher, and how her assumptions, cultural backgrounds, and experiences influenced her process and decision making throughout the research process (Merriam, 1998; Merriam & Associate, 2002) The next section explicitly presents her perspectives about learning, theoretical assumptions, and personal experiences and background that may have influenced her interpretation of the data and her actions taken during various research and design activities.

In design research, the applicability, or scalability (a concept similar to external validity in traditional research), of the results and implications to other situations is important. To enhance adaptability, or so-called "ecological validity" (Gravemeijer & Cobb, 2006, p.44), of the refined intervention and theories based on the findings from the data, it is critical to have a "thick description of what happened in the design experiment" (p. 45), including the context, participant information, design process, decisions made during the research process, data collection and analyses, and results (McKenney et al., 2006). The many documents generated to assist with the data analysis and writing process of this research included the following: a needs assessment, the course material, meeting notes with the instructor, and design notes. Also, the researcher tried to provide a detailed description of the research setting, design and implementation processes and specification, findings of the case studied, and the design principles generated so that the intervention and theories can be applied to other online product or program evaluation courses and, more broadly, graduate level online courses utilizing complex ill-structured authentic learning tasks and group work approaches.

Researcher's Perspective

As a researcher, I would like to identify myself in relation to three categories: my personal background influences on my perspectives, expertise and experience influences on my area of research interests, and beliefs about learning that influence my interpretation of learning.

I am a Korean who had 16 years of education in the Korean educational system but who has lived in the U. S. as an international student for the past eight years. English is my second language. I clearly understand the academic and non-academic challenges that international students encounter when they study in U. S. institutions. I am sensitive to diverse cultures and aware of how culture can influence one's thinking, learning and language. I am a doctoral candidate in Instructional Technology at the same U.S. university at which the course is offered. As a doctoral student, relatively speaking I am a novice researcher who is learning about how to conduct meaningful research.

I am an instructional technologist who believes in the importance of and great need for online learning environments. Regarding online learning environments, I have acquired a variety of experiences, first in my country and now in the U.S., through playing different roles such as student, instructional designer, developer, and instructor. Additionally, for the past 13 years I have also had diverse collaborative learning experiences in face-to-face and online environments. I am aware that learning at a distance can be much more challenging than instructors and designers expect it to be, and online learning can be a totally different experience for learners compared to their experiences in face-to-face learning environments.

My beliefs on learning have a sociocultural perspective, and I have a pragmatic outlook on learning. I believe that people can learn best when they engage in authentic learning activities as they collaborate with other people. When I examine how learning occurs, I tend to focus on discourse and interaction among participants rather than test results or project outcomes. I have

studied many subjects through authentic projects using a collaborative group work approach. I have experienced and come to understand that students can encounter challenges during group work or collaborative learning even though my learning has benefited from this setting and these activities. While I have much experience with and interests in online learning environments and collaboration, I do not have the experience of a student in online group work.

The Story of the First Iteration

Design and implementation of the First Iteration

The primary pedagogy of the online course throughout all the iterations was the same as in the face-to-face courses offered for the past 15 years, which makes use of authentic learning tasks (Herrington et al., 2010). Students have real clients who have a need for evaluation of their e-learning programs, and students work together with their group members to design an evaluation, carry out the plan, and write a report for their clients.

The first iteration of the course implementation was from February to May 2008. In total, eleven students were in the class. In terms of location, they were from six institutions in four different countries—USA, South Africa, Australia, and New Zealand. Considering their nationalities, they represented a total of six home countries, when Lithuania and Cyprus are added. Since it was the first iteration of the online course implementation, the design research team did not make a public announcement about the course. The instructor sent emails to colleagues at several institutions who had been asking for development of an online version. These students did not pay for the course; however, a majority of them enrolled and took the course as an independent study in their home institution. There were five doctoral and five Masters students, and one student not enrolled in any formal program. Together, there were three male and eight female students.

The overall focus of the first iteration was the following. First, as an initial trial, it was mostly formative in nature in its design and implementation. The course was not yet opened completely to the public, so the recruitment of students was deliberately limited in consideration of its formativeness. Based on design principles and associated strategies synthesized from the literature, the designers and the instructor developed learning activities, resources, and an overall structure, and set up tools in Moodle so that learners not only learned substantially about evaluation, but they also collaborated effectively and easily with each other during the project. The major design concern during the design and implementation was whether the enacted design and planned implementation would work. Second, the instructor was very interested in students' multicultural collaboration. Student teams were assigned based on heterogeneity factors such as cultural, national, and professional backgrounds.

In consideration of the students in Australia and New Zealand, whose semester did not start in January, the course began in February with the instructor teaching the course as an "overload" beyond his normal course assignment. The course had a 14 week plan. Because students were from different institutions and countries to which the instructor did not have direct access or control and the students all had different reasons and motivations for taking the course, the level of student participation varied. After a few weeks, the instructor checked the Moodle-generated student activity report and overall participation in weekly discussions. Three students out of eleven showed very little participation or engagement, and the instructor asked them to take the course the next semester if they were too busy to actively participate. The eight remaining students were assigned to two groups based on the heterogeneity of their profile information. Each group was assigned with work with clients located in the USA.

The course was delivered primarily in an asynchronous manner. Each week, students had readings and a pre-recorded PowerPoint lecture to study individually. They were encouraged to actively participate in the weekly readings forum regarding their reflections on and questions about the readings. As a group, they were asked to work together to communicate with clients, write evaluation plans, develop evaluation instruments for collecting data, analyze the collected data, and write evaluation reports for their clients. Assessment of student work was based on their evaluation plans, final evaluation reports, and participation (both individual and group work). For students to learn and work together in groups, both synchronous and asynchronous tools were provided. Each group had the following tools: Groupwork Forum to support asynchronous discussion; Groupwork Chatting room to support synchronous discussion; and Group Wiki to support collaborative writing for their evaluation plan and report. The instructor played the roles of expert evaluator, facilitator, and mentor, and helped students initiate their relationship with their clients. The instructor communicated with them through email, the course news forum, and weekly reading forums. The sample syllabus is attached in Appendix G. Figure 4.3 shows the Moodle page through which the course was offered.

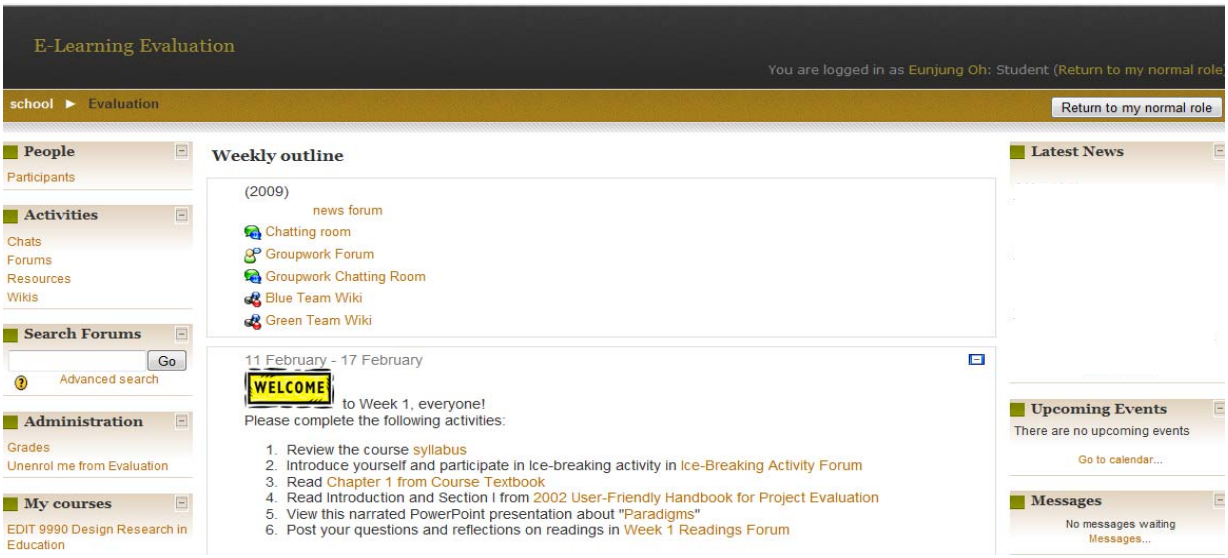


Figure 4.3. Course design version 1.0.

Findings of the First Iteration (Spring 2008)

Participant Profiles. Five of the eight students agreed to participate in the study. They were from three institutions in three countries, but by nationality they represent four different countries. Two students were international students in the country in which their institution was located. Regarding their academic backgrounds, there were two Masters and two doctoral students, and one student not enrolled in a program but who held a graduate degree and was a staff member at a university offering online degree programs. Two doctoral students were full-time students; the other three had full-time jobs engaged in online teaching and learning. In general, participants initially had a positive attitude toward online courses and online group work, thought they had a fairly high level of technology skill, and showed self-confidence and motivation. Based on the Students Profile Survey, information on the five participants is summarized below in Table 4.9. Group and individual names shown in the table are pseudonyms.

Table 4.9.

P*articipant profiles (First iteration).*

Groups	Name	Gender	Age	Work/Institution Location (Country)	Self - Reported				
					# of online classes taken previously	Level of Technology Skills	Previous Online Group work Experience	Level of Motivation and Long-term Goals	Level of Self-Confidence
A	Maddy	F	46-60	Australia	4	Expert (9/10)	Yes (Positive:7/10)	High (Application on the job)	High(8/10)
	Jennifer	F	46-60	U. S. A	None, but some online teaching experience	Almost Expert (7/10)	None	High (Application on the job)	Very High (9/10)
B	Ivan	M	26-35	Australia-Cyprus (Cyprus)	9	Expert (9/10)	Yes (Very Positive: 10/10)	High (Learning)	Very High (10/10)
	Laura	F	36-45	U.S.A (Lithuania)	4	Almost Expert (8/10)	Yes (Positive:7/10)	High (Learning)	High(7/10)
	Amy	F	46-60	Australia	2 taken, 3 taught	Almost Expert (7/10)	Yes (Very Positive: 9/10)	High (Application on the job)	High(7/10)

Q1. What challenges do learners encounter when they work in groups in online learning environments?

During the first iteration, learners encountered many challenges. These included communication related issues, technology related factors, lack of sense of community and belongingness, differences in motivation, expectations, and accordingly, accountability, overly optimistic expectations regarding students' self directness and autonomy, and lack of leadership or ineffective leadership within groups.

Communication *related issues.* Learners in both groups identified communication as the greatest challenge. Evidence of communication problems was clear not only from observations of students' interactions via e-mails and the course website, but also from participant interviews. Several reasons for the communication problems were identified: 1) differences in time zones, 2) tool affordance and choices, 3) major events in personal lives, 4) culture and language.

As seen in Table 4.9, students were attending institutions in various countries. Working with team members in different time zones presented significant challenges that hindered active communication among learners. Although students were assigned to groups based on the heterogeneity of their backgrounds including education levels, gender, culture, and so on, differences in time zones meant they worked together mostly using asynchronous tools. Therefore, communicating with group members, the instructor, and the clients was often delayed; this frequently resulted in miscommunications. Amy expressed that what she liked least about this course was dealing with time zone differences. She had three members in her group. One person had to leave the course for some weeks for personal reasons, and the time zones of the two other members were much more compatible with each other than with her. She felt isolated and sometimes became tired of waiting for the other students to communicate with her.

> Yeah. It was…fine with me. But I think it was exasperated by the fact that I felt that they were all matched close-up. Because when I looked at their times, they were within, say, four hours of each other whereas I had fourteen or fifteen hours difference.
>
> Ah…I think it's the time differences. And fitting, it was very hard to fit back in and not do the work somebody had already done because I was doing it in their tomorrow. …..[group members who are] Vaguely in my time zone. It would have helped a little because then, we could have split the tasks a little and worked on it, you know. And some people in this time zone and some people in this time zone and then switch and then see you know, what the others have done. But that couldn't work. So I would wake up in the morning and see 15 emails all sent at 1am, 2am, 3am, 4am and I think, why didn't I stay up? (Laughing) So then, the next night, I'd stay up until 1am, 2am, and nobody would get online and I'd think, why did I stay up? (Amy, second interview).
>
> …So, the time zone thing is really challenging…. It is a real that the time zone thing is the biggest problem. It's a bigger problem than the technology…..(Jennifer, first interview).

It was difficult for the students working in different time zones and having only asynchronous communication. Even though Moodle provided a chatting tool, it offered only text chat and, considering the time differences, it was too difficult for students to coordinate synchronous meetings. In one group, despite their time differences, students had to use synchronous tools such as the telephone and Skype to clarify communication and make some progress because there were continuous miscommunications and communication delays. Using these tools eased their communication and work somewhat; however, they made only a few attempts and they could not use those tools as frequently as they wanted.

> ….We had a few phone calls as well. When got us really stuck because of language interpretation… maybe cultural interpretation….Maybe cultural interpretation, I don't know. But we would get stuck. So then, we would ring up. And that sort of helped to be, because you could talk about it a bit more easily…...(Amy, second interview).
>
> We tried to divide and share what we are going to do…..we also discussed the elements that we had to include in each section….and we are going to do them…. Yeah… that was to clarify each section (Ivan, first interview).

There were additional challenges regarding tools. Even though the course provided a variety of tools, the technological affordances were sometimes not ideal to facilitate group work.

For example, even though a Wiki was provided for collaborative writing purposes, it had some usability issues and did not function sufficiently well to support collaborative writing. Some students were not accustomed to using a Wiki and never seemed to become comfortable with it. The Wiki itself also presented its own technical problems during group work. As a result, the Wiki ended up as a final outcomes (i.e., evaluation plan and report) presentation tool for communicating with their clients rather than a collaborative workspace as intended.

One choice both groups made was to use their personal emails as a major tool for working outside the Moodle system. The Group Work forum was initially provided for both groups; however, neither group used it. During the interviews, students stated that they did not use it because clients had access to the tool and they did not want their clients to see their work process. Also, from the beginning of the course much interaction among participants was generated via email because the students were dispersed at different locations. Moreover, the e-mail tool on the course website did not provide internal e-mails. Participants could send e-mails from the website; however, those messages were sent directly to students' personal e-mails.

Using e-mail certainly allowed easy access since most participants were working full- or part-time. However, some students found that using personal e-mail as a primary tool was problematic as they had no centralized place for transparent and public communication; thus, it was hard for them to keep track of the work history, manage file versions, and avoid unintentionally excluding some group members. For instance, the school for one of the students (one who did not participate in the research) changed its e-mail address structure in the middle of the course. Even though the student let her group know her new address, she missed quite a lot of her group's messages because they mistakenly kept sending e-mails to her old address.

Meanwhile, it was stressful for her team members to wait for her responses because she did not know that e-mail messages were going to her old address.

Other significant factors that contributed to chaotic communication were major life events such as the illness and death of family members or friends, moves to another country, and natural disasters that seven of nine participants, including the instructor, experienced during the course. Under those uncontrollable circumstances, participants had to leave the course for weeks, thereby causing communication breakdowns and imbalanced work loads among group members. Except for one student who dropped out in the middle of the group work, all other students rejoined their group; however, it was still not easy for fellow group members to assume a greater workload without knowing when the missing member would return. For example, Jennifer suffered throughout half the semester as a result of her mother's illness and death.

> …. it was almost impossible, I mean, I don't know what her, why her phone line, you know, wouldn't let me get on and it was a difficult situation because I was there to obviously to help and to take care of my mom and I felt like, if I could do work at my sister's home while I was there, that's one thing. But I wasn't, I didn't feel free to go off to like Starbucks or Panera that has free internet access….And I wasn't in the situation where I could go off and do that because I was in Buffalo to take care of my mom. So I couldn't leave her. I mean, that wasn't the point of my being there. And the phone line was ridiculous. But I just couldn't, you know, I wasn't only just concerned with the course but my own work at work. And I wasn't able to check email because it would timeout before the phone line would... Oh, it was a mess. Anyway, yea, I was up there five times in the last two months (Jennifer, first interview)

Students who left temporarily had to struggle to reestablish their motivation in the course and catch up on what they had missed after they returned. Amy experienced the most difficulty because she had to deal with three deaths: a friend, her father, and the sudden suicide of another friend. In each circumstance, she had to leave, but she returned every time. She acknowledged her struggle to get back into the group when she returned from her absences.

> I came back and then pulled away from the course again and then came back again. Maybe I was still grieving. I don't know but I found it very difficult to fit back into the

> team. I couldn't make out what they were doing. And I didn't feel that I had any guidance to know…and maybe because people are tip toeing around because I was grieving. I don't know why. Anyway, I found it extremely difficult but once we got back into it, it has been Ok. (Amy, first interview).

Maddy was the leader of group A. During most of the group work process, she acted almost alone in taking care of the project because she did not have her group members to work with. Despite one member's temporary disappearance and eventual withdrawal from the course—for reasons she did not know— Maddy still seemed to make progress. However, she didn't like it when her group members were not responsive because, for her, responsiveness among group members was the most critical factor of successful group work.

> …I guess, I really wasn't concerned because I thought, I'm just going to jump in and do it. I mean, I can't know what's going on…..... And I guess that was, there's a certain point where there have been points throughout the session when I have thought, "Where is everybody?" (Maddy, first interview).

> Well, when people weren't responsive…You wonder, is something going with? You know, that sort of thing (Maddy, second interview).

> Definitely that responsiveness (Maddy, second interview).

> Towards the second half of the project, I felt as if I was on my own. But I had a great Client. The client and plenty of support from the instructor and his team, so I kept on (Maddy, comment from the self-evaluation)

Even though students' lack of participation and their absences were neither intentional nor planned, difficulties in communication and lack of opportunities for social interaction and collaboration were compounded by these challenges.

Culture and language as a significant part of group culture also sometimes contributed challenges during the group work. In Group A, all the members used English as either their mother tongue or at least as the language commonly used in their countries. During the interviews, they mentioned that they did not experience any cultural challenges. However, in group B, language and culture were often issues students had to deal with.

> I think that [cultural issue] caused…loss of learning time because we were busy trying to work out what each other meant. ….Even though we were using the right words, we didn't mean the same things. So I think that there was a loss of learning time while we struggled to realize, oh that is what you mean. Yes, it's what I mean. Then we could move on. And that happens…lots. (Amy, second interview)

> In general, yes, although she harshly reacted to [group leader]'s email when he mixed up group members' responsibilities….After her harsh email to [group leader]. She wrote nicer email and tried to keep good relationship (Laura, comments from peer-evaluation, the "show respects for viewpoints and feelings of others" and "willing to negotiate when disagreements or conflicts in group arise" question)

> I think there were a number of times it felt the team got stuck. I use that expression because I sort of didn't know where to go from there. And some suggestions would be made and there would be misinterpretation….general misinterpretation... And I think it was just a cultural thing…..Perplexed would be a better word than uncomfortable. I sure had to move that point, so you just try a different angle of approach. (Amy, second interview)

> But I think because we were all wanting to finish this subject that sort of helped overcome any, like we didn't stay stuck. It helped overcome it because we knew we had to get to the end. But I do think it's an extraordinary cost because there was so much happening to each of the people in it. That wasn't related to the learning. So, you had to overcome that. And then overcome the cultural and then do the learning. (Amy, second interview)

Even though students tried to solve misinterpretations of language directly through phone calls or Skype, it certainly added to their work in communicating at the same time they were dealing with many other challenges to completing the project.

Technology related factors. For students in some countries, technology itself was a challenge. Students from two countries lacked sufficient access to the Internet to adequately collaborate with their team members.

> I must mention that, for this course there were many emails to read and respond and many files to download and upload. However, as my internet connection is not good (I am connected with wireless (?) 512MB but the backbone of the country is not good) I had to spend hours just to open an email and reply (Ivan, comment from self evaluation)

There were also frequent power outages in one country. Their team members acknowledged that the students with limited access were not able to take part as much as they

would have desired. Thus, these students' participation was neither consistent nor sufficient compared to that of other group members. In addition, lack of participation due to technical issues also contributed to the communication breakdowns. For example, one student participant from outside the U.S. also had an unstable access to the Internet. During our Skype data collection interviews with this participant, the researchers and the participant had to call each other more than 10 times because the connection kept breaking during the conversation. Even having one person dealing with such technical issues during group work can put the entire group at a disadvantage regarding communication.

Lack of sense of community and belongingness. A sense of community was not strong in either team, even though the instructor provided ice-breaking activities for them to get to know each other. To attempt to build team rapport at the beginning of the semester, they were also encouraged to share pictures and brief learner profiles. Students also interacted with each other in the weekly whole class discussion forums. Overall, a sense of community and belongingness was lacking, most likely stemming from the communication issues. Students did not seem to get to know each other very well, certainly not to the degree the instructor desired not to the degree found in the previous face-to-face versions of the course.

When participants were asked about the work of their group members, some did not have a clear understanding of what other team members had done during the group activities. Group work communication was neither transparent nor well–managed. Several students experienced major events in their personal lives, but informed their group members of these problems. However, one female student from group A began to be invisible at some point without telling either her group members or the instructor. Since she was not that responsive in the course, none

of her group members remembered the point at which she became invisible, why she had disappeared, or how much and what she had contributed to the project before she left.

As discussed above, due to the time differences some students also experienced a degree of isolation, including a sense of working alone; they also had a difficult time rejoining the group and catching up with their work. Amy in group B, who experienced three deaths among her family and friends yet came back each time, had a hard time fitting in when she returned. There was little support when she returned; it was she who patiently kept trying to reconnect with her group via emails.

> How to find a way to be part of the group….Well I'm battling a time difference and a language barrier and a period of time unfortunately, it happened at a significant time in the course and I was absent so just finding my way back into the group and working out what they were working on. I found significantly difficult. And I didn't feel that I had any way of. There was nobody I could ask to assist me back in.
>
> I just kept plugging at it until one of them replied…(Amy, First interview)

Unrealistically high expectations of students' self directness and autonomy. The instructor initially had high expectations that these adult learners would be self-directed, self-motivated, and autonomous in their learning and project work. This assumption was made, not only because these students were adults but also because they were highly motivated to seek out and take a course not offered by their institution. Although these adult learners typically exhibit the above characteristics, the course could possibly have benefited from explicit guidance and a more structured schedule. For instance, learning tasks were designed based on the principles of authentic learning. From the instructor's perspective, in the real world deadlines for evaluation projects are determined through negotiation between evaluators and clients. Therefore, to promote greater authenticity during the course the instructor required no clear deadlines; however, this "authentic" strategy confused students and elicited some anxiety.

> More often and having more like divided deadline divided and clear deadline. (Jennifer, first interview).

> Because here, we expect everything from our lecturers to say everything step-by-step to do, what to do, what we are required to do. So, for a course like this, you have not given us any deadline dates….. This never happened in Cyprus. It never happens (Ivan, first interview).

> Just some boundaries. It felt to me too open-ended…..So, the project could have gone on for another two years….Need deadline, and you know, more structure (Amy, second interview).

> Yeah… that's maybe articulating that straight up. Your process has to evolve as you work with the client, but we would anticipate x weeks to do this, x weeks to this, x weeks to do that…(Maddy, first interview).

Differences in motivation, expectations, and accordingly, accountability. Although students reported they had at least a fairly high level of motivation, actual motivation, time commitment, expectations regarding quality, and accountability concerning the group work and the course differed among group members. These differences often created challenges within groups, especially for the more motivated and more engaged members.

> It is hard to tell about his learning. Lots of time he would try to use other examples or materials instead of thinking about our case (Laura, comment from peer-evaluation "Accepts responsibility for own learning")

Students were from different institutions, and not all were necessarily under their professors' direct monitoring. In the middle of the course, just two weeks after the group work began, one non-participant student informed everyone that she was getting married and would leave for a month for her honeymoon. She was not reachable at all during this time, and her group members had to take on her workload. She later returned and rejoined work on the project, but her contribution was not significant when compared with her group members.

Some students were not enrolled in degree programs and registered for their own benefit such as professional development. One non-participant dropped out without any notification to

the instructor or group members. Since she was not responsive to subsequent e-mails, no one knew what had happened. Her sudden disappearance caused her group to wait for her responses without knowing reasons for her absence; they finally stopped trying to work with her.

Lack of leadership or ineffective leadership. Once the groups were formed, the instructor requested each one to select a leader. Group A easily determined their leader because the chosen person seemed to be a natural leader to the team members. She was dedicated to the task and very prompt in responding to communications and making progress. However, although she was very committed, she was not good at facilitating the group process and delegating the work. She tended to be a productive person who needed to begin work and move ahead very promptly rather than being a good leader who facilitated the work process through managing communication and encouraging group members. However, the reasons for her working that way were not sufficiently clear. She was the only one who did not have a major personal event during the semester and therefore could focus completely on the course work. One of her group members dropped out, one had limited Internet access, and another had to deal with a family emergency. In addition, the manner in which she led the group was not openly discussed among the group at any time during the semester because members were absent for some periods and therefore could not afford the time to discuss such issues within the constraints of the semester calendar. During the interview, one participant in this group expressed her struggle with this concern. She also mentioned that what she liked least about this group work experience was that the work load was not equitably distributed.

> ….I felt a little bad about it because [name] took on too much of it. And with my mom's situation, I really wasn't in a position to contribute very much more than I did. So I feel guilty… is how I felt…..It should be, delegating may not be the right word but it should have been more of a distribution… who's going to do what…

> …[name] kept plowing ahead which I think, we all appreciated and I appreciated it in the circumstances I was in, but it wasn't as a powerful example of work group of, how group work can accomplish, what group work can accomplish. I guess. I'm very pleased with the end result. I don't mean that it's just that, it's not we can't claim and I, honestly claim that we all participated equally at all.
>
> ….probably that there wasn't more of a distribution of the work loads…… I think [name] is probably that kind of person who would who just needs to make sure that things are going to get done, so she'll take it on, I mean, that's just a guess. But I think that is likely to be the case. She did, I mean, she did say several, well.. she did say, "Will someone be able to do this or someone be able to that?" So, you know she certainly put things out there as work that needed to get done. And I'm not sure how you really do that. I'm not sure. I'm probably, I'm probably pretty good at delegating myself, but I couldn't put into words how, how you accomplish that (Jennifer, first interview).

Group B spent several days discussing leadership without making a decision because no one actually wanted to be the leader. A leader was finally selected, even though that person was somewhat reluctant. There was a very active and dedicated female student in Group B; however, she lacked self-confidence and did not want to serve as the leader. An interesting occurrence was that, because the clients and the female student were in the same country and shared the same time zone, the leader asked the female student to become the contact person between the group and their clients, a task that was actually the leader's responsibility. Accordingly, this second student performed most of the leader's roles because she was very active and her engagement was outstanding. However, she did not feel comfortable facilitating the process, and as an international student she also lacked confidence communicating in English. She shared her frustration and hesitation about taking on leadership roles when she did not think of herself as a leader. The leader sometimes became upset, and the manner in which he communicated these feelings made other group members uncomfortable.

Generally speaking, in group B, there was no clear leadership. Even though a leader had been selected and sometimes delegated the workload among group members, another acted as the day-to-day leader. In fact, the male leader and the female student were the major actors

carrying out the group work process throughout the semester. Both of them shared with the researchers their difficulties in working with each other in such an awkward situation; however, they did not share their concerns with each other. These two individuals came from two distinctly different cultures, which may have also contributed to the poor communication.

Table 4.10.

Summary of challenges groups encountered (First iteration).

Challenges
Communication related issues ▪ Working in different time zones ▪ Tool affordance and choices ▪ Major events in personal lives ▪ Culture and language
Technology related factors
Lack of sense of community and belongingness
Differences in motivation
Expectations and accordingly accountability
Overly optimistic expectations regarding students' self directness and autonomy
Lack of leadership or ineffective leadership within groups

Q2. What are the attributes of groups working well together and what are the attributes of groups not working well together? What makes them different from each other?

Even though the instructor and the clients were both satisfied with the final project outcomes and the students were satisfied with the level of productivity, considering the many uncontrollable circumstances and challenges, both groups neither collaborated nor functioned ideally. There was evidence of ineffectiveness and mal-functioning in both. These attributes were observable by the researcher and the instructor and shared by participants through interviews and

surveys. The following are the attributes that these ineffective, disfuctional groups exhibited: 1) Lack of interaction and unclear communication, 2) Inappropriate use of tools, 3) Poor management, 4) Free-riders, 5) Lack of understanding of others and their contributions, and 6) Low quality on deliverables.

Lack of interaction, and unclear communication. Due to issues such as time zones, technical problems, and personal concerns, a lack of interaction and unclear communication were observed in both groups, even though their interaction and communication styles were different. In Group A, the leader did most of the work, and there was no substantive discussion of how to conduct the evaluation project and write the evaluation plan and report. As cited in the interview data above, the lack of responsiveness from group members was the most significant issue in this group inhibiting their making progress. There was not, of course, a sufficient level of collaboration that could adequately influence all the members' knowledge construction regarding the e-learning evaluation. Most communication occurred between the leader and the instructor or the leader and the clients.

In Group B, for the most part, two students collaborated and the contributions of the other two members' were somewhat limited. As discussed earlier, due to language and technology barriers and cultural differences, there were times when interaction was not simple between these two students and among the whole group. Despite these challenges, interaction and communication were fairly active between these two members even though it was not ideal. These two active group members tried their best to make progress by taking most of the burden onto their shoulders, but consequently these two became stressed by the lack of interaction with the other two members and the consequent workload they had to carry.

> Without [group member], our team may have failed….She was also willing to take part in voluntary basis at every activity that was needed to be done which I didn't see with the

> other members of the team. The only weakness that can be talked about her is her language. Sometimes it was difficult to understand what she was writing about but it didn't cause any major problems (Amy, comment from peer evaluation)

The other two members became more engaged later in the project once they returned. Toward the end of the term, when all four members were working together, even then the group did not communicate well with each other. By adding more time differences in the group, they experienced delayed and unclear communication. Accordingly, interaction in this group was not sufficiently substantial to discuss the content of their evaluation project. Mostly, their discussions were limited to determining how to divide the work, clarify their division, and review each other's work. Their work seemed more cooperative than collaborative. In addition, there were at least two instances in which they struggled because of language and culture misinterpretations.

Although differences in reasons for and patterns of work existed, both groups lacked sufficient interaction and clear communication, especially among the members who contributed more and those who contributed less. Because of the medium they used, their communication was often not timely and resulted in delays in making decisions and progressing.

Inappropriate use of tools. Technology tools are important for making progress and communicating with each other in online group work. Through technology, the process of group work should be transparently shared by group members and all group members should be able to access the history of their work whenever they wish. Therefore, it is important to use open tools and a centralized group work space such as a group forum where everyone including the instructor can see the process. In these two groups, for the most part, students used personal emails for communication, depending upon convenience in access, which is important for these adult learners. However, both groups failed to establish a clear communication and document management system using their emails. In addition, most members had personal challenges in

their lives and there were times they could not interact with their group members. Moreover, the project required constant and sometimes intensive communication and interaction among group members. If their communications were not well-organized and managed, as in this case, using personal emails as a primary communication tool could result in communication and management problems. Concerns about the way the groups used tools were more evident in Group B. Laura was particularly concerned about keeping track of their communication and really wanted to use a group space instead of personal e-mails.

> And I really would like… I [would be] much more comfortable in discussion space….I think it opens more and challenges more because everybody sees that. And they can email….. Not everybody cares those emails and then we Skyped in some part of decision, from some part of challenges. And not everybody can see… and [it] is not convenient and …..I didn't like email because…it is very hard to find the letter. I use gmail and sometimes it is …very funny and it's so painful to go and even ……. [name] email me when we started working on this decision. He ….emailed me [asking] all the letters of client which means that even he has hard time to find in his email. (Laura, first interview)

However, once they had become accustomed to the tools they were using, it was not easy for them to switch tools in the midst of their work. Another member in group B, who during the first interview stated she had not experienced problems with using e-mail, during the final interview expressed regrets about using it.

> It could have been, could have been much better for us. Because, look who turned the write-up, uh, the headings in, into that discussion board……We could get done something much better. Uh, but sometimes, we had…like 10 emails with the same subject name but in different, it consisted of different knowledge or information. And sometimes I had 10 emails from the same person in the same day. And to answer all of them and, you know, respond to all the emails, it was really, really, eh, bad experience. I'd say. (Smiles) And it's something to experience, but not, not a very pleasing experience (Ivan, second interview).

In an online course using authentic tasks, it may not be easy or realistic to specify exactly which tools groups must use because students have preferences for and familiarity with different tools. However, it is important for students to know the kinds of tool options they have, the

strengths and weaknesses of each, and the ways individual groups should organize and manage their communication, depending on their unique situations.

Poor management. In both groups, the overall group work process was poorly managed. As mentioned earlier, leadership in both groups was not ideal. Mostly, the leaders were not good at delegating workloads and managing the work process. Poor management was not solely the fault of the leaders, and all group members were responsible for these factors, particularly during this first iteration. Due to insufficient communication and a lack of delegated workloads, Group A did not really work together. The leader did most of the tasks even though other members contributed to the project as much as possible when they could. Overall, the group members, including the leader, were not clearly aware of what parts each group member had contributed. In the case of Group B, even though the students worked together, they were not good at meeting deadlines. Indeed, they took two weeks beyond the due date to finish the work. One participant from Group B described their groupwork process as "not organized and chaotic." As cited in the interview data, sometimes two people worked on the same part of the document at the same time. In addition, they did not meet internal deadlines they had assigned each other. They all had difficulties in their lives (e.g., natural disaster, family emergency, health) during the semester, but ignoring or not meeting dealines became a habitual pattern for them; thus, they did not deliver the outcome on time.

Free-riders. Some students became free-riders because of their personal lives. Even though there were degrees of severity in their individual situations, most students experienced difficult personal events that forced them to disappear for a while. When students had to leave and deal with outside factors, their group members understood their unequal contributions and the unfair and imbalanced workload. They seemed to believe that none of their group members

were intentional free-riders. However, it was not easy for the people who were left to complete the tasks since the project workload was initially designed for four people. Group A was almost a single member work group and Group B was almost a pair work group, neither of which were environments that could promote and take advantage of true collaboration during groupwork. For members who had to leave, coming back, catching up with the work, and fitting into the group were not easy processes, either. It seemed difficult for both: the people still working and those leaving and returning.

> As in much team work, the contributions are not balanced (Anonymous comment from Process and Team Work evaluation)

Lack of understanding of contributions of others. This problem was more obvious in Group A. People did not recall who had contributed to which aspects of the evaluation project, other than what they personally had done. Each person had some sense that other members had contributed, but none were aware of exactly what that contribution was. This phenomenon may have resulted from the lack of interaction and unclear communication. Also, it indicates that their group work was not even at the level of a division of the workload, therefore excluding true collaboration.

Low quality on initial deliverables. One pedagogical strategy the instructor used was to provide students with a formative assessment to improve the quality of their learning outcome. In both groups, students submitted their evaluation plans and developed instruments and evaluation reports before they shared them with their clients or used them for the evaluation project. According to the instructor, the quality of their draft documents submitted for formative feedback were not satisfactory. Considering all the challenges they experienced and all the attributes they had as groups, it was not a surprising result. The instructor advised them and gave

them opportunities to improve the documents and final drafts so that the materials submitted to the clients were satisfactory to both the instructor and the clients.

Table 4.11.

Summary of attributes of these ineffective, disfuctional groups (First iteration).

Negative Indicators
Lack of interaction and unclear communication
Inappropriate use of tools
Poor management
Free-riders
Lack of understanding of others and their contributions
Low quality on deliverables

Q3. What supports or scaffolding do learners need during the group work process?

To overcome the challenges students encountered and help them become more functional, collaborative groups and to experience more substantial learning through group work and projects, the following supports or scaffoldings appeared to be needed for improving future iterations of the course: 1) model appropriate communication styles and methods, 2) encourage student autonomy, yet provide sufficient course structure and specific guidelines, 3) enhance the sense of community and belongingness, 4) provide new, enhanced tools and guidelines for technology use for group work, 5) facilitate students' learning about evaluation , 6) assign groups with careful consideration of particular students' heterogeneous characteristics, and 7) share instructor's expectations for performance.

Model appropriate communication styles and methods. As discussed earlier, communication was the major issue in the semester. A number of students mentioned that they would have liked to improve communication within their group.

I think communicate better. Communicate better. (Laura, first interview)

I would recommend a better way of communication. (Ivan, second interview)

Different communication tools, approaches. (Maddy, second interview)

To augment communication among group members, several strategies can be considered. The instructor and course facilitators could subtly model communication methods in ways that facilitate online communication and appropriate tool use within groups. For example, the instructor could use more open and commonly shared tools for his announcements instead of e-mails to all students so that students naturally learn appropriate group communication styles. If the instructor can add more frequent check-ins with students along with the weekly announcements, students will perhaps more actively and frequently interact with each other. Communicating with students using different tools may help them easily learn when particular tools can be optimally used for their group work. Adding weekly discussion activities within the class can help them increase the quantity and quality of their cognitive and social interaction.

Encourage student autonomy, yet provide sufficient course structure and specific guidelines. Student autonomy is important for adult learners and collaborative learning contexts. In addition, considering the nature of the authenticity of learning tasks, encouraging students to take ownership of and learn to be flexible in the project process, including the timelines, is important. Although students sincerely appreciated the way the instructor provided formative and summative feedback on their middle and final learning outcomes, in addition to promptly sharing his opinions on their questions, they still felt they needed more guidance and structure in their

group work process. For learners who are novice evaluators, more course structure and specific guidelines, such as smaller sub-deadlines for evaluation sub-tasks, more explicit information on how to work as a group of evaluators and how to communicate within a group at distance, can provide more opportunities for learning how to conduct evaluation projects.

> …More like boundaries. "Let's make it limited to 15 pages." Or, I don't know. Some boundary….Some boundary for the depth of analysis that wanted us to go to…. (Amy, second interview).

> That's, um, maybe articulating that straight up you're, your process has to evolve as you work with the client but we would anticipate x weeks to do this, x weeks to this, x weeks to do that. (Maddy, first interview)

Students also mentioned more frequent check-in points with the instructor, such as frequent group work progress checks.

> ….Maybe a weekly, um, weekly summary of activity and maybe if a group leader or someone within a group took that on and said, write, just keeping things on track. You know, this is what we did last week. This is what we're gonna do next week. So somebody that, perhaps somebody that's tracking progress? Somebody keeping things on track… (Maddy, second interview).

The participants often felt lost because of working at a distance without the physical presence of the instructor and other group members and dealing with communication issues. It will be important in the following iteration to have structures that guide groups in a timely manner, depending on each group's situation, as they work on projects throughout the semester.

Enhance the sense of community and belongingness. Even though there were ice-breaking activities at the beginning of the term and students worked together for an entire semester, interviews with participants revealed that they did not establish a sense of community or belongingness within the group. Since for various reasons communication was the greatest challenge for many of them, group members did not know much about each other and did not have sufficient opportunities to establish strong bonds.

> I don't know that much. We introduced ourselves to each other very early on. With the ice breaking activity. Uh, [group member 1] really has a lot of very professional and constructive things to say. [group member 2] as well like I was saying he just I don't think he is able to contribute as much as he'd like to. And uh like I say I don't really know a whole lot about them. (Maddy, first interview)

> And then at the very end of getting that evaluation plan up there was quite a bit of contribution that was made to it. And I'm even a bit unsure about where some of it came from but I was pleased that it was there……(Maddy, first interview)

> And I didn't feel that I had any way of, there was nobody I could ask to assist me back in. (Amy, first interview)

Adult learners have personal lives that require time and attention. Major life events can happen to any adult learner enrolled in a class. The important issue is not whether they have to disappear in the midst of group work, but whether they can rejoin and contribute to their groups. Encouragement and condolences from the people they are supposed to work with will help them return to their normal lives. Constant support from their group members and the instructor are needed not only when they are away, but also once they return. Having ice-breaking activities or activities to establish a social presence throughout the semester would be helpful.

Encouraging student interaction and establishing a cognitive presence will also help them. For instance, having course discussions in greater quality and quantity will increase interaction with and among students. Allowing students to see other groups' progress may help them overcome feelings of isolation and insecurity. Looking at their peer groups' work would be helpful for them to determine whether they are on the right track. Even encouraging students to share their difficulties across groups may help them see that the problems their group is having are not occurring just with them, thus possibly strengthening their sense of belongingness.

Provide new, enhanced tools and guidelines for technology use for group work. Adult learners have diverse backgrounds and their experience and competency with technology are at different levels. Even though all the participants had online learning or teaching experience, most

of our participants were not familiar with using a Wiki for online group work, and the Wiki was not used in a way that could enhance collaboration.

> Maybe I could figure out more things with Wiki….[if] the professor give[s] an example what other people did with Wiki…[it will] save us time. It doesn't mean that we will use the in the same way….Some limitation little bit made me more reserved with Wiki and time [was] not enough and then because two of us, [name] [was] ready to email….it's ok because only two of us…..But for some reason I didn't notice at the beginning that we have discussion space in the Moodle (Laura, second interview).

> Well, I think I will say using technology successfully. I mean, of course, I think that I'm using the technology successfully. But I didn't have experience in using Moodle and um, and Wiki….And probably asking people to use Wiki beforehand and or if you can just put some more information on how Wiki works and how people can track the changes that are made. I think it will make life easier for them (Ivan, second interview).

Some students were new to Moodle, the learning management system used. Providing more specific orientation to the technology available in the course would help provide students with better ideas about what is available and which tools are most effective for various learning activities.

Facilitate students' learning about evaluation. The instructor's formative feedback on evaluation plans and report drafts revealed that students' initial learning outcomes needed significant revision. Based on the instructor's comments and suggestions, they were able to complete their final evaluation plans and reports with good quality. In addition to the aforementioned scaffoldings, providing more resources such as more evaluation cases, templates, and multimedia tutorials, individual quizzes can help students learn about evaluation. Also, upgrading the pre-recorded PPT lectures and developing content on additional topics will also assist students to learn about evaluation.

Assign groups with careful consideration of particular students' heterogeneous characteristics. When assigning groups, the instructor was interested in how students in different countries and from diverse cultures worked together. Therefore, students were deliberately

assigned to groups using cultural and educational backgrounds as major criteria. However, working in different time zones presented students with several challenges that were hard to overcome.

> I think, like I said earlier, I think if I had felt that there was somebody else on the team, say, New Zealand, or in Hong Kong, or vaguely, vaguely in my time zone. It would have helped a little. Because then, we could have split the tasks a little and worked on it, you know. And some people in this time zone and some people in this time zone and then switch and then see you know, what the others have done. But that couldn't work (Amy, second interview).

Because the course targets an international audience, avoiding issues with time zones would be difficult in future iterations. However, assigning students to groups by considering their time zones will help students collaborate more easily and communicate and interact in a more timely manner.

Share instructor's expectations for performance. Students showed various levels of commitment to the course during the semester and some students had to be asked to drop out. Differences in student motivation and commitment are pretty common in any university course; however, this particular case was more extreme because all the students were from different universities from around the world. Therefore, the instructor did not have administrative control over them, even though he communicated with their advisors. Based on interviews with the student participants and the instructor, the expectations of the instructor needed to have been more explicit. It would be helpful for students in future iterations if the instructor shared expectations for factors such as clear boundaries of the project outcomes, student commitment in the course, the roles of leaders, and the importance of collaboration.

Table 4.12.

Summary of supports and scaffoldings for the students (First iteration).

Identified supports and scaffoldings
Model appropriate communication styles and methods
Encourage students' autonomy, yet provide sufficient course structure and specific guidelines
Enhance the sense of community and belongingness
Provide new, enhanced tools and guidelines for technology use for group work
Facilitate students' learning about evaluation
Assign groups with careful consideration of particular students' heterogeneous characteristics
Share instructor's expectations for performance

Discussion: Refinement of course design and design principles for the second iteration

As mentioned earlier, as the first version of this online course this first iteration had a formative nature, and several areas for improvement were identified. The following five design principles were used for the first iteration: 1) establish a sense of community, 2) enhance individual motivation and engagement, 3) maximize the benefits of collaboration, 4) enhance individual accountability in group projects, and 5) provide a variety of technology that everyone could use. Based on the findings, the course design and design principles were revisited and refined.

As noted, the major concerns for the first iteration were the problems that precipitated and resulted in ineffective and inactive communication. In collaborative learning environments in which students need to establish a common ground, students can have difficulty in communication on four levels: "contact (indicating they are willing and able to continue the interaction), perception (indicating they are willing and able to perceive the message),

understanding (indicating they are willing and able to understand the message) and attitudinal reaction (indicating they are willing and able to react and respond, accept or reject the message)" (Paulus, 2009, p. 229) (cf. Baker, Hansen, Joiner, & Traum, 1999). In online environments in which students do not know or see their group members and the instructor, it may be unrealistic to anticipate these adult learners would naturally know how to communicate with each other actively and work together effectively and efficiently to learn the essence of evaluation and complete the project.

Design Principle One: Facilitate communication. It is important to facilitate communication among students in groups and across the whole class. The goal of facilitating communication is to establish a sense of presence so that communication and interaction among students can be more active. According to Tu and McIssac (2002), social presence can be defined as "the degree of awareness of another person in an interaction and the consequent appreciation of an interpersonal relationship" (p. 133) and it is "necessary to enhance and foster online social interaction" (p. 146). Russo and Campbell (2004) studied students' perceptions of mediated presence and discovered that frequency of interaction, participant's responsiveness, and the way participants talk influence how presence is established. Also, social presence can be described through two concepts: immediacy and intimacy (Tu & McIssac, 2002).

Specific strategies to facilitate communication in this course are the following. First, it is important to provide in various ways strong instructor and facilitator presence from the beginning and throughout the semester. During the first iteration, the instructor and facilitators were prompt in responding students' questions and providing feedback on their group work outcomes. However, more strategies can be used. For instance, the instructor can send out weekly announcements to remind and encourage weekly activities and student engagement.

Facilitating weekly discussions can also improve communication. Inviting students to individual meetings with the instructor or encouraging their questions can help them have a greater sense of instructor presence despite the physical distance. Second, efforts to enhance the quality and quantity of course discussions can also help facilitate communication. Although there was a discussion forum, course discussion was not a part of the requirements. By having weekly discussions as a requirement, a sense of immediacy of online communication and expectation of interactivity perhaps can be enhanced among students. Once social presence is established as a whole group, it might be easier to elicit immediacy of online interaction within groups. Also, the established social presence will positively influence online interactions (Tu & McIssac, 2002). Third, modeling optimal communication behaviors, styles and methods is important. Adult learners still need guidance because many of them are new to online learning environments, online communication, or group work with different tools, or are unaware of optimal communication methods among their group members. Many studies on online learning suggest that explicit facilitation of online groups is important for guiding students to effectively learn and work together online (Paulus, 2009). In addition to frequent instructor presence and facilitation of discussion and modeling of optimal communication in online environments and in professional evaluation project settings, students can easily learn how to communicate with each other in other contexts. Four, a fundamental method that must be considered is assigning groups with consideration of time zones. The response time in online groups is a critical factor to the online interaction because when one group member does not respond promptly enough to establish common ground and move the project forward, other group members, in particular the sender, perceive less social presence (Tu & McIssac, 2002)

Design Principle Two: Establish strong sense of community and help students have sense of belongingness to their groups and to the class. Findings revealed that students in the first iteration did not have a strong sense of community or belongingness to their groups because, within their groups and in the class as a whole, there was a lack of opportunity to have social interactions. Group members do not need to become friends to work together; however, there should be a sufficient sense of belongingness to the group and the class to establish common ground and eventually achieve common goals. Kreijn and Kirschner (2004) claimed that for computer supported collaborative learning to be successful, social interaction among participants is a prerequisite. However, Kreijns, Kirschner and Jochems (2002; 2003) argued that social interaction fails to occur in distributed learning groups (DLGs) in CSCL environments because instructors tend to 1) *take social interaction for granted* and 2) *restrict social interaction to cognitive processes.* In DLGs, group members predominantly communicate using texts and do not have much opportunity to interact outside of the classroom or during a break in class sessions as students in face-to-face classes usually do. Even though recent cutting edge tools provide greater affordances for communication than ever before, most communication in this class had to be asynchronous because of multiple time zones. In addition, for students to interact with each other, a social (psychological) dimension—that is, socio-emotional aspects influencing social interaction is important (Kreijns, Kirschner, & Jochems, 2002; 2003). Although social and psychological processes can be initiated and developed in primarily cognitive tasks, non-task contexts can foster the process of constructing communities by positively influencing the building of an affective structure (Kreijns, Kirschner, & Jochems, 2003). That is, to establish a sense of community, students need to build a kind of affective structure through such processes as acquaintance, impression formation, and interpersonal attraction to promote social

relationships. Social relationships contribute to mutual trust, a spirit of collaboration, belongingness, group cohesion, and a sense of community. Since online learners tend to experience a greater sense of disconnection and anonymity and feel less individuality and the personalities of others, it is important to design diverse—both task and non-task—opportunities and contexts for them to interact with each other and encourage social relationships. In the same vein, Tu and McIssac (2002) claimed, in their study to understand students' perception of social presence, that social context (e.g., task orientation, privacy, topics, and social relationships), online communication (e.g., communication anxiety, computer expertise), and interaction (e.g., immediate feedback) are three critical dimensions to establish a sense of community.

The specific strategies for the second iteration are the following. First, have strategies to form impressions of co-members and promote the development of social relationships. For example, have learners share their personal profiles and pictures so that each other's presence becomes more than virtual. Impression formation can be achieved through participating in carefully designed ice-breaking activities. Second, provide social spaces and contexts throughout the semester. For instance, weekly discussion forums for weekly readings discussion and general thought sharing can be useful for students to improve their in-course social relationships, social presence, and sense of community. It is also important to encourage students to respond actively to each other's postings to maintain a strong sense of social presence. In addition, the use of the group forum as a private group space needs to be encouraged so that each group can feel that they have a virtual space that they own in common and in which they can see other members' contributions and their group's progress. Third, establish a culture of knowledge sharing and open communication. The instructor and facilitators can initiate this at the beginning of the semester through their active participation and strong presence, along with assessment strategies,

to emphasize the importance of communication and participation. Also, the instructor and facilitators can openly encourage a culture of knowledge sharing and open communication in their own messages and responses to students' discussion postings so that students feel comfortable in sharing. By doing so, students can be naturally aware of the importance of engagement in active and open interaction.

Design Principle Three: Provide a variety of technology everyone can use. Technology is a critical means to enabling communication and collaboration in online groups. Haythronthwaite and her colleagues (2000) recommend that it is important to provide multiple modes of communication to support students' needs to engage in cognitive and social interactions and develop a community of learners at a distance. Online collaborative groups function through technology in Computer-Mediated Communication Learning (CMCL) environments, and it is important for them to learn how to use different online CMC technologies to fulfill their needs (Paulus, 2009).

Based on the findings in the first iteration, specific strategies include the following. First, provide group spaces and encourage their use. During the first iteration, the major tool for communication was personal student email, which was convenient for access but not ideal for organized and transparent group work. It would be important that the instructor and the facilitators not only provide group spaces such as a group work forum, chat, and wiki, but also encourage their using them. Second, there should be group writing and editing tools. When writing reports in online groups, students tend to divide the whole piece, write individual portions, then exchange and combine what they wrote. Therefore, much collaborative interaction—interactivity and negotiation influencing other group members' cognitive process and the group's common outcome (Dillenbourg, 1999)—occurs before and after they write their

own portions. Group members should discuss their ideas regarding the evaluation plan and report before they divide up the task or begin to write. Also they should share their ideas and opinions during the feedback process after they have shared their writing. At the group level, tools to support group writing and editing are critical for collaborative learning and work. Third, provide both synchronous and asynchronous tools. For the first iteration, due to the significant time differences among group members, it was hard to coordinate synchronous group meetings. However, it is clear that students sometimes needed and wanted communication via synchronous tools despite time differences. The literature also claims that interactions in collaborative learning imply synchronicity (Dillenbourg, 1999). It is important to provide both types of tools for different types of and purposes for communication. Fourth, provide overt guidance for students to take advantage of the tools in proper ways. The proficiency in technology of the students was all at different levels. Although most students had online learning experiences and had worked full-time using different technologies, they could have used more explicit guidance and orientation regarding the kinds of tools available and useful for their group work.

Design *Principle Four: Maximize the opportunities of collaboration and scaffold group work process.* Collaboration is a "coordinate, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (Roschelle & Teasley 1995, p.70). In addition, collaborative learning is neither a learning mechanism nor a prescriptive method to elicit learning. Rather, collaborative learning "describe[s] a situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms, but there is no guarantee that the expected interactions will actually occur" (Dillenbourg ,1999, p.7). Thus, for group members to collaboratively learn and work on their

evaluation projects, it is important to maximize the opportunities for collaboration and to scaffold the group work process.

Specific strategies are the following. First, assign heterogeneous groups by considering factors such as time zones, online learning and online group work experience, technology proficiency, and educational background. The literature often discusses the importance of heterogeneity when forming groups to maximize student collaboration. However, what is important is which heterogeneous student characteristics that instructors, particularly those teaching online, need to consider. In the first iteration, because the instructor was interested in the multicultural aspect of student collaboration, students were assigned based on factors such as culture, nationality, gender, and educational background. However, to maximize students' online group work, it would be important to assign students to groups by considering their experiences related to online learning, online group work, technology proficiency, and educational background. In addition, it is important to assign group members who are more nearly in the same time zone to prevent delayed communication and enable synchronous communication when needed. Second, have each group select a group leader and provide guidance regarding the role of leader. The leader roles are important because the team leaders manage the workflow and clarify communications during the project. The process of selecting a leader and leadership styles were not ideal during the first iteration. While leaders' roles are important, there is a need to guide students about the characteristics of those who should be a leader and what a leader's responsibilities are. Third, monitor group development and dynamics and check in with the groups frequently regarding their work process throughout the semester. Groups do not automatically establish trust and identity, and maintain a positive dynamic because they are assigned into one group that needs to work toward one goal. It is important for the instructor and

the facilitators to continuously monitor how students work in their groups and identify their challenges. Checking in with groups frequently is important for preventing their feeling lost and for letting them know that the instructor and facilitators are always available to help.

Design *Principle Five: Enhance individual motivation, accountability and engagement for active participation in group work.* The goals of collaborative group work in this course are successful completion of the evaluation project and substantial learning about evaluation during the process. Learning about evaluation can be achieved individually if not collaboratively; yet, the project must be completed collaboratively. Therefore, individual contribution to collaboration is important. In this sense, individual student motivation and engagement in the group work process is important. The first iteration showed different levels of motivation among students and this condition caused different kinds of challenges within groups. Individual student accountability is also an important factor that influences collaboration (Hathorn and Ingram, 2002). Diverse motivation results in different levels of sense of accountability; additionally, there can be potential conflicts between students who have a high sense of accountability and make greater contribution and students who have a moderate or low sense of accountability and produce less contribution. For the second iteration, it will be useful to use strategies to influence both the intrinsic and extrinsic motivation of students.

Specific strategies are the following. First, use authentic evaluation projects that have real-life relevance to students. As a primary pedagogy in the course, this strategy should consistently be used in the second iteration. Perceptions regarding the relevance of a learning task are important for students' intrinsic motivation. Second, incorporate a variety of assessment strategies. To encourage the extrinsic motivation of students to actively participate in group work, it will be helpful to use strategies reflecting students' individual contributions to the

group's work, including self and peer evaluation. Third, share instructor expectations regarding the learning outcome, commitment, and performance. During the first iteration, students had dissimilar ideas regarding commitment and the instructor expectations, which resulted in a difference in the contribution and level of accountability of individual members. Clearly knowing what is expected and required for the group project process and outcome will help prevent potential conflicts and challenges within groups. Fourth, encourage student autonomy yet provide sufficient course structure and specific guidelines. By emphasizing student autonomy, class members will feel they are respected and will be aware that they need to be self-directed and proactive. However, as discussed in the findings, students as novice evaluators will appreciate more structure and guidance through the instructor's using smaller sub-deadlines and sub-evaluation tasks.

Design *Principle Six: Facilitate individual student learning about evaluation.* As mentioned earlier, findings of the first iteration revealed that the initial group outcomes for formative feedback were not satisfactory and the instructor's formative feedback on evaluation plans and report drafts helped students improve the quality of their final documents. During the interviews, students also mentioned that they would have liked more resources that could support their individual learning. The goal in this course to achieve through collaborative group work is ultimately individual students' significant learning about evaluation and their ability to conduct evaluation projects as evaluators. It is also important that individual students contribute to the whole class and group discussion and negotiation. That is, individual contributions are input for establishing common understanding regarding specific discussion topics or issues regarding the specific evaluation projects. Therefore, it is important to improve students' individual learning in order to improve the quality of their group evaluation project performance and outcome.

Specific strategies are the following. First, provide a course structure encouraging and assessing both group and individual performance in terms of outcome and participation. Adopting these measures not only can help improve the quality of group performance, but also can potentially prevent students from receiving a qualifying grade with insufficient contribution to the group projects. For instance, individual quizzes can be employed to assess student mastery and understanding of the evaluation. In addition, student participation in the weekly discussion can be required and more systemically assessed. Second, provide diverse resources such as narrated PPT lectures, evaluation cases, previous project examples, templates, scenarios, and multimedia tutorials. During the first iteration, there were narrated PPT lectures and readings were provided. For the second iteration, revision of those pre-recorded lectures and readings, as well as addition of diverse resources to help students grasp and experience authentic evaluation, will be useful. An evaluation project is a truly authentic approach to learning about evaluation; however, students also need different scales, complexity, and authenticity levels of learning tasks to learn about evaluation.

The design principles and strategies that were refined based on the findings of the first iteration and are to be used for the second iteration are presented in Table 4.13 below.

Table 4.13

Refined design principles and strategies for the second iteration

Principles	Design and Implementation Strategies
1. Facilitate communication	▪ Provide strong instructor and facilitator presence in various ways ▪ Enhance the quality and quantity of course discussion ▪ Model optimal communication behaviors, styles and methods ▪ Assign groups considering time zones
2. Establish strong sense of community and help students have sense of belongingness to their groups and the class	▪ Have strategies to form impression of co-members, and promote the development of social relationships ▪ Provide social spaces and contexts throughout the semester ▪ Establish culture of knowledge sharing and open communication
3. Provide a variety of technology everyone can use	▪ Provide group spaces and encourage using them ▪ Provide group writing and editing tools ▪ Provide both synchronous and asynchronous tools ▪ Provide overt guidance for students to take advantage of the tools in proper ways
4. Maximize the opportunities of collaboration and scaffold group work process	▪ Assign heterogeneous groups by considering factors such as time zones, online learning and online group work experiences, technology proficiency, and educational background ▪ Have each group to select a group leader and provide guidance regarding the role of leader ▪ Monitor group development and dynamic and check in with the groups frequently regarding their group work process throughout the semester
5. Enhance individual motivation, accountability and engagement for active participation in group work	▪ Use authentic evaluation projects that have real-life relevance to students ▪ Incorporate a variety of assessment strategies ▪ Share instructor's expectations regarding learning outcome, commitment, and performance ▪ Encourage student autonomy; yet provide sufficient course structure and specific guidelines
6. Facilitate individual student's learning about evaluation	▪ Provide a course structure encouraging and assessing both group and individual performance in terms of outcome and participation ▪ Provide diverse resources such as narrated PPT lectures, evaluation cases, previous project examples, templates, scenarios, and multimedia tutorials

The Story of the Second Iteration

Design and implementation of the Second Iteration

The second iteration of course implementation was from August, 2008 to December 2008. In total, sixteen students were enrolled in the class. The second iteration was opened to students in both the host institution and other institutions. Five students were from other institutions and eleven students were from the home institution. The host institution had offered a face-to-face version of this course every fall semester. Therefore, eleven students from the host institution were enrolled based on the course listing through their own registration system. To recruit students from other institutions, the instructor sent emails to colleagues in other institutions who had been asking for development of an online version of the course. These students did not enroll in this course through the host institution; however, a majority of them enrolled and took the course as an independent study at their home institution. There were ten doctoral and six Masters students. Together, the class included three male and thirteen female students. To avoid the extreme time zone issues, for this iteration the instructor limited the course to students enrolled in institutions in North America; the students were from four different institutions in either America or Canada. Considering their nationalities, they represented a total of five home countries including Canada, Korea, and Taiwan, and six students spoke English as their second language.

Whereas all the refined design principles and strategies were used in the course design and implementation, the overall focus of the second iteration was the following: How to simultaneously improve communication among group members and individual learning about evaluation? First, as the second trial, the instructor and researchers focused on strengthening the course in terms of its structure (e.g., 16 weeks, deadlines, assessment), activities (e.g., question

of the week, weekly general discussions, individual quizzes), guidance (e.g., Moodle survival guide, Wiki guide, team leader guide, weekly announcement), and resources (e.g., new reading lists, PPT lectures, evaluation cases, multimedia tutorial for survey design) so that students could have improved environments in which to learn about evaluation. Second, as communication was the major issue and the major cause for many other challenges during group work, the instructor and course facilitators paid special attention to improving communication among students, instructor, and facilitators, and among students in the class as a whole and within each group.

The course had a 16-week schedule following the semester calendar of the host institution. Similar to the first iteration, the course was delivered primarily in an asynchronous manner using Moodle. Each week, students were asked to do five to ten activities, including reading articles, textbook chapters and evaluation cases, watching a narrated PPT presentation, reviewing multimedia resources, and participating in discussions. As in the first iteration, the instructor also communicated with students via email sending additional announcements and encouragement, answering questions, and giving feedback on groups' outcomes. In this iteration, the course instructor facilitated the class much more actively. The instructor sent out weekly announcements using the Course News Forum, posted weekly activities and resources, and posted weekly discussion questions regarding evaluation. Instructor expectations for student performance such as commitment, level of outcome, and leader roles and responsibilities were also shared clearly during these communications. Through these actions, the instructor tried to model appropriate communication styles and methods.

Students were required to answer the questions the instructor posted in the Weekly Learning Forum and to respond to other students' postings. Also, more explicitly, they were encouraged to actively participate in the weekly discussion forum regarding learning about

evaluation. Again, similar to the first iteration, as a group they were asked to work together to communicate with clients, write an evaluation plan, develop evaluation instruments for collecting data, analyze the collected data, and write an evaluation report for their clients. Students were assigned to four groups of four members each. After a few weeks, one group wanted to separate into sub-groups due to many disagreements within the members. For a better group work process and outcome and based on the request of the group members, the instructor divided the group into two two-person groups. Student assessment was based on both individual and group performance, yet more individual performance assessment activities were added to this iteration than were in the first. The individual portion considered each person's participation, quiz grades, and results of self and peer assessments. The group part assessed their evaluation plans and final evaluation reports.

Tools were provided as in the first iteration to support students' group work, including a Groupwork Forum to support asynchronous discussion; Groupwork Chatting room to support synchronous discussion; and Group Wiki to support collaborative writing for their evaluation plan and report. Students were encouraged to use internal emails and the Groupwork Forum for organized and transparent communication. Also, external tools such as Skype, which could be useful for group work, were introduced and guidelines for using the technology in group work were provided. Appendix G contains sample syllabus and weekly activities outline. Figure 4.4 shows the Moodle page included in the second iteration through which the course was offered.

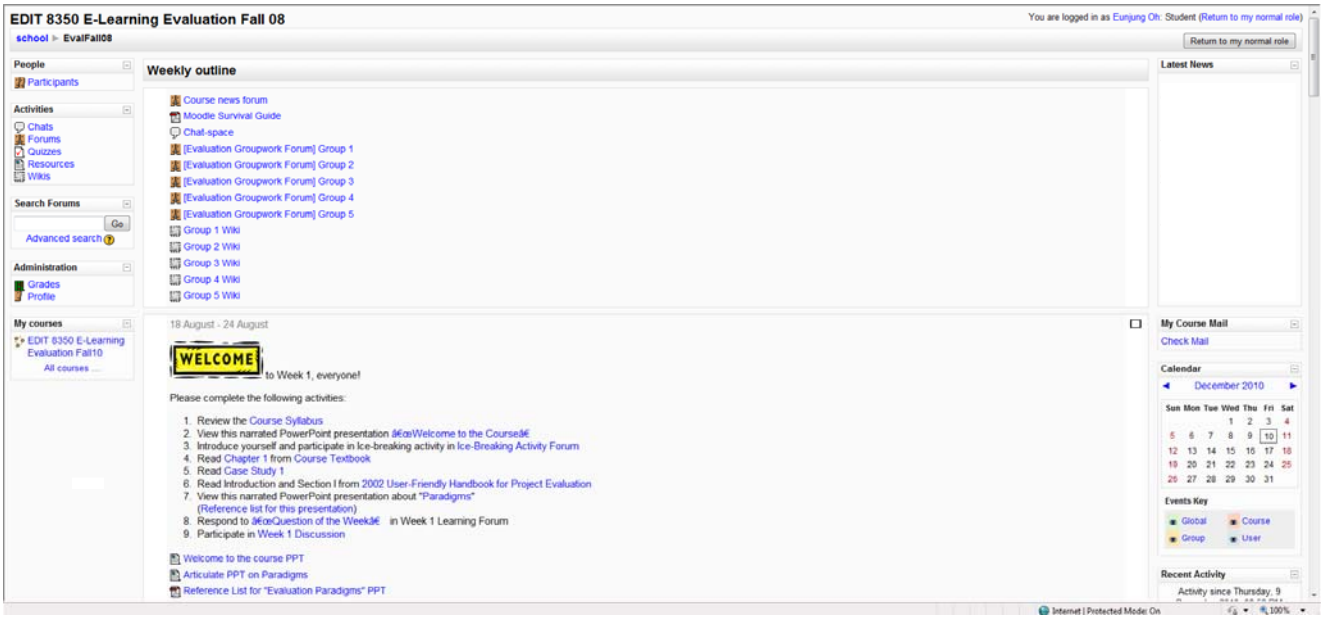


Figure 4.4. Course design version 2.0.

Data collection Methods

Data collection methods were consistent with those of the first iteration, using four primary methods: 1) interviews, 2) surveys, 3) archival data, and 4) online observations (see Table 4.3). However, individual quiz results were added in the archival data category as a secondary data source since the quizzes were important parts of assessing students' learning. Also, semi-structured interview protocols for pre, during, and post group work were slightly modified from the first iteration. The revised interview protocols used in the second iteration can be found in appendix E.

Findings of the Second Iteration (Fall 2008)

Participant Profiles. Eleven of the 16 students agreed to participate in the study. They were from four institutions in four regions in North America. Five were from other North American institutions, and six were from the host institution offering the course. By nationality, they represented four different countries. Three of 11 students used English as their second

language. Regarding their academic backgrounds, two were Masters and nine were doctoral students. One doctoral student had a full-time job while working in the doctoral program, and all other participants were full-time students. Most participants had online learning experiences and reasonably strong confidence in their technology proficiency. Only six had online group work experience. Students showed a high level of self-confidence in and motivation for the course. Based on the Students Profile Survey, information on the 11 participants is summarized in Table 4.14. Group and individual names shown in the table are pseudonyms.

Table 4.14.

Participant profiles (Second iteration).

Grou-p	Name	Gend-er	Age	Location/ Nationality	Self - Reported				
					# of online classes taken	Level of Technology Skills (x/10)	Online Group work Experience (x/10)	Level of Motivation and Long-term Goals	Level of Self-Confidence (x/10)
A	Kate	F	26-35	U. S. A	12-15	Expert: 9	Yes (Positive:7)	High (Learning & Application)	Very High: 9
	Chris	F	36-45	U. S. A /Trinidad and Tobago	15	Expert: 10	Yes (Very Positive:9)	High (Learning & Application)	Very High: 10
	Ted	M	36-45	U. S. A	Several blended	Expert: 9	No	High (Learning & Application)	High: 8
	Jenny	F	18-25	U. S. A/Korea	She missed the survey due to her joining the class late.				
B	George	M	26-35	U. S. A	2	Almost Expert: 8	No	High (Learning & Application)	High: 8
	Cindy	F	36-45	Canada	3	Almost Expert: 7	Yes (Positive:8)	High (Learning & Application)	High: 8
C	Kathy	F	36-45	U. S. A	1	Almost Expert: 7	No	High (Learning & Application)	Very High: 10
	Tim	M	36-45	U. S. A	Many	Moderate: 5	No	High (learning)	Very High: 10
	Susan	F	26-35	U. S. A/Korea	4	Expert: 9	Yes (Positive:7)	High (Learning & Application)	Very High: 9
D	Maggy	F	46-60	U. S. A	2	Expert: 10	Yes (Negative:3)	High (Learning & Application)	Very High: 9
	Ann	F	46-60	U. S. A	Over 6	Almost Expert: 8	Yes (Positive:7)	High (Learning & Application)	High: 7

Q1. What challenges do learners encounter when they work in groups in online learning environments?

During the second iteration, the overall course and students' group work process improved when compared to the first iteration. Certainly, the challenges were much less serious and intense. Learners identified the following challenges: *communication*, differences in expectations regarding commitment and product quality, unexpected and uncontrollable events that retarded the work process, insufficient knowledge about team members and opportunities to establish a sense of belongingness, and ineffective leadership in some groups.

Communication. As observed in the first iteration, communicating actively at a distance to achieve a common goal was challenging and required significant effort and coordination. After the first iteration in which communication was quite chaotic and unorganized, we provided more scaffolding for communication among group members. Groups were assigned considering the time zones of the members, which allowed all groups opportunities for synchronous meetings. For communication, the groups used tools such as Skype, email, Google group, Moodle group forum, and Wiki. Students had many more opportunities to interact with each other as a whole class due to the weekly discussion requirement as a whole class. Overall, the presence of the instructor and course facilitators was enhanced. Students also were guided to different tools. Consequently, groups had quite functional communication, but there remained room for improvement. In particular, the delayed manner of communication and lack of response on the part of some group members caused frustration for others in the group.

> Member A and B are typically end of weekers. We hear from them later in the week. Or only at the next conference set they will have read the email but they don't necessarily respond…… but now it's been ten weeks and now they just aren't online as much as [team leader] and I. (Cindy, second interview)

> ….. I think that we have some good conversations on the content, but I don't get very quick responses asynchronously from the two of the group members. The one I told you about that's always there and always working hard she I get quick response from her and so I'll talk to her about you know well what do you think about what the client said here what do you think I should do. But I can't really ask that of the other two because it takes two or three days for them to respond. By then it's too late. So we generally try to use synchronous or Skype meetings for things like that when we need a quick response…... (George, second interview)

> Ok. Cause man, we've really tried and cant' get him. So I'm we'll have to do something I figure if I can't get him this week. He has some of the stuff that you know some of the surveys that we're supposed to be sending out. And so he wanted to get them out the end of last week and we were trying to help him get those ready. But he wouldn't respond. And now I can't figure out what's going on. So, I have to reach him this week somehow. (Kathy, second interview)

These kinds of delayed communication issues are difficult in online group work because without everyone promptly responding to each others' emails and discussion postings, the others cannot possibly know how these group members—non-responders—think. The delayed responses postpone decision-making and the group work process, often resulting in a lack of contribution from those members to the groups' collaborative efforts.

In addition to delayed responses during asynchronous communication, some group members occasionally missed the synchronous group meetings. Although most of the time members had reasons for missing the meetings, such behaviors, when they occurred a few times, caused communication breakdowns and frustration within groups.

> Well, at the beginning it was more because of technology, and the meeting which was fine, but later on, you know, was they forgot…(Cindy, third Interview)

> (Anonymous comments from the process and team evaluation, "please rate your level of satisfaction with communication among your evaluation team members" question)

- More communication can be done by a particular member to ensure greater group activity (Group 1)

- Greater access and faster turn-around time (Group 2)

- We have had some trouble coordinating schedules and different members are on-line much more than others so getting consensus on any issue takes a while - too long for a true evaluation team.

- We have also had short weekly meetings in Skype starting last week and that has been nice but not all group members have been to these meetings yet and that could be improved. (Group 3)

Communication issues were present during the synchronous meetings as well. For instance, some members did not speak much, which caused frustration for other students. Interviews revealed that these students spoke less for different reasons including a lack of confidence as Masters students when all others in their groups were doctoral students, a lack of confidence in their English proficiency, shyness and reserved personality traits, and in some cases, a lack of commitment and engagement.

> Member A is very quiet. And anytime we give her an assignment, she is great to do it. I just wish I knew how to get her more involved and to help her. When we have Skype calls and stuff a lot of times, you know, we're trying, we'll ask her, her opinion and stuff. So we try and include her but she is quieter. And that is the challenge with distance. If we are face-to-face, I think it would be easier for her. But she's wonderful and she's very knowledgeable and is more than willing to do anything so. (Kathy, second interview)

> I am not really good at English and I'm doing masters degree….Because the Skype doesn't show your face or your body language, it's a bit hard for me to express…When they are talking, I am listening but they wouldn't know that I'm listening or something like that….. So it's kind of hard to let them know that I am participating…Most of time we just talk about what we did, but I don't say about the other stuff cause most of the time, like leader is asking what we want to do and I just say yes or no. (Jenny, second interview).

> That we meet every Monday at the same time. I don't know, I felt not everybody was taking it seriously and or I guess I mean I think they I don't know didn't I guess then it ….didn't' take part like she should have. Like never, never bothered to be able to get a microphone and speak to us was always on a chat. So it didn't really have to participate that way. You know, she could listen but didn't have to comment or take part in the conversation. I guess she just wasn't as engaged as the rest of us and it didn't feel that it was as important. (Cindy, third interview)

> Except me, they are all doctoral students, so they know what to do. I am worried that I am not following them enough (Anonymous comment from the process and team

evaluation, from "Please rate your level of satisfaction with how your team is making progress on your evaluation project" question)

Generally speaking, although groups still functioned fairly well, more prompt, interactive and proactive communication within groups by all group members could have decreased the level of frustration of well-engaged group members and accelerated the overall group processes.

Differences in expectations regarding commitment *and product quality.* As seen in the communication section, there were the members who participated more and others who participated less. Participation in the online group work can be seen in different ways, but in this course, it can be perceived as responsiveness in asynchronous communication, activeness in synchronous communication, and actual contributions to the group outcome. Differences in the degree of participation mostly came from differences in expectations regarding how much commitment each student thought he or she would put into the course and what level of quality of the final product with which he or she would be satisfied. These differences and following actions caused the greatest challenge and frustration in this iteration.

In one group, the differences in group members' *expectations* on commitment were exceptionally significant. The group was originally composed of two doctoral and two Masters students. The two doctoral students were very enthusiastic about the course and project, expecting that the project would require much effort and commitment including daily communication and regular synchronous group meetings, and wanted to achieve very high-level evaluation outcomes, including potential publication. However, for the two Masters students, it was only one class among the others in their busy schedule. After a number of arguments and conflicts within the group over communication protocol and the scope of the project, the students requested the instructor to break their group of four into two groups.

> I believe that the team members are not communicating regarding expectations. There is a lot of resistance to any form of direction or leadership. There is one team member that is resistant to producing work or working amicably.
>
> I don't know what could be done to get this team to work together. I am spending a lot of time dealing with "group dynamics" issues instead of productivity. UGH. I have a funny feeling two team members are going to do the work and the others will just complain about everything. I was hoping this would have been resolved by now. Very frustrating.
>
> To have leaders understand that it is important to be open-minded and LISTEN to others. It is also important for leaders to know that we each have difference schedule and life that we all need to try to work out a best way for all.
>
> (Group members' comments from the team and process evaluation)

The case of this group was somewhat extreme, but other groups also experienced some frustration regarding this matter. Overall, students seemed not to engage in sufficient discussion regarding their expectations about the course. Accordingly, at times, students disappointed each other or felt too much pressure from other members. During the interview, many of the research participants shared their concern or frustration over members contributing less, if not free-riding, as their greatest challenge at that moment. Examples of free-riding include a lack of or delayed email responses, absences or inactivity during meetings, procrastination, or missing internal deadlines for assigned work.

> Just like, you know, with group work, there's always, you know, I think, when people don't pull their weight, it's sometimes frustrating. (Kate, third interview)
>
> Again, it didn't change much in we still had three of us participated, one not. She did but not like fully engaged as I said. And I expected especially with an online course that people would be available through email and I don't see any reason why people aren't available at least check it once a day….It was frustrating not to get a single response like, I'll get back to you was have been good enough, but now often we didn't hear from one of the group members and then she didn't' participate in the conference and you know, I was frustrated but it was [the group leader] who had to deal with it. But I offered to take on extra tasks, cause we weren't sure what was going on. And I don't think that's fair to your group members. (Cindy, third Interview)

> Usually unresponsive in communication, or delayed, unless specifically addressing her then it might be more quick in response. (Comment from peer evaluation, "Communication with Peers" question)

In three four-member groups, there were one or two free-riders who caused others to do more work than was fair, but free-riders did not often consider themselves to be such, at least not intentionally. The peer and self-evaluation results revealed that these less-contributing members, if not free-riders, considered themselves to be contributing group members while others in their groups were frustrated with them. For instance, in one group, one doctoral student member was not responsive or active in either asynchronous or synchronous communications and did not contribute to the group outcome either. When asked to rate the overall performance of the person as a team member, on a scale of 1 to 5, 5 being the highest, her group members gave her 3, 3, and 2; however, she gave herself 5, which is the highest. In terms of responsiveness, while her peers gave her 2, 3, and 2, she gave herself 4. For participation in group processes, her peers gave her 3, 2, and 3, and she gave herself 5.

> No, [she] missed too many meetings and was not available enough for a group communicating on-line….. As I said, [she] did not respond to emails or was not available, never go a microphone for our weekly conferences so was always on chat feature.
>
> Working with a group, I expected more involvement
>
> Unfortunately, I would prefer not to work with her again as she was not available enough and I don't feel [she] pulled her weight as equally as the rest of our team members.
>
> (Comments from the group members, on questions in peer assessment)
>
> Although I was responsive, I think I could have responded to a few of the emails in a more timely fashion if I didn't receive so many other emails in my inbox every day.
>
> I really appreciated this course. It's one I would even take again if it was in a face-to-face setting.
>
> (Comments from the free-rider, on questions in self-assessment)

The excerpts above only present the case of one group; however, the tendency of less-

contributed members considering their contributions to be greater than what others perceive is shown in other groups as well. These kinds of gaps regarding expectations, commitment, and actual individual contributions to the group work clearly showed that group members not only experienced frustration, but also did not know enough about each other. Although during interviews, contributing group members who were also research participants shared their frustration and speculation on the reasons behind free-riding, none of these groups requested help from the instructor or to even discussed the matter openly within the group. Rather, they simply took on more of the workload amongst their frustration.

Insufficient knowledge or opportunity to learn about each other and build relationships as team members. Although there were more efforts to increase the quantity and quality of interaction by including and actively facilitating an ice-breaking activity at the beginning of the course, making weekly discussion participation a requirement, and improving overall communication, students still seemed not to know each other well enough. Some students in the host institution knew each other a little better because they had had slight interactions in other courses or contexts. Moreover, in general group members' relationships were very task-oriented, which is not necessarily negative in a work situation; however, to work together more effectively, they needed to know more about each other including individual work ethics, capabilities, experiences, schedules, and so on. Online courses lack face-to-face contact that will allow students natural and regular opportunities to see each other and talk about personal things. In online environments, students' interactions are dependent upon their own willingness to share their presence. Sharing necessary information about themselves and establishing social relationships were still not that natural in the second iteration.

I hated not knowing them and their schedules. So trying to coordinate the whole thing

> was really probably …the part I didn't like the most because I didn't I just didn't know what was going on in.
>
> You know, I think it would have been really nice, but I don't know we could have done it but we just didn't. I don't think, I knew, it was all new to me. If I were to do it again probably the very first thing I would want to do is to do a Skype call or something. I wish we could have played some game or we could have gotten to know each other a little bit better. Because I really don't know anything about my team members. I don't know, really what they've studied. I don't know what their work experience is. I don't know what their life experience is. I don't know if they are married or single or have children. I don't know, I don't know anything about them. And they don't know anything about me. And I think that is detrimental in our interactions because I think, I think it makes it more fulfilling and also easier to understand how you know about people's strengths and weaknesses when you know a little bit more about them. And there just hasn't been a time when we have done that. (Kathy, third interview)
>
> I don't feel like, I know them very well to be honest. I feel like they are just kind of the person in the computer because we are distance from one another (George, second interview)
>
> It wasn't developed socially before we got into the project. That would have helped a lot. The first time we talked, we had something, issue we had to deal with this thing. I would like to have known as people the group members more. That might have helped. So socially I mean it started out fine. So I don't think socially it's developed. (Tim, second interview)

Considering that two of the three participants in the above excerpts were their groups' leaders and who communicated the most with all the members, in addition to the expectation discrepancy among students, the lack of knowledge about the members of their own group in general added a certain layer of challenge. Students felt that they got to know about each other more as the semester went; however, it should have happened earlier for groups to function more seamlessly.

Uncontrollable challenges that retarded the work process. Students could neither expect nor control some challenges, and this condition slowed the process, especially during the data collection phase of the project. Those challenges included insufficient or delayed support from the clients, difficulty in recruiting evaluation participants, severe weather conditions, and

technical problems with the evaluation programs or the course management system. In the case of clients, every group had different clients, and some were certainly more eager to know about the evaluation results and more cooperative with their evaluators. To some groups, their positive client relationships accelerated their group work process, but for others, working with their busy clients was a challenge.

> We had other times where the client was, you know, slowing us down from things, that they hadn't produced…. …. There were a few times like that they had planned on implementing the project with ….so we would have plenty of interviewees and that never happened during the semester, or at least not until the very end. And so that kind of slowed us down as well. (George, third interview)

> The challenges were more that the client didn't implement the program when he was supposed to. So we were kind of scrambling at the end to collect data. We didn't get a lot of responses. The usability testing went well but the online survey, we didn't get the number we expected and the telephone interviews either. So it was and, you know, continuously bothering people, you know, Can you participate? Can we call you? They were wonderful in responding. It was just, they didn't implement their program when they were expected they would. So it reduced the amount of time we had to collect data and because people had to go through it before we could get their feedback. (Cindy, third interview)

In terms of technical difficulties, the course management system, Moodle, occasionally caused some issues. Students mainly used email and Skype for their communications; however, they also used Wiki and Groupwork Forums, depending on their needs.

> The worst thing I think about this course was the minor Moodle glitches.
>
> Being frustrated about posting in Moodle. It made me not want to participate until we all figured out how to work around it.
>
> (Anonymous comments from the final course evaluation, "What was the worst thing about this course?" question)

When students had these kinds of issues transcending their ability to control, they usually asked the instructor and the course facilitators for help; in comparison, they tried to deal with all other challenges within the groups or chose to keep their frustrations to themselves.

Ineffective Leadership. Each group had leaders who were either selected by the group members or was a member who volunteered to play the role. In each group, leadership style and previous experiences of leaders were different from each other. In Group 4, which had to be divided into two groups (Groups 4 and 5), two group members were very uncomfortable with the direction and the style the leader preferred to have, and eventually they had to work in a separate group on a different project. After becoming two different groups, each functioned as a partnership, working as pairs rather than having an explicit leader.

In the three other groups—Groups 1, 2, and 3 –with four people, Group 3's leader effectively managed the work process and communicated well with the clients, instructor, course facilitators and the group members, despite two members not being as active as the others.

In Group 1, the leader took care of most tasks reasonably even though there was one member whose personality and opinions were fairly domineering and who liked to control. Regarding the leadership, the major issue in this group was that the leader did a poor job in coordinating group meetings, considering everyone's schedule, which accelerated the isolation of one member who could not participate in the meeting due to her work schedule. This particular member was a Masters student for whom English was a second language who had low confidence regarding her potential contribution, as she was surrounded by three American doctoral students; thus, she was passive in expressing her opinions during interactions. With these factors intertwined, she was perceived as a free-rider by the leader and one other member in this group. She contributed less than other members; however, interestingly, one group member who worked directly with her on a common task in a pair mentioned that she worked well with him.

> One of the things was they were setting up the meeting time and there slots about 4pm and 5pm, but I work until 4. so I check on the 4 and then I commented even though I

> can't be on 4, I can be on 4:20 because I work until 4. But the leader had meeting started around 4 o'clock and when I was there at 4:20 the meeting was over. So, I was talking to the leader that I cannot do that and they just …and she said, "Yes, I did, but I'll try to make the meeting 4:30 next time." and then the next meeting, it was held on 4 as well. So I asked the leader to record the meeting and then I was following up, but I was also really frustrated by that and I asked the leader, like please do not do that again. But after that we did not have a regular meeting so that was kind of challenge for me……(Jenny, third interview)

> *very* passive. We were very aware of the possibility of linguistic or cultural issues, or intimidation issues, but nothing seemed to work to draw her out. We just came to accept that she will not really be an active participant. (Kate, Comment from the Peer and Self evaluation, "Participation in the group process" question)

> Well, I was the one that worked directly with her and so I think the other two members maybe didn't see a lot of what she was doing. Right? So, like I said it was 4 and then 2 by 2 and then 4 again and really most of her work was when we were doing the 2 by 2. (Ted, third interview)

In Group 2, the leader was not knowledgeable and lacked sufficient experience in evaluation, online learning, or group work. The group had some group dynamics issues, and she did not do a good job of facilitating the group work process, either. As a result, their initial project report significantly disappointed the instructor. Based on their evaluation draft, an interview with the leader revealed that she really did not seem to know how to work with and manage the group work online, and at the same time that she was new to evaluation itself.

Table 4.15.

Summary of challenges groups encountered (First & Second iterations).

Challenges (1st)	Challenges (2nd)
Communication related issues ▪ Working in different time zones ▪ Tool affordance and choices ▪ Major events in personal lives ▪ Culture and language Technology related factors Lack of sense of community and belongingness Differences in motivation, expectations and accordingly accountability Overly optimistic expectations regarding students' self directness and autonomy Lack of leadership or ineffective leadership within groups	Communication Differences in expectations regarding commitment and product quality Insufficient knowledge or opportunity to learn about each other and build relationships as team members Uncontrollable challenges that retarded the work process Ineffective leadership

Q2. What are the attributes of groups working well together and what are the attributes of groups not working well together? What makes them different from each other?

In the first iteration, both groups were neither functional nor ideal and showed attributes such as 1) lack of interaction and unclear communication, 2) inappropriate use of tools, 3) poor management, 4) free-riders, 5) lack of understanding of others and their contributions, and 6) low quality on deliverables. In this iteration, among the five groups, three groups—1, 3, and 4 worked fairly well together functionally and effectively, although they expressed and experienced some challenges with internal and external factors, but two groups—2 and 5—did not work well together most of time. Because the groups were more functional in general compared to the first iteration, no groups, even the most problematic groups, had issues with

inappropriate tool use that would have fundamentally prevented functional communication. However, the ineffective and dysfunctional groups exhibited similar attributes with the groups from the first iteration. For instance, these groups had issues such as low quality deliverables, communication and interaction issues concerning frequency and content, free-riders, and ineffective leadership and management. To some degree, negative attributes existed in effective and functional groups as well. For instance, except for Group 4, each group had at least one free-rider who communicated in a delayed manner, was passively engaged, and contributed less to the project. This section describes how these groups differed in attributes that influenced their effectiveness and functionality in the group process and the course outcome.

Quality of deliverables. The quality of deliverables, including evaluation plan documents, instruments developed to collect evaluation data, and final evaluation reports are important criteria to assess the learning success of these groups. Similar to the first iteration, the groups submitted their drafts to the instructor to receive formative feedback; then, they revised the draft and submitted the final version to the instructor and their clients. As a result of going through this process, the final deliverables were of satisfactory quality for their clients. For all the groups, although most of their initial deliverables had some room for improvement, they were generally of good quality. However, Group 2's first draft of the evaluation report was very disappointing. This group in general had issues with the dynamics between one member and the other three, lacked substantial thinking from individual members and necessary group discussions about their evaluation project, an assertion made by the previously mentioned single member during the interviews, inactive communication among group members, and ineffective leadership and project management.

> The biggest issue is my group, I sense and I think, by their own admission, [they] are unable or unwilling to really get their hands dirty with the product for evaluating and they

> have almost 100% copied and pasted the questions from the tool section of the website and used it as their own work for instrumentation, even questions that were clearly inappropriate for this product. For example, questions like, "does the link to external websites work?" There are no links to external websites. I had the impression that they didn't even look at the DVD. They didn't get down and say, "Ok. What is it we are evaluating here?" (Tim, second interview)

For this group's evaluation plan and instruments, the instructor encouraged them with constructive feedback; however, for the evaluation report, the instructor gave them more critical and candid feedback stating that their report lacked essential components and was not of acceptable quality for their clients. The initial draft seemed to be more a collection of poorly thought out and individually written work rather than a thoughtful and cohesive project outcome developed by one group. Interestingly, although the instructor did not ask this group to revise their report to a satisfactory quality level considering the time constraint, the instructor's feedback was a wake-up call and great motivator for this group to substantially improve their report through intensive collaboration for a very short time.

> …Because he's never been in the whole time we've had the course, have I never seen a negative comment about anything. You know it's always, well, you know, this is a good start and here you go…..I think once we got the final one done, we could see what a huge difference that was. And as an instructor, how you could have gotten someone for where we were to what we ended with in one day. I don't think he would have asked that. I think we would have had if I had been the instructor I would have said the same thing as he did. Basically, you know, you missed the boat and hopefully it will be ok. It was really, I don't know how to explain it. It was just we all just looked at that comment and we all, we emailed each other and said, "oh, my word, what do we do now? What do we do now?" And I just said, "I'm sorry. I'm not willing to end this course this way. And how do all of you feel about that?" I said "I'm willing to do whatever it take to make this better. Does anybody else feel the same?" And they all did. And that made a big difference. (Kathy, third interview)

> We did not have a strategy for doing that [reviewing each other's contribution]. …There was a bit of collaborative in saying, "Ok, what should, how should we frame this? Where did we go wrong? What did we miss?" And miraculously we all missed, I don't know how the kind of self guiding nature that was provided in chapter 6 or chapter 9 or whatever it was of the textbook. Chapter 9. We, I cannot explain how we all, all of us we did not have a strategy of how to do it. (Tim, third interview)

> I think they before we got the feedback from Dr. Reeves, I think including me, we didn't see other team members work critically. Just scanned. (Susan, third interview)

Communication, Interaction and Balance of Workload. As seen in the first iteration, communication and interaction is a very important and fundamental factor for successful collaborative group work. How often, in what manner, and about what the students communicated with their group members were different across the groups. Overall, students used both synchronous and asynchronous tools. All groups had Skype meetings: some did regular meetings and others had meetings upon need. In addition, all groups used email, the Moodle Group forums, and Wiki were sometimes used to communicate, depending on their needs. One group set up a Google group as their main group space. Except for Group 4, every group had one or two members who did not communicate or interact as often as the others. Waiting for these people to respond was certainly frustrating to the other active members because activeness in communication was also related to actual contributions to the project in these online groups. In short, except for Group 4, every group had at least one or two members who contributed less than others, if not acting as free-riders.

Group 1 set up an independent Google group for their communication and had extensive interactions. Google group sends out postings to group members' email addresses whenever there is a new posting. Three of the four members very actively communicated and one member's communication with other three members was less frequent. They had some 15 to 20 minute synchronous meetings at the beginning of the semester and mostly worked using Google Group space for the remainder of the semester to exchange ideas and comments. Two members were at the hosting institution and two others were at another institution. After the evaluation plan submission, they began to work in pairs with those who were in the same institution. The workload among three group members was fair and one person who was passive in

communication did not contribute as much as the others. Although this person contributed to the pair work more than before, the other pair, including the leader, did not know about her contribution since they did not communicate much between pairs in terms of task specifics.

Group 2 used Group forum and Skype for their communication at the beginning and then began to switch to email for their asynchronous communication instead of using Group forum. They also had a few synchronous group meetings; however, it was not consistent and regular communication. They also occasionally used Moodle Wiki to build their group outcomes by adding their own individual contributions. Three of the members, including the leader, were somewhat active in communication and interaction. However, one member did not consistently or promptly responded, sometimes for more than a week. The other members were very frustrated because of their not knowing whether or when this person would interact with them. The whole group work process was greatly influenced by this, especially in the beginning of the project when they did not know each other very well. Initially, this person shared a fair workload and actually did well on his part; however, as the semester continued, he contributed less than others since he did not interact as much.

> I think it depends on what happens probably this week. If [the unresponding member] is fine this week and I mean we all get busy and I understand that and, maybe, he's just been busy the last week and hasn't been able to anything. I mean, if we go two weeks and I don't hear from [the unresponding member], then I don't really have a choice other than to talk to [the instructor] about it and say, "I don't know what's going on but I can't…." or to talk to [the other member A] and [the other member B] and see if they can go talk to [the unresponding member]. You know, physically go talk to him and see what's up. They've emailed him, too and haven't got any response from him. He may have just been busy. I'm not panicking yet about it. I think, if I'll email him today and probably Thursday and if I don't get any response from him by Friday……we have to get stuff done. So if I don't get any response from him, then I'll have to do something. And that's probably where I'll probably start with my team members and have them try and track him down and find him. And then if nothing works, then I will probably have to talk to [the instructor]. But I don't really think that's going to happen. I'm hoping. (Kathy, second interview)

Group 3 communicated mainly via emails and Skype. Overall, the group's communication was active and consistent, and they had weekly synchronous meetings throughout the semester. However, differences in activeness in interaction existed. Two of the four members, including the leader, were very active and responded promptly online. They communicated very often throughout the week and engaged actively in synchronous meetings. One group member was a Masters student who initially was somewhat lacking in confidence. She was not as outspoken in synchronous meetings although she responded to emails. However, with the support and encouragement of the leader and other group member she was able to make more contributions there were substantial as time went on. The last group member was not active in either email or synchronous meetings at all. This person often did not respond to messages, join in the meetings, or speak during the meetings. She remained passive and contributed less to the final outcome. These two members were also end-of-the-week players; therefore, there was quite a bit of time for the active two members to wait for these inactive members to respond. Both active members identified delayed communication as the greatest barrier preventing their group from moving forward.

> Interviewer: So, you really have waited like seven days to get their responses so far?
>
> Cindy: Sometimes yea. Or they'll send the email Monday morning and then we discuss it Monday evening. (Cindy, second interview)

Consequently, the two members who communicated more frequently also spent more time in discussion as well as volunteered to assume more of the workload throughout the semester to push the project moving forward.

Group 4 exhibited the most ideal communication and interaction during this iteration. As a pair group, they actively interacted most because they were engaged in the project and the course on a daily basis. These students were both very motivated and eager to learn about

evaluation and execute a successful evaluation project for their clients. Similar to the other groups, they used email and Skype as their primary tools for communication. As they had only two people, it was easier for them to coordinate meeting times and they communicated when they needed rather than setting up a regular meeting time as other groups did. The workload was balanced in this group as they had much discussion about the project outcome and helped each other with their parts constantly.

Since students in Group 5 did not volunteer to be research participants, it is hard to capture the detailed work process and pattern of this group. Peer and self evaluation results revealed that they communicated primarily via emails, and one of the members did not do her equal share on the project, although she tended to respond promptly in email communication.

One important thing to note is that for the most part, students did not openly discuss issues with delayed communication or lack of interaction from certain members in their groups. As mentioned earlier, everyone had a different perception of how much commitment he or she should make and how frequently communication should occur. Without knowing each other's situations, people also tended to wait for others to finally respond. In one group, when one member finally felt that she should bring up the issue, it was after the tenth week of the course.

> Interviewer: Have you discussed that during the meeting like respond promptly?
> Participant: No, I don't think we've actually discussed that.……I think it is something I should bring up next Monday. Just because it's not well we're already in week ten so we're going to need to get the next half of the work done in a shorter period of time. (Cindy, second interview)

Another important thing is that, in general, consistently conducting weekly synchronous meeting was important for progress. Groups 1 and 2 had only a few synchronous meetings, Group 3 had weekly meetings, and Group 4 had multiple meetings during the week. The more they met, the more chance that they would have substantial discussions regarding the project and

strategies; therefore, the better such groups' outcomes were. Groups with more frequent opportunities to communicate with each other demonstrated smoother and less stressful processes. When students began to skip the meetings because they felt they all knew what they were supposed to do, this decision often resulted in communication deficiencies in email interactions as well, and eventually caused frustration and procrastination for the groups. Group 1 worked sufficiently well although they had only a few short synchronous meetings; the reasons for the fewer meetings were these: first, they were able to talk face-to-face because they had divided the group and worked in twos after data collection, and they were working with a person who was in the same institution with them. Second, their asynchronous Google group communication was sufficiently synchronously. It was possible because three of the four members were online all the time and were available to respond to each other promptly and willingly. However, not all groups can have this kind of online availability and willingness to communicate this often. In that sense, groups need synchronous meetings to discuss and make decisions on important matters so that they can move forward each week.

Leadership/Project Management. The challenges regarding ineffective leadership were discussed in the previous challenges section to some extent. In online groups, particularly when there are more than two people in a group, having an official leader is important for two reasons. First, online group work requires much more thoughtful facilitation and strategic project management to produce a successful outcome. Second, when students have real clients, the communication channel needs to be consistent throughout the project duration to avoid any confusion between the groups and their clients. As mentioned above, Groups 4 and 5 worked in pairs and there were no official leaders. Among Groups 1, 2, and 3, all the group leaders were doctoral students. During the interviews and in other evaluations, the members of Group 3 did

not have any complaints about their leader at all and was very appreciative of how the leader had worked with them. Based on the Student Profile Survey result, before this course he had only taken two online courses and did not have online group work experience. However, he had had a few years professional experience as an instructional designer at a university and he was sufficiently knowledgeable about Moodle and other emerging technologies to facilitate the group work process. Despite the many challenges this group had, such as a free-rider, delayed communication, and less active clients, his leadership and project management skills contributed much to making Group 3's evaluation project outstanding. He was also well skilled at approaching the passive members, delegating tasks and empowering them when they lacked confidence. With his efforts and encouragement, one Masters student who was somewhat passive contributed substantially as the semester went.

> [The team leader's name] was the team leader and performed the role above and beyond my expectations. It was quite labor intensive keeping the instructor and clients informed, organizing the group and keeping everyone on track. I cannot say enough good things about [the team leader]. I thoroughly enjoyed working with him. He is professional, always on task, very diplomatic, delegated well, communicated well, dealt with issues that came up very quickly. He was always on top of things.
>
> He has been great to lead the team and the work in a timely manner with such a profession[alism].
>
> I would work with him again and would recommend him for other teams in the future.
>
> (Group members' comments about the leader, Peer evaluation)

Group 1's leader did well in contributing her fair share as a group member and in organizing the overall group process. In this group, there were two members with much more experience as leaders. Member A was a natural leader, and also very outspoken and dominant in her opinions, according to others as well as her own assessment during the interviews. Member B had a great deal of business and academic leadership experiences. For some reason, the leader took the leadership position although it did not seem to be natural to her.

> I don't really like the name leader because I don't. Cause it's, kind of, you have to be, I guess, I don't really take like a leading role. I like to take what I would probably call an active role. And rather than telling people what to do, I would say "well, what about this idea? What do you think?" So, that's probably more how I would describe my role. [It] would be more active. (Kate, first interview)
>
> She took leadership position when she knew the lead is not a common position she would take. (Comment about the leader, peer evaluation)

Everyone in this group participated in the research study. According to the members, there were moments when Member A held strong opinions during the decision making process that she was not willing to negotiate. The interviews with the students revealed that the leader was mostly compliant with the opinions of Member A. In addition, although the leader organized the process, she did not facilitate or delegate when it was necessary.

> …I think everybody in the group is doing pretty good at their share. As a matter of fact the dominant member is probably producing more than anybody else. Because you know she's it seems like she has taken this to be her project. Is certainly the thing that I think everybody else has given? And so, the atmosphere of the group is not that this is a group project that we are all working on. It's that this is her project and we are helping with. So it's sort of a subtle shift in the group dynamic there. The group leader isn't really dealing with it at all. I don't think she cares, either. Well, I don't know. I haven't talked to her about it, so I don't know how she feels privately but our group leader has become more of just a manager. So, she is like scheduling the meetings and that kind of thing. So she's doing more sort of bureaucratic leadership, which is fine. She is doing a good job of that. So, but, I think that she is sort of take probably a similar stance to me and she's just stepped back and you know, doing her assigned work and not really giving much input other than that. (Ted, second interview)

As mentioned above, in this group, there was one Masters student who did not feel as confident as the doctoral group members. This member was passive in her interactions and contributions compared to others and became even more passive because she had to miss some meetings because her schedule was not fully considered for the meetings. Also, the leader was unaware of this person's contribution during the pair work since the leader and this person were in different pairs. One important competency of a good leader is maximizing the available

resources including people and time. When there are problems with unbalanced workloads or communication issues, it is the responsibility of the leader to reach out to the problematic members, identify reasons behind those behaviors, and help them contribute as equally as possible. If the leader had facilitated the development of individuation of this passive member by reaching out to her and delegating tasks, the frustration of the leader and her pair partner, Member A, could have been significantly reduced.

In Group 2, the leader was a motivated person and most group members liked to work with her; however, she lacked experience with online courses and online group work. Her perceived confidence in the technology tools was not high as well. Therefore, in this group, there were issues with strategic matters. Although she was putting efforts not only to do her share as a group member, but also manage the project as the leader, she seemed simply not to be knowledgeable about how online groups work most effectively. She also struggled a great deal with one member who had strong opinions on the project direction, yet did not communicate often with the group members. In short, the project process was not ideally-managed or facilitated for most of the semester, which contributed somewhat to the disappointing evaluation report draft. However, after receiving the instructor's feedback, she made a critical decision as a leader, which eventually benefited everybody, to encourage the other group members to join in on an intensive collaboration to revise the draft substantially.

Collaboration / Cooperation. All the groups employed cooperative 'divide and conquer' strategies as their primary approach to accomplishing group work. However, groups had differences in the degree of collaboration through discussion and review of each other's writing. The groups with more substantial discussion and collaboration at the cognitive level produced the best quality final project outcomes. In terms of collaboration, Group 4 did the best job among

the five groups. Although they had portions each person was in charge of, they constantly and continuously discussed ideas and co-constructed the outcome.

> I would say we communicate a lot every single day whether it is through email or whether it is through Skype or combinations or telephone. So it's continuous consistent and continuous……. And [her group member] and I are collaborative people and we crate everything together. She may have created the expert usability instruments and I created the learner instruments but contribute to each other's part. We review the content. And we edit, we format, we know, we do everything together…….. Also, we co-construct. That's one of the ways we co-construct sometimes synchronously sometimes asynchronously. (Maggy, second interview)

For building documents, they used two programs: Microsoft Word with track changes and Microsoft SharedView. They used MS Word to write their individual portions, then used SharedView for discussion and revision while they spoke on Skype.

> Shared view is a Microsoft product that allows us to share my desktop and so [her group member] can have control over my desktop and can edit documents….. She can open internet explorer. She can search for something. She can open up the documents she can do anything she wants. (Maggy, second interview)

Both group members were very experienced in a variety of areas, technologically savvy, and highly motivated. When they worked together by discussing ideas and co-constructing the outcome together, there was a very positive synergy for both of them in learning and performance.

> Maggy was a contributor to bringing the usability testing to a higher level. I learned a lot from her.
>
> Ann possesses a lot of knowledge which has deepened her critical perspective of what she does. She brought that perspective to our work effort and, in doing so, made me aware of perspectives that I had not considered.
>
> (Comments about each other, peer evaluation)

An opposite case from this group would be that of Group 2. For the first few weeks until they worked on their evaluation plan, they had weekly meetings and their communication was pretty active. However, as the semester proceeded, their communication was neither as frequent

nor consistent as other groups, both asynchronously and synchronously. They generally lacked strategic management and mutual commitment as well. They worked cooperatively by dividing the workload and conquering the work individually. The problem was that they did not contribute to what other people did through thorough review and critical feedback for improvement. Rather, they simply submitted their work to the others, and the editor of the group combined the separate portions in one document and formatted it for consistency.

> We work very individually in comparison beginning of semester. We just divide with instrument. So, we, for everyone, had an instrument. So, we individually collect data….When we work individually, email, exchange to each other, but we didn't exchange the documentation always. So, at the end of the semester, we exchanged the documentation and change documentation to one format…..I think she [the editor] just combined it. She didn't check, I guess. (Susan, third interview)

They neither discussed nor had a decent protocol or system for collaboration. Their discussions and collaborations were mostly at the administrative level to complete the work. As a result, their initial evaluation draft was disappointing in quality, and they revised their work through a short-term intensive collaboration. During that time, they actively identified the problems with their report, reviewed the course materials and external resources, and discussed how their report could be ideally improved. Although it was a short period of time, substantial discussion and intensive efforts enable much learning by individual members and an improvement of the project outcome.

C*onflict and resolution.* When groups work, members often experience differences in opinions, and the negotiation of those differing opinions is a part of collaboration. However, groups also sometimes experience conflicts that are not easily negotiated. How groups deal with the differences in opinion, disagreement and conflict influence their group process and outcome. Groups 4 and 5 were initially one group and they were divided in two groups because they had a serious conflict; however, they had failed to resolve it within the group through compromise and

negotiation. It was a wise decision to the benefit of all the team members that avoided unnecessary sacrifice but achieved what they aspired to achieve. Breaking up a group was a possible solution for conflict because the conflict occurred at the beginning of the project; for most cases, such an action would not be a feasible solution.

Interviews and surveys revealed that students experienced differences in opinions; however, mostly they were well negotiated within the group and they were not causes of frustration. However, in the case of Group 1, there was a disagreement between group members regarding the direction of the project. While one member wanted to focus on usability testing, others wanted to focus on the effectiveness of the program they were evaluating.

> There's a second member who is also at the team leaders university and she has a very dominating personality. And it feels like she has largely taken over the project. And she is sort of generating lots and lots of content and doing it all her way. And she isn't very receptive I think to alternative on how to do things. So, it sort of feels like we are all doing the project for her kind of. She is generating a lot. It's not, that she's not working. It's just, it's all become her vision I guess. So we are all doing that.
>
> I wanted to do an interface evaluation you know a ….evaluation of the software. Because that's something that I'm, I have some expertise in and I think I can do a pretty good job at. But the dominating member of our group for some reason, she doesn't like them. I don't know why. But so, she didn't even want to heuristics evaluation at all. Again, I don't know why. I mean since we had a whole chapter, you know, we had a whole week devoted to heuristics in the course. But she didn't want it. So you know, it's just not worth the effort of convincing her that we need one. So, I just said ok whatever. So I've taken a very since that I've taken a very passive role. And I'll just do what I'm told. And I don't, I make the minimum number of comments necessarily to be an effective group member. (Ted, second interview)

Although these adult students were mature and professional enough to focus on what was decided and continued to pursue it with their fair share of contribution, this group certainly did not deal with a situation of disagreement effectively. After this, the motivation of one student seemed to decrease, and the group members, except for the dominating member, probably felt

that negotiation in this group would not be easy in future situations. As the event set a tone, students probably would not be honest about their opinions and ideas in the future.

Group 2 also had two significant conflicts that caused tension between one member with a dominant personality and the leader. When these two people were interviewed, both seemed frustrated with each other. The member was not satisfied with the quality of other people's work and wanted to do things his way. However, the leader felt that the manner and frequency of the member's communications with the others were not helpful for the group, although he had some great ideas that would have contributed to the quality of group outcome. After compromising on things according to his opinions and ways to keep the peace, there were two incidents in which the leader expressed her frustration and disagreement to him. One was over improving the quality of the instrument, which started as a conflict in an exchange of emails with upsetting tones; however, the conflict ended with an improved instrument and by these two people apologizing to each other.

> In my group, I made a comment to that effect and I made it to our group leader confiding in her. I mean I didn't do reply all. I just sent it to her. And she sent back a nasty kind of replay that well if you are the big expert on this it's all in the Wiki so you can go change it. Fortunately, I prepared my expert review protocol and sent it at the same time. And when she looked at that, she was like. "Wow, that is really good." And then she sent out to the group as a whole something to the effect of the bar has been risen, you know, its higher now. We need to do better. We're, so yea in the sense that she or they did realize that…...(Tim, second interview).

> Sometimes, he'll get upset because he wants things done a certain way and I perfectly happy with working through that. But then if it's not exactly the way he thinks, it should have been done then he's upset. But he doesn't want to communicate you know he just wants to be angry and upset about it……

> ……And then he starts emailing saying these are crappy. Why aren't we putting any thought in these? It's just like we just took them right out of the book or whatever. And I'm like ok well, you know I agree with you we can put more effort into that and that's good. But based on, so then he whines some more and finally I just said look you've got to quit whining about this and do something. Because you haven't done yours yet….It's a Wiki. You can go in and help make these better. You know, no one has stopped you

> from doing that. So please just do something and don't whine about it. So, he agreed and said I'm sorry and then he produced this great tool and stuff but then, now he hasn't' talked to us for a week and I can't get him ……(Kathy, second interview)

Another incident was over the client's teaching assistant, in which he put the TA in an uncomfortable situation regarding evaluation data collection. Other group members, including the leader, were opposed to his approach and ended up apologizing to the TA on his behalf. He did not agree with the leader's approach, as well as considering that the apology in that context made the evaluators look unprofessional.

> Honestly a lot of times it was just to keep the peace..……I wanted the team to work together and the thing of it is all three of us girls, we all get the same and you could tell in our Skype calls in everything that if he said it, then we would just agree. And I guess, after awhile, it wasn't fair to the group. And it wasn't helpful because he may have an opinion, but he actually got us in a little trouble with the TA for our client because he was badgering her a little bit and giving her a hard time. And I had to email her and apologize to her and tell [the member] to back off. And you know, not put so much pressure on her which he wasn't very happy with me about. But I just couldn't continue to agree with his approach and the way he was doing it. And the other two group members agreed with me. (Kathy, second interview)

Overall, from his perspective, other group members were not sufficiently thoughtful about creating something that reflected the essence of their evaluation project. However, from the leader's perspectives, pursuing only his ideas, particularly he is not sufficiently communicating with group members, is not fair to others in the group although he often had great ideas that she valued. However, after going through these two incidents, although he had to be away for a while at international conferences, both the leader and this member reported that the group dynamic became more positive than before. By exchanging emails, they were attempting to clear the air to prevent potential misunderstandings about the group's productivity, and openly having that conversation actually helped them stay more positively and move forward. A large conflict was openly and effectively resolved in this group for the best of everyone.

> I think that we all really tried hard to maintain a good relationship even during the stressful times so that was good. We had some potential moments of you know we could have easily blown up and had to change groups or, I think we all wanted to work it out. So, that was good and that's a characteristic that you need to have in a group.
>
> [Group dynamic] was pretty favorable. I mean, it was pretty good. We certainly lost contact with each other for a while. We probably procrastinated and let things go…… We remained civil….We didn't have any more big explosion moments. There was one interesting potential for misunderstanding between [the leader] and I that I quickly cleared up. She thought I was being snippy with her when I was not at all. But we worked that out immediately……It was very important for me to keep the harmony of the group and I think we were all committed to that so. (Tim, third interview)
>
> ….. I think I had just sent him the email that said, "Look, quit whining and just get some work done." And really even though he was gone quite a bit of time after that second interview, he was a lot more positive and a lot more willing to get stuff done than he had been before. And so I think if nothing else, just the whole feeling that everyone had about, about him, as a team member changed just because he was more willing to work and to work with us and to be positive. (Kathy, third interview)

Although it is not true in every group's case, conflict often exists whether it is evident to everyone in the group or only to some members. When disagreements or conflicts are not negotiated or resolved well, it brings negativity to the group members whose needs are not satisfied and who can become de-motivated, as in Group 1. Sometimes, conflicts are detrimental to the whole group and the group needs to be divided as in Group 4 and 5. When there are disagreements and conflicts in groups, it is important to openly discuss the issues so that all the members can willingly pursue the negotiated decision.

> We have differences in opinion. I wouldn't say that we have not had any conflicts we've have not had any disagreements its differences in opinions and we negotiated. We say, "Why do you think this?" And we come up with a solution that makes both of us comfortable…..I think this is probably a dream team, something you could ask for really. (Maggie, second interview)

For groups to be able to do so, the group members should feel the sense of safety and acceptance of the group to which they belong as a safe place to open their minds and share their opinions. Their opinions should be valued by others even though all of them might not be used.

Table 4.16 presents a summary of attributes of the five groups from this second iteration.

Table 4.16.

Summary of attributes of groups (Second iteration).

Attributes	Group 1	Group 2	Group 3	Group 4	Group 5
# of members Effectiveness / Functionality	4 Yes	4 No	4 Yes	2 Yes	2 No
Quality of deliverables	Good	Poor → Good	Good	Good	Good
Communication / interaction (# of people)	Active (3) Inactive (1)	Somewhat active (3) Inactive (1)	Active (2) Somewhat active (1) Inactive (1)	Very active (2)	Not sure (2)
Fairness and balance of workload (# of free-riders)	Mostly fair (1)	Mostly fair (1)	Mostly fair (1)	Very fair (0)	Unfair (1)
Leadership / Project Management	Somewhat effective	Mostly Ineffective	Effective	Pair work-No leader	Pair work-No leader
Collaboration/ Cooperation	Mostly cooperation Some collaboration	Mostly collection Some cooperation Collabora-tion at the end	Mostly cooperation Some collaborate-on	Mostly collaborati-on Some Cooperation	Mostly collection Some cooperation
Conflict and Resolution	Some disagreement but compromised	Major conflict but resolved well	Some differences in opinions but negotiated well	Some differences in opinions but negotiated well	Not sure

Q3. What supports or scaffolding do learners need during the group work process?

To overcome the challenges students encountered during this iteration and help them form more effective, functional, and collaborative groups, the following supports or scaffoldings are needed for improving future iterations of the course: 1) Provide opportunities for discussion of their expectations, 2) Guide communication and organization/management strategies directly, 3) Provide guidance on effective leadership, 4) Assign groups with careful consideration, 5)

Reach out to students, 6) Establish an atmosphere for more social/personal interactions, and 7) Provide task-centered scaffolding.

Provide opportunities for discussion of their expectation. As discussed earlier, the greatest challenge in this iteration that also became the cause of a few concerns was the discrepancy among group members regarding their expectations about the course, individual commitment, and quality of the work. Generally speaking, this particular factor has the likely potential to present the greatest conflict for group work. However, discrepancies among group members' assumptions can be resolved if students are guided to establish common understandings regarding the contested issues. For the first and the second iterations, students rarely requested help from the instructor regarding this matter, with the exception of the one case in which group members asked to break up their group. Sharing expectations did not naturally occur in the groups; therefore, opportunities for such dialogue need to be planned for and included in the discussions to avoid potential challenges to harmonious, productive group work.

> I think just people performing the way that I think, the way that I expected them to the way that we agreed to in the group. And maybe I didn't make it clear what people were suppose to do and that's why they didn't perform well. (George, third interview)

For example, once group memberships are assigned, the instructor can ask students to conduct the first group meeting and discuss ground rules that all the group members should adhere to in their work together during the semester. While establishing those ground rules, students can discuss naturally, as well as formally establish, their mutual expectations regarding topics such as communication protocols and agreed upon accountability.

Another strategy can be to use the whole class discussion activity to actually explore the process of collaboration. During the interviews and course evaluation surveys, several students

mentioned that the best thing about the course was its collaborative group work on authentic evaluation projects.

> The ability to practice working in an online collaboration (however painful it was at times). This is a reality of the modern world and practicing at it is important.
>
> Great course connected to practical world.
>
> Authentic experience.
>
> It was an excellent experience and I am happy to have worked with so many wonderful people that I hope to meet some day.
>
> Learning how to work as a team, collaborating at a distance.
>
> The use of authentic work and conducting a real evaluation plan makes it very real.
>
> Project.
>
> (Comments from students, Course evaluation, question "what was the best thing about this course?")

However, during the actual work process, at times students simply did not know what was expected of them in their work with others on a complex, authentic semester-long project and how individual irresponsible behavior and work ethics could possibly influence the whole process, other members, and their project.

> I think there could be more facilitating done and discussion done about the process of collaborating…….help discuss at least the how to work more effectively in groups. And get people to think about working in groups and their role in the groups……I think, "here's the kind of general rule of thumb" ……."If you don't spend the time, you end up losing the effectiveness in the overall part of the class." So, I would do that and then deliberately or from that, talk about the group work in this class..……..I think there are things you can do to facilitate that to make it stronger to be reflective to think about it, to think about people's role and much the function that this interview does. (Tim, third interview)
>
> Know what collaboration is. And I think that covers it because it covers how people relate to each other, it covers how people learn, it covers how they manage the work. I think that's the key. Is to understand what collaboration is. And I think to strive for

> high quality work instead of the minimum to get away with things (Maggie, third interview)

Such discussion activities regarding group work or collaboration do not have to occur every week, but at least at the beginning of the semester and twice more during the term, students should have opportunities to reflect on the characteristics of good collaboration, its potential influence on their group work, and the nature of their roles to facilitate that goal.

Guide communication and organization/management strategies directly. Although much was improved in the second iteration compared to the first, it was necessary to share with students directly what strategies could facilitate their communication and organization/ management to enhance the overall group work process and collaboration. For example, during the interview regarding the things to be improved, advice for future students, or factors for successful group work, a number of participants identified the importance of having consistent synchronous group meetings, although not every group consistently held weekly meetings.

> Regular consistent meetings are necessary. (Susan, third interview)

> I think we could have well not always but I think maybe twice a week would have helped. Just only because it would have insured that we all touched base and, you know, yea, just we would have been able to touch base and keep each other on track I think if its twice a week then you are more committed and then you make sure what you need to do is done when you meet. (Cindy, third interview)

> We need to meet every week even though we don't have any agenda and assignments. Check with each other…. That would be good. (Susan, third interview)

> Communicate clearly, often. Schedule your meetings and stick to them. And realize that since we are using technology even in Skype, you can misinterpret things so kind of don't be too sensitive just let things go….. Be a little more flexible…… (Ana, third interview).

Student participants also stated that they would like to improve the organization and management of the project and group work process; they mentioned that future students would probably appreciate some tips and strategies from the instructor regarding those topics. Although

groups had the entire semester for their projects, the scope of the projects was large and included several factors that delayed their work processes.

> Plan early. I think try to, definitely like the earlier that you can start implementing the safer you are. (Kate, third interview)

> Start early and try to develop a time line so that you will be finished at least two or three weeks earlier than you need to be because you are probably going to have delays that were unexpected. And so you need that buffer time. (Ted, third interview)

Also, there were two groups that lacked strategies for managing group work.

> Maybe that was just our group I don't know but there could have been a better way to deal with management issues I think. We could have dealt more effectively with dealing with this issue of how to manage, for example, documents…..We could have had more straight on, "Here are some ways to make the collaboration more effective, management wise, document wise." And maybe it was a matter of laziness of not pursuing it ourselves but for whatever reason we were not well enough informed about how to manage the group work. (Tim, third interview)

Adults are assumed to be experienced in team work; however, these students needed scaffolding in communication, organization and management because working in online groups on an authentic project was new for many students.

Provide guidance on effective leadership. Along with the areas of communication and organization/management, students also needed more guidance on effective leadership. Taking on the role of leader requires that individual to assume a workload greater than their fair share. Leaders' roles are critical for the success of the group process and outcome because they are responsible for managing the work flow, facilitating communications, making important decisions about resource allocation, coordinating schedules for deliverables, nurturing a positive and collaborative culture, empowering group members, and ensuring that each member's contribution is fair. Although effective leadership is critical in online group work, only one group had a leader who played the role very successfully. For the first and second iterations, a guiding document described how each group could select a leader, what the major responsibilities of a

leader were, and what expectations groups should have of their leaders; however, the interviews revealed that leaders had different perceptions about their expected roles, responsibilities, and appropriate leadership styles. There were moments when these leaders made mistakes and also struggled with challenges. In addition to the current guidance on leadership, it will be useful to provide more context-specific strategies and tips for groups and their leaders based on the pitfalls and mistakes leaders experienced in the first and the second iterations.

Assign groups with careful consideration. Assigning groups based on selected characteristics is a very important starting point for effective group work. For the second iteration, the instructor and the course facilitators considered individuals' time zone as the first criterion, and then considered students' educational levels (e.g., doctoral vs. master), mother tongue (e.g. English vs. non-English), and gender as the next criteria. However, observing and interviewing the student groups revealed that a number of additional factors that should be considered in forming online groups.

Regarding group sizes, two-people groups struggled with the workload; however, the four-people groups had at least one member who did not contribute much, yet the workload was still manageable. Therefore, three member groups might be more desirable for the next iteration. This configuration may make coordinating meeting times easier and reduce some of the wait time during asynchronous communication. Other factors to consider would include students' experiences with online learning and online group work experience. It would be ideal for each group to have at least one person who knows how to facilitate online communication and assist group members to work together effectively. Additionally, based on information collected from students' profile surveys about students' online experiences, professional backgrounds, English proficiency levels, motivation, and educational levels, when assigning groups it would be

interesting to consider potential group leaders likely to volunteer or be nominated by group members.

Reach out to students. In the second iteration, there were efforts to provide greater presence of the instructor and facilitators in the group work and course in general. Students appreciated the instructor and facilitators' presence; however, more evidence of their presence and participation would address students' comments and facilitate the group work. For the whole class discussion, the instructor's approach was to post weekly questions and summarizing thoughts after the students' week-long discussions. In the course evaluation survey, five of twelve respondents mentioned that they liked the current way of participation from the instructor and seven respondents said that they would appreciate a little more monitoring and moderation of discussion during the week since there had been confrontational discussions that made some students hesitant to participate; additionally, more instructor presence with follow-up questions would guide discussions and illustrate the importance of active interaction and deep thinking.

At the group work level, other than providing feedback to groups, most instructor and facilitators' presence was manifest through email announcements and invitations. For instance, during the semester, the instructor invited students to have one-on-one Skype or face-to-face meetings with him. Also, when announcements were sent out, the instructor or the facilitators let students know that their questions and requests for help were welcome. However, when students had problems or questions, students tended to deal with them by themselves.

> Maybe it's as simple as you as facilitators just checking in with the group or I don't know if it's the group leads that maybe you need to check in with and get reports from them on how things are going and then, you know they could let you know if you need to intervene with the group. (Cindy, third interview)

> ….But still that was not sufficient you still felt like you're been a little at a distance. (Ana, Third interview)

> In the future uh I guess in each group post a message say hey you know you guys ok just checking in to see if you need any assistance. (Chris, third interview)
>
> I think you can email each team …Do you need help?...First, ask …..If you ask, we could, we can, ah, I mean, we need this. we need this. Because we know if we ask something to you guys will provide us assistance, but usually we forgot that…(Susan, third interview)

From interviews with both students and the instructor, it was evident that the instructor and the facilitators needed to reach out to students more frequently and directly rather than merely inviting them to have individual consultations.

> Instructor: But another thing I've learned I think is that I probably need to make sure not just invite people to come see but really reach out to people and make sure you know so if [the name of student C] hasn't said she's going to come see me by week 8, I should write to her and say "[student C], I really want to talk with you when can you come in?" I need to be more proactive.
>
> Interviewer: Do you have the impression how many student have come to you for help? Did they take the initiative to reach you?
>
> Instructor: I would say at least 2/3 of the students at one time or another have reached out for assistance. I mean people like [Student D] and [Student E] and [Student F] and [Student G] and others have reached out. Some people haven't some people are totally invisible.
>
> (Instructor Interview, After the semester being over)

Although it may not be realistic for online instructors and facilitators to participate in and monitor intensively each group's work process, joining the first two meetings to assist each group to initiate their group work and then to follow up with frequent email check-ins would enhance students' sense of the instructor and facilitators' accessibility.

Establish an atmosphere for more social/personal interaction. Although there were two groups that felt quite connected, most students, including group leaders, mentioned that they did not feel they actually knew their fellow members well. However, people make collaboration possible. During the interviews and the course evaluation, a number of research participants

emphasized the importance of the social aspect because individual members make the group work and collaboration possible.

> For group work, definitely a social aspect. We definitely need to work on social aspect because I think that knowing your group members know what their expectations are. (Chris, third interview)

> I think it's important I really believe the only way these types of environments work is if everyone cares about not only the project itself but about each other. Those are the keys to making it work. (Kathy, third interview)

> Everybody, an understanding of collaboration and understanding that social interdependency theory is the key. And understanding that relationships between people are the key and they …honesty and integrity and respect and trust. I think that's the most important part. (Maggie, third interview)

Several students also mentioned that they would try to get to know their group members better in the future and recommended offering more opportunities for social and personal interactions.

> I wouldn't say I'm not 100% comfortable with them but I probably discuss things but not to the same level that I would if I knew them better. I guess I probably a bit guarded at the what I say and I'm not can't think of the word but I'm not 100% at ease with them I guess. (Cindy, second interview)

> I think one big thing is bonding with each other. Sometimes it is important to know each other and it's easy to discuss and meet when we know each other. I think so. In other class, we know each other and when we meet, it will meet for assignments. We sometimes talk about our personal lives and how are you? And in this course there was no talking about that. I think at the beginning of the semester in this course there was an introduction part.I think the activity was just all member not just our team member. So I think there is activity for our team at the individual team. We need some time to build…..(Susan, third interview)

> One, it wasn't developed socially before we got into the project. That would have helped a lot. The first time we talked we had something issue we had to deal with this thing. I would like to have known as people the group members more. That might have helped. So socially I mean it started out fine. So I don't think socially it's developed. (Tim, second interview)

> Bonding with group members is important *because* it would make understanding others, sharing ideas, and negotiating with others easier by giving students more opportunities to get to know each other and build relationships within their groups.

Provide task-centered scaffolding. To facilitate *students'* evaluation process, providing task-centered scaffolding is necessary. Interviews and observations noted that students struggle with the project sub-tasks. Although there are resources including reading lists and sample evaluations and the instructor provides constructive formative feedback on their drafts, at times students were having hard time with some of the tasks.

> More participating of the instructors and TAs regarding discussion and setting up discussion and setting up a schedule….helping us with tasks what we need to do. I think it helps the student's kind of stay on track. (Ana, third interview)

> ….This is just an idea but if maybe more task-centered scaffolding. So, like wherever students are in the task, you could have a little thing that says "Ok, this is how you do your evaluation plan and all the resources that you that have been gathered for the course that talk about doing an evaluation plan could be right there." So, the chapter on evaluation plan, the example evaluation plan whatever else is in the course, you could tell the people……. (George, third interview)

More task-centered scaffolding can perhaps offer opportunities for students to more deeply reflect on and learn about the actual project with less anxiety. One proposal that would apply to all the groups would be to include some discussion questions focusing on the evaluation tasks and processes the groups would be completing in the following weeks.

> I think it would for me, some of the course discussion questions, like I think, sometimes, I would have liked to discuss evaluation processes specifically more. Like some of the discussions were good but at the same time like…(Kate, third interview)

Previously, the discussion questions focused on readings and resources to provoke students' thoughts, insights and reflections on what they should know as evaluators. Although it is a valuable approach, adding some questions focusing on the actual project process would help students, perhaps in particular the less contributing students, to think more about and engage in the project. Also, students struggled most between the data collection and writing of the report because they experienced the more significant uncontrollable challenges and procrastination

during that period. Facilitating students' group work process during that time with additional sub-timelines would help the project move forward.

Table 4.17.

Summary of supports and scaffoldings for the students (Second iteration).

Identified supports and scaffoldings
Provide opportunities for discussion of their expectation
Guide communication and organization/management strategies directly
Provide guidance on effective leadership
Assign groups with careful consideration
Reach out to students
Establish an atmosphere for more social/personal interaction
Provide task-centered scaffolding.

Discussion: Refinement of course design and design principles for the third iteration

The overall focus of this iteration concentrated on how to improve communication among group members and their learning about evaluation. The design principles guiding the design and implementation of the second iteration were the following: 1) facilitating communication; 2) establishing strong sense of community and helping students develop a sense of belongingness to their groups and the class; 3) providing a variety of technology everyone can use; 4) maximizing the opportunities of collaboration and scaffolding group work process; 5) enhancing individual motivation, accountability, and engagement for active participation in group work; and 6) facilitating individual student learning about evaluation. Although some of the aforementioned challenges continued into the second iteration, the overall communication and student learning about evaluation improved. Communication was much more functional, effective, and active.

The final evaluation project outcomes, individual quiz results, and discussion postings showed that many students in this iteration learned a great deal about evaluation that went beyond the superficial. In addition, according to the final course evaluation results, from among the course materials and activities, many students mentioned that they particularly appreciated the knowledge they acquired through the authentic evaluation project on which they worked with peers for real clients.

Amongst the challenges they experienced, their major concerns in the second iteration were problems associated with differences in expectations regarding commitment and product quality. Because of the discrepancies in expectations among group members, and accordingly in commitment, there were communication delays, free-rider issues, social loafing and imbalanced workloads, and conflicts that result in group separation, de-motivation and negative group dynamics. Generally speaking, the interdependence among group members needs to be significantly strengthened to deal with these issues. The social interdependence theory provides useful insights and ideas that will potentially improve future students' perspectives on and commitment to their group work. The theory is based on the assumptions that

> (a) the essence of a group is the interdependence among members (created by common goals) that results in the group being a "dynamic whole," so that a change in the state of any member or subgroups changes the state of any other member or subgroup, and that (b) an intrinsic state of tension within group members motivates movement toward the accomplishment of the desired common goals. (Johnson & Johnson, 2006, p. 93)

According to this theory, social interdependence influences people's actions, psychological processes, interaction patterns, and outcomes in groups (Johnson & Johnson, 2009). When positive interdependence exists among group members, they tend to engage in *promotive interaction*, develop positive psychological processes of *substituatability, positive cathexis,* and *inducibility* within their groups, and these promotive interactions and psychological processes

result in more *efforts to achieve*, *higher quality of relationships and social support* with group members, and *psychological health and self-esteem* (Johnson & Johnson, 2005; 2009).

Based on findings previously discussed, four of the existing six design principles were refined by adding or revising their associated strategies and a new design principle was added to the list. Although all seven design principles and associated strategies will be applied in the third iteration design and implementation, only revisited design principles and strategies are discussed in this section.

Design Principle One: Facilitate communication. As discussed earlier, the goal of facilitating communication is to establish a sense of presence among students and between students and instructor/facilitator so that interaction and communication become more effective in contributing to optimal collaborative group work. For establishing social presence, two important concepts are immediacy and intimacy (Tu & McIssac, 2002). Although the presence of the instructor and facilitator was stronger and was presented in more diverse ways, students still expressed a desire for a more active presence of the instructor and facilitators. Although there was a sense of immediacy, there was a lack of a sense of intimacy. For the second iteration, the instructor and facilitators interacted more with students. The types of communication and interaction were based on regular activities (e.g., discussion question postings, discussion summaries, weekly announcements), formative feedback on outcome drafts, and some unscheduled interactions such as inviting questions or one-on-one meetings. However, regular activities are mostly non-group work related, and group work related interactions typically occurred via emails to either individual students or single groups; consequently, not every student may have a strong sense of the instructor and facilitators. Therefore, if the instructor and facilitators actually reached out to individual students as well as groups rather than inviting them,

students might more readily develop sense of intimacy. For instance, by the instructor and facilitators regularly checking in with students more frequently, students will perhaps feel that the instructor and facilitators are actually very approachable and share individual or group concerns and challenges.

Another important strategy for enhancing both immediacy and intimacy among group members, as well as facilitating the overall group work process, is emphasizing the importance of regular synchronous meetings. Having synchronous meetings is only one communication method for group work; however, groups that consistently held synchronous meetings tended to have more collaborative discussion at a cognitive level. The notion of collaboration implies synchronous communication in which group members perform actions and make decisions together; in contrast, cooperation is more associated with asynchronous communication (Dillenbourg, 1999). Although active email exchanges can be as effective as synchronous meetings for discussion and negotiation, most groups communicated in a delayed manner when they communicated with emails. Groups tended to skip meetings after members divided the workload and then focused individually on their separate tasks. For collaboration, it is important to have interactions that will influence other group members' cognitive processes (Dillenbourg, 1999). The more collaborative interaction that students experience during synchronous meetings by establishing a shared understanding of their project and helping each other on individual subtasks, the stronger a social presence of each other they will experience, as well as appreciating more each other's contribution via collaborative discourse.

Design Principle Two: Establish strong sense of community and help students have a sense of belongingness to their groups and to the class. Despite the three strategies used in the second iteration, several students still felt that there was a lack of sense of community and

belongingness. In most groups, students maintained good working relationships; however, they did not necessarily have a strong sense of belongingness to their groups. According to prior research studies, a strong sense of community is important because it helps establish and strengthen a positive interdependence among group members (Kirschner, 2002; Wang, 2009). Conversely, a positive interdependence promotes a deep sense of belongingness to groups and group cohesion (Nam & Zellner, 2011; Strijbos, Martens, & Jochems, 2004). Researchers also assert that good working relationships are often established off-task (Kreijns & Kirschner, 2004; Rovai, 2001) and that groups built on friendship promote collaboration (Wang, 2009).

However, in this course, groups had to be assigned considering students' profile, not on any existing friendships with each other. The importance of building an affective structure to promote social relationships that will contribute to mutual trust, a spirit of collaboration, belongingness, group cohesion, and a sense of community was discussed in the previous iteration. Therefore, groups need additional opportunities to build affective structures to promote a sense of belongingness and community in each group.

Findings revealed that students still did not feel they knew each other well enough to work together effectively. During the second iteration, different strategies to form impressions of co-members were considered; however, considering the project workload, timeline, and online communication, it was not realistic to have multiple off-task activities throughout the semester unless students shared those during their meetings. The most realistic strategy for the third iteration can be to help students begin building impressions of co-members from the beginning of the semester. For instance, providing specific guidelines for the first synchronous meeting regarding the information each student should share and then permitting students to acquire sufficient information about each other. Along with the introductory whole class activities,

breaking the ice within a group, a more intimate environment, will perhaps enable groups to get along with each other more naturally and at the same time, provide ideas for how they can harmoniously and effectively work together. As a good working relationship is likely to maintain good community (Kreijns & Kirschner, 2004; Rovai, 200; Wang, 2009), this approach will likely promote the development of deep social relationships.

Design Principle Four: Maximize opportunities for collaboration and scaffold the group work process. The deeper the collaboration, the greater will be student satisfaction with their learning and group work. To maximize opportunities for collaborative learning and optimize the group work process, some strategies are revised and other strategies are added. First, strategies regarding the leader selection and guidance for the leader role need to be strengthened to optimize leadership for the groups. When assigning groups, the instructor and facilitators can consider who the potential leaders are based on the student profile survey, although it is 100% the group members' decision to select whomever they wish as their leader. It is important that the leader have the most or at least sufficient experience with online learning environments, online group work, and job experiences in educational settings. Leaders need to have positive perception regarding group work. Unless master students are natural leaders by their personality, it is better that leaders would be doctoral students. They also should have high motivation and express how passionate they are about learning in this course. It is ideal that leaders be in a fairly similar time zone to the clients as well. By reviewing the student profile survey, assigning at least one person having most of these traits to each group can perhaps be helpful for each group to start with a leader potentially capable of leading their group well. For the first and second iterations, after announcing groups, guidance regarding how to select a leader and roles of leader was provided. In addition to the existing general directions, it will be helpful to provide

more specific project management and organization tips from previous students to advise new leaders regarding future project situations.

To improve management of the group work process, three additional strategies can be considered. One is that it is important to provide guidance for effective group work. This guidance can be constructed with advice from previous students based on their lessons learned. The guidance document can inform students how to facilitate collaboration, and more easily coordinate their project group work. Another strategy is to have groups upload brief meeting minutes to their group Wiki after their group meetings. This particular approach allows the instructor and facilitators to monitor all groups' progress efficiently. Researchers have asserted that coordinating and monitoring group work process is important for enhancing both individual accountability and establishing positive interdependence in the collaboration process (Wang, 2009). Uploading brief meeting minutes will also facilitate the project management by keeping the groups moving forward with their weekly progress and avoiding procrastination as much as possible. Also, monitoring the minutes helps the instructor and facilitators provide support in timely manner by identifying potential pitfalls that perhaps could challenge students or lead to failure (Wang, 2009). Finally, sharing of meeting minutes will keep communication within the groups transparent and allow group members to remain connected even when group members cannot attend meetings.

The last newly added strategy is providing task-centered scaffolding as a part of whole class activities. Although students have abundant resources including narrated PPTs, readings, and sample evaluations, student learning about conducting evaluation projects can be enhanced with task-centered scaffolding. Collaboration over authentic learning tasks brings challenges because the complexity and scope of tasks require continuous negotiation among group

members, regarding organization of project timelines and resources, including collected data (Wang, 2009). Also, challenges students encounter during the group work is often similar across the groups. Not only sharing thoughts about evaluation projects within groups, but also as a whole class would be helpful for students to gain more diverse perspectives from the other groups, while also potentially comparing their group work process and ongoing outcomes with those of others. This activity would contribute to groups' awareness of themselves and their work, potentially help them to be more self-directed and persistent.

Design Principle Five: Provide opportunities for establishing positive interdependence. This newly added design principle was developed primarily to avoid issues with discrepancies in expectations among group members. Positive interdependence is established in a group work situation when members perceive that learning and performance goals can be achieved by their working well together (Johnson & Johnson, 2005; 2009). Positive interdependence connects group members to each other by having students understand they cannot be successful in their group work without each other's contribution (Wang, 2009). Positive interdependence needs to be structured through careful pre-instructional and instructional scaffoldings using different goals, rewards, resources, roles, and task interdependence. Although structuring positive interdependence is likely to result in increased achievement and productivity of group work (Johnson & Johnson, 2009), using all of interdependence does not necessarily improve students' collaborative group work. Social interdependence theory is more strongly applied in cooperative learning situations, although using foundational ideas can be also useful in this collaborative group work. For instance, a study by Brewer and Klein (2006) using different types of interdependence treatments, roles and rewards reported that role and reward interdependence

increases group process and non-task interactions; however, groups having no treatment actually had more cognitive interactions than any other treatment groups.

In this class, using goal interdependence can be the most appropriate. Students' perception of goals certainly influences the means and processes they will use to accomplish tasks (Brewer & Klein, 2006). Students need to have conversations to share their own expectations and goals, and establish a common understanding of what they want to accomplish, how they should work, and what they want to produce. Since this kind of conversation does not happen naturally, it needs to be guided. Once groups are assigned, it would be useful to give students guidelines for their first group meeting. They can introduce themselves to each other by sharing their profiles, goals, expectations, schedules, and so on. This is not a cognitive grounding activity, but it is a very important grounding process that will promote group work by establishing the common grounds of their groups. Common ground includes the "mutual understanding, knowledge, beliefs, assumptions, presuppositions and so on" (Baker et al., 1999, p.33) that already exist among people as they communicate and interact with each other. Since students will select a leader during the first meeting, perhaps the instructor or course facilitators could join the first group meeting and guide students as they select their leader while smoothly initiating this conversation. Also, it is important to emphasize the significance of positive interdependence and collaboration for the success of the group so that everyone understands how critical it is for everyone to participate in and contribute to the group work. During this process, students will be able to adjust their own objectives and establish common goals toward completing the outcome task. As their first shared outcome, it will be useful to ask them to create three to five ground rules that as group members they must keep throughout the semester. An

example of such a rule could be "replying to emails within 12 hours." They can post these rules in their Group Wiki to share with the rest of the class.

Design Principle Six: Enhance individual accountability, motivation and engagement for active participation in group work. It is important to maintain a balance between group and individual accountability (Graham & Misanchuk, 2004; Thompson, & Ku, 2006) to optimize group work. Various strategies were incorporated in the second iteration to balance accountability of both individuals and groups, to intrinsically motivate students with the nature of the task, and to clearly inform them of what the instructor expects of them in the course; however, most groups still had a person who contributed less than the others. This social-loafing phenomenon occurs for complicated reasons; therefore, strategies regarding individual accountability are combined with strategies from other design principles such as positive interdependence, communication, collaboration and sense of community. For instance, positive interdependence generally helps group members be "posited to result in feelings of responsibility for a) completing one's share of the work and b) facilitating the work of other group members" (Johnson & Johnson, 2009, p. 368). When group members have an increased sense of individual accountability, they also tend to perceive a higher interdependence (Johnson & Johnson, 2009).

Although the existing framework was well structured, one other strategy can add value. Many research studies claim that social loafing and imbalanced workloads occur often when a group member feel that he or she can still be rewarded without doing his or her fair share of work on the group project (Thomson & Ku, 2006). That is, if the individual contribution is difficult to identify and if there could be a high possibility for redundant efforts, social loafing can more easily take place (Johnson & Johnson, 2009). People tend to be thorough when they work in a situation that demands it (Thomson & Ku, 2006). One important observation from both

the first and second iteration is the size of groups. When groups had only two people, the workload was too great. However, when groups had four people, they managed the project, although they struggled because of at least one member who contributed less. Students tended to be more stressed when there was a free-rider who did not work as much as the others did, while also making communication difficult. Other group members did not try to resolve these situations; rather, they volunteered to take on more work to keep the project moving forward. Generally, when groups become larger, it is more difficult to see individual contributions to the group. It is harder to coordinate communications, meeting schedules and project timelines. As a group becomes larger, individual members tend to respond less often than needed. People tend to be less truthful about their opinions during the negotiation process, and they also have to adjust their ideas and perspectives more often to conform to those of their group members (Johnson & Johnson, 2009). Therefore, the literature claims that larger groups increase the possibility of social loafing. Perhaps in future iterations of this course, forming groups of three students will give an impression that everyone's contribution is more than necessary, and students will manage the workload realistically.

The design principles and strategies that were refined based on the findings of the second iteration and are to be used for the third iteration are presented in Table 4.18 below.

Table 4.18

Refined design principles and strategies for the third iteration

Principles	Design and Implementation Strategies
1. Facilitate communication	▪ Provide strong instructor and facilitator presence in various ways ▪ Emphasize the importance of regular synchronous meetings ▪ Enhance the quality and quantity of course discussion ▪ Model optimal communication behaviors, styles, and methods ▪ Assign groups considering time zones
2. Establish a strong sense of community and help students have a sense of belongingness to their groups and the class	▪ Guide the first group meeting to get to know each other, form impressions of co-members, and continue to promote the development of good working and social relationships ▪ Provide social spaces and contexts throughout the semester ▪ Establish a culture of knowledge sharing and open communication
3. Provide a variety of technology everyone can use	▪ Provide group spaces and encourage their use ▪ Provide group writing and editing tools ▪ Provide both synchronous and asynchronous tools ▪ Provide overt guidance for students to take advantage of the tools in proper ways
4. Maximize the opportunities of collaboration and scaffold the group work process	▪ Have each group select a group leader and provide guidance regarding the role of leader ▪ Provide guidance for effective group work ▪ Have groups upload meeting minutes and monitor group work progress ▪ Provide task-centered scaffolding ▪ Assign heterogeneous groups by considering factors such as time zones, online learning and online group work experiences, technology proficiency, and educational backgrounds ▪ Monitor group development and dynamics and throughout the semester frequently monitor the groups regarding their group work process
5. Provide opportunities for establishing positive interdependence	▪ Guide students to have conversations regarding their own expectations and goals ▪ Emphasize the importance of positive interdependence and collaboration ▪ Guide students to establish their ground rules

Table 4.18

Refined design principles and strategies for the third iteration (continued.)

Principles	Design and Implementation Strategies
6. Enhance individual accountability, motivation, and engagement for active participation in group work	▪ Assign three people per group ▪ Use authentic evaluation projects that have real-life relevance to students ▪ Incorporate a variety of assessment strategies ▪ Share instructor's expectations regarding learning outcome, commitment, and performance ▪ Encourage student autonomy, yet provide sufficient course structure and specific guidelines
7. Facilitate individual student learning about evaluation	▪ Provide a course structure encouraging and assessing both group and individual performance in terms of outcome and participation ▪ Provide diverse resources such as narrated PPT lectures, evaluation cases, previous project examples, templates, scenarios, and multimedia tutorials

The Story of the Third Iteration

Design and implementation of the Third Iteration

The third course implementation iteration was from January 2009 to May 2009. In total, ten students were enrolled in the class. This iteration was opened to students in the same institutions as the second iteration. Seven students were from other institutions and three students were from the home institution. Also, only one of them was from the same department where the course was offered because the course formerly was offered fall semester, and many students from the program had already taken the course during the previous fall semester second iteration. The student population was much more diverse in terms of their institutions and nationalities. In total, the ten students were from six different countries, Australia, China, Korea, Puerto Rico, Sweden and the United States and were enrolled in seven different institutions in the United States, Europe, and Australia. Seven of 10 students spoke English as their second language, although most of them were sufficiently fluent when working with each other. Similar to the

second iteration, students were recruited via different routes. Home institution students enrolled using the university's regular registration system. Other students took the course because their advisor or peers who had previously taken the course recommended it. We also announced it through ITForum (http://it.coe.uga.edu/itforum/), an instructional technology listserv, and two students from this source asked permission to enroll. Again, similar to the second iteration, students from other institutions took the course as an independent study at their home institution. There were seven doctoral and three Masters students, four male and six female.

While the course goal is to help students learn substantially about evaluation and complete their evaluation projects successfully, the specific focus in the design and implementation of this iteration was improvement in the following categories: How to decrease social loafing issues by 1) helping students develop positive interdependence as well as 2) create a strong sense of individual accountability on the project. Since the overall course structure and materials have been strengthened through the two previous iterations, most of the course structure, activities, and resources remained as they were for the second iteration. That is, the course had a 16-week schedule following the semester calendar of the host institution. Similar to the first and second iterations, the course was delivered primarily in an asynchronous manner using Moodle. A weekly calendar in Moodle guided students to engage in five to ten activities, including reading articles, textbook chapters and evaluation cases; watching a narrated PPT presentation; reviewing multimedia resources; and participating in discussions.

For creating a more social and affective atmosphere, in addition to the ice-breaking activity and personal information sharing on participants' pages, the instructor's weekly announcement included casual and social messages as well as learning and task guidance messages. In the discussion forum, students were also strongly and explicitly encouraged to

share their reflections and thoughts with each other rather than to share merely their answers to instructor's weekly questions. For stronger instructor and course facilitators' presences, the instructor participated in the discussion throughout every week compared to the second iteration in which he posted weekly questions, observed the discussion, and provided an integrated summary. Also, additional reminders regarding activities were sent via email in the middle of each week. Students were not required to reply to the emails, but this practice was instituted as a way to reach out to students so they would perceive the instructor and course facilitators as more approachable.

To improve the overall collaboration and group work on evaluation projects, more guidance (e.g., general advice about the E-learning Evaluation course, tips for successful online group work) was added and counseling on selecting leaders was also revised to improve the overall leadership. To help students keep moving forward with their projects, the weekly calendar provided task specific group project guidelines, including weeks during which there were no submission requirements. Carefully considering the student profile survey results and student heterogeneous characteristics, members of this cohort were assigned to groups of three, with the exception of one group; however, the four-person group became a group of three a few weeks later as one member withdrew from the course because of extra-curricular life demands.

Once the groups were formed, students were asked to conduct their first meeting and carry out a few activities. Strategically, these first group meetings were very important for many reasons. One of the course facilitators joined the group meetings to help students break the ice; provide a brief orientation about the course; emphasize the importance of the overall group work, timely communications, and weekly meetings; give students the impression that the instructor and facilitators were available and willing to help them succeed; and answer any questions about

the course and their projects. The instructor and course facilitators prepared the first team meeting agenda and shared the expected norms for group meetings. During the first meeting, students selected their team leaders; introduced themselves; shared their goals, expectations and motivations; and discussed within each team the ground rules for the semester. After the meeting, students uploaded their meeting minutes to their Wiki. Having weekly meetings and posting meeting minutes were designed to help students effectively manage their project without procrastinating, transparently communicate with each other, and build an effective and efficient communication channel regarding each group's project progress between the instructor/ facilitators and students without a significant effort in coordinating administrative issues.

Similar to the second iteration, student assessments were based on both individual and group performance, yet the assessment portion for individual performance such as scores on quizzes, participation in discussions and results of peer and self-assessments was slightly increased. The group performance portion assessed their evaluation plans and final evaluation reports, with the group performance piece slightly decreased from that of the second iteration.

The same tools were provided, and guidance for Moodle and general tools was again included. In the third iteration, students once more generally selected Skype and email for communication and Google docs and MS Word for collaborative writing. A Groupwork Forum was provided, but they were not required to use it. However, they were asked to use a Wiki for transparent communication and effective management of the project progress. Appendix G includes the syllabus and weekly activities outline for the third iteration. Figure 4.5 shows the third iteration Moodle page through which the course was offered.

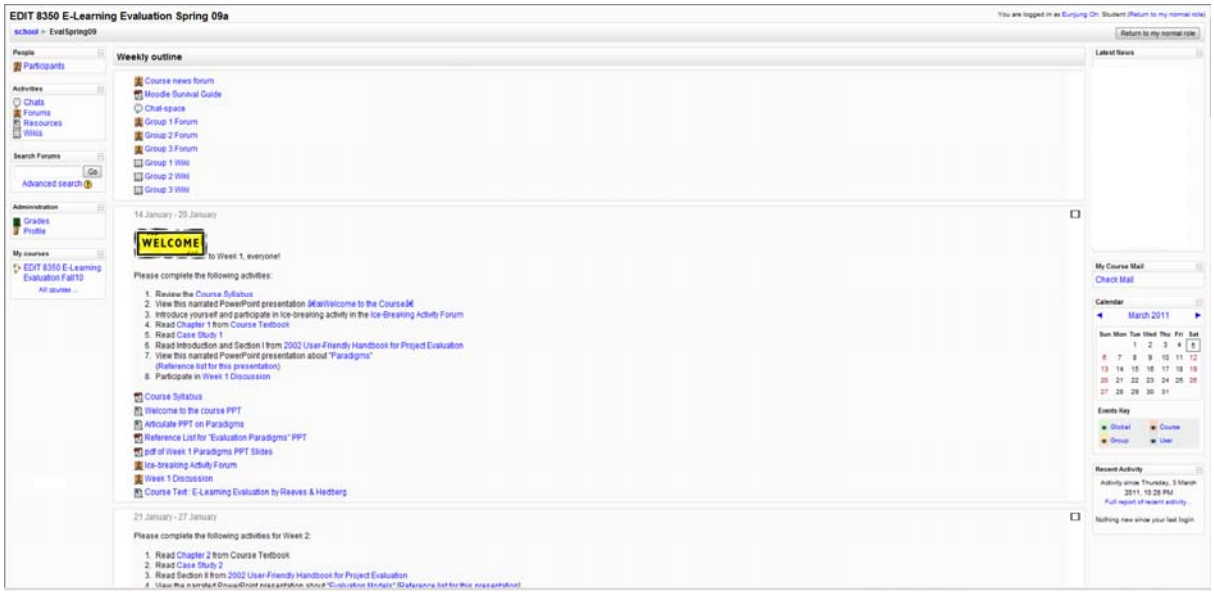


Figure 4.15. Course design version 3.0.

Data collection Methods

Consistent with the first and second iterations, data collection methods used four primary methods: 1) interviews; 2) surveys; 3) archival data and 4) online observations (see Table 4.3). However, the semi-structured interview protocols for pre, during, and post group work were slightly modified from the second iteration. As the course facilitators now joined a few meetings of each group, observations of those meetings were used as supplementary sources. The revised interview protocols used in the third iteration can be found in appendix E.

Findings of the Third Iteration (Spring 2009)

Participant Profiles. Seven of the nine students agreed to participate in the study. They were from six institutions in the United States and one institution in Europe. Two students were from the host institution, four from other North American institutions, and one from a European institution. By nationality, they represent five different countries. Only one of the seven students spoke English as their mother tongue. Regarding their academic backgrounds, two were Masters and five were doctoral students. One doctoral student had a full-time job while working in the

doctoral program; all other participants were full-time students. Most participants had online learning experiences and a reasonably strong confidence in their technology proficiency. Among these participants, five students were very familiar with online environments, and they had previous online group work experience. One student did not have as much experience as the others, but she has been actively interested in and learning about online learning. However, the online course was very new for one student, who was not majoring in Educational Technology. Students showed a high level of self-confidence in and motivation for the course. Based on the Students Profile Survey, information on the seven participants is summarized in Table 4.19. Group and individual names shown in the table are pseudonyms.

Table 4.19.

Participant profiles (Third iteration).

Group	Name	Gender	Age	Location/ Nationality	Self - Reported				
					# of online classes taken	Level of Technology Skills (x/10)	Online Group work Experience (x/10)	Level of Motivation and Long-term Goals	Level of Self-Confidence (x/10)
A	Liz	F	46-60	USA	1	Moderate: 5	No	High (Learning & Application)	High: 8
	Jina	F	26-35	USA/Korea	6	Expert: 9	Yes (Positive:8)	High (Learning & Application)	High: 8
B	Ella	F	26-35	Sweden	12	Expert: 9	Yes (Positive:8)	High (Learning & Application)	Moderate: 6
	James	M	26-35	USA/China	6 +	Almost Expert: 8	Yes (Positive:7)	High (Learning & Application)	Very High: 9
C	Ben	M	26-35	USA/Puerto Rico	Online Master's degree	Almost Expert: 8	Yes (Positive:7)	High (Learning & Application)	Very High: 10
	Will	M	26-35	USA/Korea	0	Almost Expert: 7	No	High (Learning & Application)	Very High: 9
	Vicki	F	18-25	USA/China	2	Expert: 9	Yes (Positive:7)	High (Learning & Application)	Very High: 9

Q1. What challenges do learners encounter when they work in groups in online learning environments?

During the third iteration, the overall students' group work was much improved. Compared to the first and the second iterations, there were no intense challenges, such as communication, social loafing, or group dynamics, that caused frustration among groups. However, from the surveys and interviews, participants from all three groups reported two related major challenges they experienced: delays in the work process and time management.

Delays in the work process and time management. A number of students mentioned delays and waiting during the work process as the most challenging aspects. Delays in the work process happened primarily because of unexpected and uncontrollable situations. For example, clients were busy with their schedules. Although clients requested evaluation on their e-learning programs because they needed external help, sometime their responses were not prompt enough for groups to make progress as they planned.

> James: For example, when we send something to the client, the clients maybe too busy and they just, I mean, they just rely on our expertise.…They just…..that we are doing a good job. And they don't read the documents. So I think that's might be a big problem in the later stages.
>
> Interviewer: Are they returning your documents, kind of too late?
>
> James: Yeah, it's too late. Or maybe they simply revel in a rush. (James, first interview)

Also, groups often had difficulty recruiting participants for their evaluation projects. Waiting for responses from potential participants delayed the project timeline.

> I think our biggest problem right after the second interview was the waiting time we were at that time. We already sent the survey out to the client or to the people that were going to participate or hopefully the people that we wanted to participate on the survey. And we had sent out invitations for the interview. And we were waiting for people to reply…….and I think that was probably the biggest. (Ben, third interview)
>
> I do have difficulties in finding the participants. One of the faculty members was responding to my emails a very quick in 5 days, actually. It was not very quick but she or

> he responded. The other two were responding my email two weeks after. So I have to wait three weeks to complete all three faculty interviews. (James, third interview)

Sometimes, weather conditions or holidays on the participants or clients' sides hindered data collection and delayed the project timelines.

> I think our biggest challenge, I guess, was trying to we had decided, we wanted to do three different methods of evaluation and because of the snow storm and things got pushed back and then, we knew we were up against deadline at the end of the semester. (Liz, third interview)

> We felt that our, we had a question, an online questionnaire and that that was kind of late because they had a longer semester or holiday than we did.… Another week of holiday still there. It all worked a bit later than we had expected to therefore it was a bit difficult in that part (Ella, third interview)

When these events occurred, students felt progress during this period was slower than they had hoped, became frustrated, and were stressed by lack of sufficient time before the deadline.

As there were delays in the process, groups had anxiety about time management. Events did not work out as they had planned and hoped. The authentic evaluation projects involved multiple activities, with many requiring a sequential process. For instance, without the clients' approval on instruments, groups could not recruit participants. Without participants, groups could not collect or analyze data. Unsurprisingly, groups had little time left when they finally were able to work on tasks over which they had full control.

> Time is your biggest concern. (Ella, first interview)

> I think we were just feeling pressure on trying to get everything done by the end of the semester. as far as actually conducting heuristic review once we decided what we wanted to do I think [group member A] mentioned that one of the interviewees [the client] chose three students but one of them actually didn't complete that portion of the class so I mean so we really only had two people's opinion for the phone interview to rely on. But you know it happens and I think yea our biggest challenge was just the calendaring the scheduling and trying to get done by the end of the semester. (Liz, third interview)

> My only challenge is time management…..but it was kind of a normal thing. (Jina, third interview)

> I guess the biggest challenge was to complete the final evaluation report on time (James, third interview)

In summary, in the third iteration, students did not have issues or concerns related to working with their group members. Rather, from the first interview, the groups' evaluation projects were their primary focus and concern, which can be considered a very legitimate source of anxiety.

> One is the schedules because when the semester comes to the end everybody tends to become very busy. But the project is also at this point is…..period because we have to collect data and writing the report and….the data. So I am not so confident that we can keep up the group work as well as we did in the previous weeks. That's my biggest concern. And also for the clients it's the same case they are the faculty in the universities. And they tend to become very busy in this period. (James, first interview)

> My biggest worry was ……actually focusing on getting the plan and then once we had the plan, we needed the data collected and, of course, we actually gave the final report that….concerns… Not so much the people but more like concerns about the tasks (Liz, second interview)

Although efforts for improvement are needed to overcome the challenges students encountered, particularly because they were common across all the groups, responses regarding group work in the third iteration were overall positive. Table 4.20 summarizes and compares the challenges discussed.

Table 4.20.

Summary of challenges groups encountered (First, Second & Third iterations).

Challenges (1st)	Challenges (2nd)	Challenges (3rd)
Communication related issues ▪ Working in different time zones ▪ Tool affordance and choices ▪ Major events in personal lives ▪ Culture and language Technology related factors Lack of sense of community and belongingness Differences in motivation, expectations and accountability Overly optimistic expectations regarding student self directness and autonomy Lack of leadership or ineffective leadership within groups	Communication Differences in expectations regarding commitment and product quality Insufficient knowledge or opportunity to learn about each other and build relationships as team members Uncontrollable challenges that retarded the work process Ineffective leadership	Delay in project process Time management

Q2. What are the attributes of groups working well together and what are the attributes of groups not working well together? What makes them different from each other?

In the first iteration, both groups were neither functional nor ideal. The second iteration had a combination of groups working well together and others not working well together. In the third iteration, although there were differences in work styles and group dynamics, all three groups worked well together and demonstrated many positive indicators in their group work.

Personal Satisfaction. Many participants reported satisfaction with their project, group work, and their team members. A number of students mentioned during interviews and course evaluation that they had learned most from working on their projects, and some said that the real-world evaluation project was the best part of the course. In terms of student satisfaction with group work, students were content with their team's productivity and work with their team members. They thought their groups were effective and functional in achieving the shared goals.

> I was pretty satisfied. If it's not, [it is] because of the limited time…I'm glad that I have very good team mates….I can see we cannot do too much about this timeline, so I understand that. They were, I mean, all the team members were very efficient in terms of completing the task. (James, third interview)
>
> The task was very successful, I think. (Jina, third interview)
>
> It was good, I think. It's like you learn from others and I think, I don't know, it was great, you know, everyone was working together to accomplish a common goal together….I am really satisfied. I think it was the end product was better than I expected, if I told you the truth. I didn't think we were going to get into as much detail both as we did. (Vicki,third interview)
>
> I think, overall, I had a fairly positive experience. (Liz, third interview)

Students tended to be more satisfied with their outcome products than the process portion because they had to work in a rush as the semester progressed because of the circumstances that delayed their process. However, generally speaking, students expressed their satisfaction with the experiences they had had.

Quality of deliverables. In terms of the quality of the evaluation reports, based on the instructor's assessment, they were good and satisfactory. Despite the challenges students experienced that retarded their group work process, groups finally put their data and analysis together and produced the evaluation outcomes. However, the instructor thought there was room for improvement.

> I would say that given the amount of modeling and scaffolding this group had they turned in projects that were good but not great. (Instructor interview, after the course)

Several potential reasons could have contributed to this result. In the instructor's opinion, having the same clients as in the second iteration could be one. Due to their prior experiences, these clients who had requested evaluation projects had very clear ideas about what they wanted. In addition, their projects were similar to previous projects; this allowed the groups to follow the previous students' models.

> It's interesting. I think in two of the teams, I probably didn't get in retrospect, it might have been better if they had had clients who hadn't been clients before. (Instructor interview, after the course)

It could be easier for students to work on projects of this kind *because* guidelines are more specific and sufficient scaffolding is given. Conversely, it could be more difficult for students because their clients might limit the students' creativity and desire for exploration on their evaluation projects. From the instructor's perspective, because there were more models, resources, and scaffolding given to these students compared to previous students, the outcomes were of higher quality.

Communication, Interaction and Balance of Workload. Ineffective communication, inactive interactions, and an imbalanced workload were the most significant issues in previous iterations. In this iteration, student comments about communication, interactions, and balance of workloads were very positive. Actually, some participants mentioned that what they liked most was communication or conversation with their group members, and effective communication was the success factor in their group work.

> I like to, I think what I enjoyed the most is to learn from [member A] and [member B] how to communicate with the team members. And they are very good at communicating. That's what I enjoy most. (James, third interview)

> I think it[the success factor] was communication…people's engagement. (James, third interview)
>
> I think we worked quite well. We were all very, I think, the communication was very good. (Ella, third interview)
>
> I think we communicated well. (Will, third question)
>
> In this group, I think our communication is good and everyone is like sharing opinion and encourage to hear other people's opinion and open-minded. (Vicki, Final Interview)

Although there were slightly different communication *styles* across groups, all three used Skype for group and clients meetings, with emails for asynchronous communication and Wikis for updating their meeting minutes. Two groups had regular weekly meetings and exchanged emails actively in between. One group had weekly meetings for the first half of the semester and a few meetings for the rest of the semester, depending upon their needs, and exchanged emails very actively.

One student, whose major was not instructional technology, was very new to both this field and online learning. At first, he struggled significantly with his work in the course because both communicating and working online with others and the subject itself were totally new to him. However, he commented that communication with his group members was the best experience, after all.

> Maybe the conversation…..I think communication was most, best experience. Usually I meet people I have a meeting with people and you know so difficult you know up person's eyes you know and talk with them and just chatting and email, just email first time it was very difficult for me to meet other people through emails and chatting but especially in English but I'm getting comfortable with that I think. So I think I'm comfortable with that and just try to find some question in this environment so yea experiencing like online communication was really good. (Will, third interview)

He said that communication was very positive because he felt a social support from his group members when he began to lack confidence and lose interest in the course. Communicating with his group members was "very enjoyable" to him. Initially, communicating and working via email

and chat were a fairly new concept to him. However, being a part of his group and experiencing active interaction and conversation within the group made him "more responsible" to his group members even though they did not meet and work face-to-face.

Another international student initially had communication as her major concern. During the first interview, she expressed her concern about communicating with her group members and with the clients. She worried about potential misunderstandings because of her English skills and their working at distance. However, during the final interview, she mentioned that she felt she had "communicated with team members better and better." Her team members noted in peer evaluations that they thought they communicated with her very well and appreciated her patience, although there were a few occasions of misunderstanding during email interactions.

None of the research participants complained about imbalanced workloads, and there was no obvious social loafing. Students were very busy with school work; however, group members were responsible about their parts and also helped each other when one member was too busy to complete his or her portion on time.

> I believe it was divided equally I don't think anybody had an excessive amount. (Ben, third interview)

> I think it was because of three team member were all of us were very interested in this topic and we all wanted to learn something from this course and we communicate very, how can I say, effectively. (James, third interview)

During the interviews, when students were asked about others' contribution, they clearly knew who had contributed which part. They also appreciated unique contributions from others and the opportunity to learn from each other. A number of students also mentioned during interviews and peer evaluations that they enjoyed working with their group members and would like to work with them again if there were opportunities in the future.

Leadership/Project Management. Leadership styles were different in each group; however, generally group members appreciated and acknowledged their leaders' efforts and contributions to make their groups work together well.

> [Group leader] is very responsible for the project. She initiates the client meeting at the early stage of the course. And she kept the team on schedule.
>
> [Group leader] as the team leader assigned the tasks well.
>
> Willingness to accept others' suggestion
>
> As a leader, [group leader] enthusiastically participated in our group project and he also motivated other team members.
>
> Very sensitive to including others and supportive. Very easy to work with.
>
> She always tried to lead each of members to have equal voices. And she was very skilled in reaching consensus so that there was a feeling of openness and trust in our team.
>
> (Comments about leaders, Peer evaluation)

According to participants, their group leaders were good at delegating *tasks*; communicating with group members, instructor and clients; and organizing resources and process. They were also open to and appreciative of other members' ideas and opinions, and they facilitated good conversation to make important decisions together.

The project management itself was not the most perfect because of delays caused by the clients. However, despite impediments beyond their control, leaders managed the projects fairly well considering the limited amount of time over which they had actual control.

Collaboration / Cooperation. Among all three iterations, groups in this iteration probably collaborated most. There was a division of work; however, they constantly held discussions during regular synchronous meetings and via emails. There were substantial discussions about their projects within the groups at a cognitive level. A number of students said they had learned a lot from other group members and appreciated the opportunities to learn from each other.

> I think both of them have done some type of evaluation before, I think, [group member A] more than [group member B] for previous class. And I hadn't done. This is my first evaluation, so I did learn a lot form them on how to conduct evaluation the type of questions we should ask and all that kind of stuff. So, they did help me a lot. (Ben, third interview)

> We had some good discussions…..I remember talking about, you know, what is the point of what we are trying to accomplish here. We gathered around a bunch of ideas and settled on a heuristic review for our interviews and online surveys. And, you know, those seemed to be at least in our situation, the most feasible and we talked about the importance of trying to triangulate it if at all possible. So, we were trying to come up with three that we could actually feasibly accomplish. And so, I remember that, that was an interesting discussion we had. And then, as we were starting, as we were finishing up our report, we were talking about like, the findings and on the executive summary finishing that up. (Liz, third interview)

Students also mentioned that insights from others or strengths of others allowed them to accomplish their project easier.

> I like the most the contribution. Like that contribution that we all had. our specific yeah, the parts we worked, good in and all three of us made it, made it a lot better than just doing it one of us. (Ella, third interview)

> She brought a difference to the group, which helped us think outside the box. (Comments from Peer evaluation)

> [Group member A] is a quick thinker. During the meetings she summarized whenever needed. That was very helpful. (Comments from Peer evaluation)

Student collaboration occurred through discussion group meetings, email exchanges, and reviews of each other's documents. In addition, when students were too busy or having a difficult time completing their own parts on time, group members took action and helped each other.

> I think we worked pretty good together. Probably or I don't think it was our base problem but probably the hardest part was [group member B] had a lot of work with all his classes. so lots of times we were trying to do something by a certain date and we were getting close to our own deadlines……We were getting close to those deadlines because he was still managing his other school work. And that's when [group member A] and I will jump in and help. And the same thing happened with the three of us, I think. So that's probably the biggest part balancing our school work based on our own deadlines. (Ben, third Interview)

During the interviews, students shared how they contributed improvements to certain parts of the projects through collaborative efforts and how others helped them to improve their parts as well. Overall, although students had sections they were responsible for, they put substantial collaborative effort into accomplishing the project in a competent manner.

Differences in Opinion and Negotiation. All three groups reported that there were no conflicts among their members during the term. However, there were differences in opinions during the group work. Since trust and a sense of safety was built up within the groups, group members were not afraid of raising questions when they disagreed or provided critical reviews of each other's writing.

> We have a good relation that way that we can express what we want to say and not be afraid that the other person will be intimidated or anything like that. (Ben, second interview)

> I think probably the biggest contributing factors to being successful are listening to others ideas and not being so vested or think that your ideas are the best, you know, be willing to listen to others and then when it comes to the writing just, you know, I don't know some people really get offended when you start changing how they wrote something, but you know, you are writing a lot of documents and there's three or four people doing writing to make it flow. You really have to be open to change because you've got different writing styles and you don't want it to be obvious that A wrote the heuristic review and B wrote this part and C wrote that part. You want it to flow and be readable. (Liz, third interview)

In this iteration, group members got to know each other early on and became aware of the different strengths and prior professional experiences of the other members. When differences in opinion arose, they were able to conduct constructive discussions in a respectful manner.

> Instrument that they developed…..Questions were too simple, like yes or no….To me, like "wait, we can't catch like meanings or their reaction in this way." and then I changed a lot….But when I changed that, I remember that our people ask me, "Why do you ask these?" "Why do you change this" So I had to explain….. I just try to persuade them. (Will, second interview)

> Well, we don't have very big disagreements, but sometimes, well, sometimes I was thinking about something, I would suggest. And then I would just send it by email. And

> then, I would say, "How about we do this, how about we do that?" And then [group leader] will reply and [another group member] will reply and then we will finalize that. (Vicki, second interview)

By sharing opinions and negotiations in this manner, groups constructed and strengthened their product outcomes.

Table 4.21 presents a summary of attributes of the three third iteration groups.

Table 4.21.

Summary of attributes of groups (Third iteration).

Attributes	Group 1	Group 2	Group 3
# of members Effectiveness / Functionality	3 Yes	3 Yes	3 Yes
Quality of deliverables	Good	Good	Good
Communication / interaction (# of people)	Active (3)	Active (3)	Active (3)
Fairness and balance of workload (# of free-riders)	Fair (0)	Fair (0)	Fair (0)
Leadership / Project Management	Effective	Effective	Effective
Collaboration/ Cooperation	Collaboration with individual task accountability	Collaboration with individual task accountability	Collaboration with individual task accountability
Conflict and Resolution	Some differences in opinions but negotiated well	Some differences in opinions but negotiated well	Some differences in opinions but negotiated well

Q3. What supports or scaffolding do learners need during the group work process?

Overall, this iteration was successful. *Students* appreciated the refined design and implementation based on findings from the previous iterations. Regarding further support for challenges students encountered, providing more task-centered scaffolding to improve time management was important.

Provide more task-centered scaffolding to improve time management. Preventing impediments to effective project time management, such as client situations, severe weather, and difficulty in recruiting participants, was somewhat beyond students' control. These situations are difficult to control, even by the instructor. During the interviews, students simply mentioned that it would have been better to give them more time to complete their projects. However, both the course and project are one semester long and students cannot have more project time unless the course was longer than a semester. Realistically, what the instructor and facilitators can do to improve this situation in the future is twofold.

First, guide future students more strategically to manage their project time without as much stress about the lack of time remaining to work on their projects. For instance, students tended to spend more time than necessary on their instrument development. Also, typically group work tended to become delayed between data collection and analysis. After assigning groups and before work began on evaluation plan documents, it would be useful to provide an overview of their evaluation project and outline very clearly all the subtasks to be accomplished to complete the project. Then, require students to create an overall project timeline as their first group outcome. During this process, the instructor can direct students to have a tighter timeline for the period until they send invitation emails to potential participants and thereby allot more time from they recruit participants to they actually get data to analyze. In addition, asking them to create a timeline as a group task early in the semester can set the tone that students need to work on projects in a fast-paced way.

Second, another strategy is to re-structure weekly course activities with consideration of students' workload in different phases of their group work. Currently, there is somewhat less work assigned in the later weeks of the semester; however, students seemed to focus on data

analysis and final writing after waiting quite a bit for finally obtaining data to analyze. For instance, fewer weeks could be assigned for students to complete their evaluation plan documents. Perhaps, the content on data analysis can be introduced earlier. Individual quizzes can be rescheduled to the earlier weeks. By doing so, students can focus more closely on their collaborative report writing for the last few weeks without worrying about needing to complete other activities simultaneously.

Discussion: Finalized design principles and strategies.

The primary concentration of this iteration focused on how to decrease social loafing issues by helping students 1) develop a positive interdependence as well as 2) create a strong sense of individual accountability for the project. The design principles guiding the design and implementation of the third iteration were the following: 1) facilitating communication; 2) establishing a strong sense of community and helping students develop a sense of belongingness to their groups and the class; 3) providing a variety of technology everyone could use; 4) maximizing opportunities for collaboration and scaffolding the group work process; 5) creating opportunities for establishing positive interdependence; 6) enhancing individual accountability, motivation, and engagement for active participation in group work; and 7) facilitating individual student learning about evaluation. By incorporating all these design principles and strategies, students had positive experiences with the entire course and their group work. Refined design principles and strategies for the second iteration were successfully implemented. Interviews revealed that the ones newly added chiefly to support students' positive interdependence and individual accountability were also well-received by students. Although students had challenges, it is worth noting that these challenges pertained only to tasks and not to people. Actually, it appeared with whom they worked were helpful for them to get through the challenges with tasks.

The findings and student outcomes corroborate that students had effective collaborative group work experiences.

During the final interviews and course evaluations, when students were asked to give advice to future students, they shared suggestions similar to what previous students had mentioned. However, differences among the advice from earlier iterations and the most recent one existed because the third iteration student comments were primarily based on positive and successful experiences; in contrast, the advice previous students provided was often based on the mistakes and difficulties they had experienced. Although the majority of the design principles and strategies have been retained, one design principle needs refinement: maximizing opportunities for collaboration and scaffolding the group work process.

Design Principle Four: Maximize the opportunities of for collaboration and scaffold group work process. Due to the authentic nature of the task, just as professional evaluators experience challenges with project management or time management, so did students in this course experienced similar issues. As Wang (2009) claimed, collaboration over authentic real-world tasks naturally creates challenges. One strategy related to task-centered scaffolding is to help students develop a "big picture" view of their evaluation project, similar to professionals initially drawing a project timeline and delineating subtasks to complete their projects. The course illustrated the basic week-by-week activities necessary for completing the evaluation project. Although students knew they were going to work on evaluation projects, it would not have been realistic to expect students to plan the timeline of the project, delineate subtasks and be flexible in case of delays. Although students as novice evaluators still need structure and deadlines to help them with the weekly subtasks, it would be helpful for them to develop a macro

perspective first. The instructor and course facilitators can guide them in creating a realistic timeline that can also respond flexibly to unavoidable challenges.

To optimize the group work process, another strategy to include is structuring course activities by considering the workload in terms of the flow and different phases of the group project. Professional evaluators prioritize different tasks and projects on their own by considering the progress and workload of each project they take on. However, students work on projects as a part of their learning process and engage in additional course activities to enrich their learning about evaluation. It is more appropriately the instructor's role to arrange and structure course activities in consideration of the students' workload during the different phases of the group project. Based on three iterations, there are subtasks that students must complete to finish the entire project, and there are patterns in the flow and workload of their group work. Therefore, it can be predicted when students will have time for the other course activities and when they will need to focus more closely on their group work.

Table 4.22 presents the design principles and strategies that were refined based on the findings of the third iteration.

Table 4.22

Finalized design principles and strategies

Principles	Design and Implementation Strategies
1. Facilitate communication	▪ Provide strong instructor and facilitator presence in various ways ▪ Emphasize the importance of regular synchronous meetings ▪ Enhance the quality and quantity of course discussion ▪ Model optimal communication behaviors, styles and methods ▪ Assign groups considering time zones
2. Establish a strong sense of community and help students have sense of belongingness to their groups and the class	▪ Guide the first group meeting to get to know each other, form impressions of co-members, and continue to promote the development of good working and social relationships ▪ Provide social spaces and contexts throughout the semester ▪ Establish culture of knowledge sharing and open communication
3. Provide a variety of technology everyone can use	▪ Provide group spaces and encourage their use ▪ Provide group writing and editing tools ▪ Provide both synchronous and asynchronous tools ▪ Provide overt guidance for students to take advantage of the tools in proper ways
4. Maximize opportunities for collaboration and scaffold group work process	▪ Assign heterogeneous groups by considering factors such as time zones, online learning and online group work ▪ Have each group select a group leader and provide guidance regarding the leader role ▪ Provide guidance for effective group work ▪ Have groups upload meeting minutes to monitor group work progress ▪ Provide task-centered scaffolding ▪ Structure course activities considering the workload of different phases and flow of group project ▪ experiences, technology proficiency, and educational background ▪ Monitor group development and dynamics and throughout the semester frequently check in with the groups regarding their group work process
5. Provide opportunities for establishing positive interdependence	▪ Guide students to have conversations regarding their expectations and goals ▪ Emphasize the importance of positive interdependence and collaboration ▪ Guide students to establish ground rules

Table 4.22

Finalized design principles and strategies (continued.)

6. Enhance individual accountability, motivation, and engagement for active participation in group work	▪ Assign three people per group ▪ Use authentic evaluation projects that have real-life relevance to students ▪ Incorporate a variety of assessment strategies ▪ Share the instructor's expectations regarding learning outcomes, commitment, and performance ▪ Encourage student autonomy yet provide sufficient course structure and specific guidelines
7. Facilitate individual student learning about evaluation	▪ Provide a course structure encouraging and assessing both group and individual performance in terms of outcome and participation ▪ Provide diverse resources such as narrated PPT lectures, evaluation cases, previous project examples, templates, scenarios, and multimedia tutorials

Implications for Research and Practice

The experience of and findings from the three iterations of this educational design research study indicate potential implications for future research on online collaborative group work, and future practices in online evaluation courses or online courses using both collaborative group work and authentic learning tasks as major pedagogical strategies. This study includes the unique voices and experiences of 23 doctoral and Masters students from multiple institutions worldwide, and the instructor and two course facilitators who were also designers and design researchers. I have organized implications into two categories—research and practice, as educational doctoral research has dual goals.

Limitations and recommendations for the future research. The purpose of this educational design research study was to 1) optimize learners' collaborative group work as they work on authentic learning tasks in an online evaluation course as well as 2) develop contributing design principles and a model for supporting online collaborative group work. The study examined the challenges students encountered, attributes of effective and ineffective

groups, and scaffolding to overcome the encountered challenges. By undergoing this process during the course, design principles and associated strategies were developed.

The study is unique for the following five reasons: 1) its unique development research goal integrated with the use of extensive qualitative data collection and analysis, 2) students with exceptionally diverse backgrounds and dispersed locations, 3) an instructor who is an expert evaluator with extensive experience in teaching evaluation in his first experience teaching a wholly online course for geographically distributed students, 4) real world clients who contributed to the dynamics and processes of group work, and 5) the influence of the researcher's perspective (who performed three roles: researcher, designer, and course facilitator) on data collection, analysis, and interpretation.

From the researcher's perspective, this study, as with all educational design research studies, has limitations that inspire recommendations for future studies. First, the study is based upon 23 participants' stories, out of the 33 students who took the course. Three students from two groups in the first iteration, five students from the four groups in the second iteration, and two students from the three groups in the third iteration are not a critically large number compared to the overall numbers of the research participants as, generally one student out of each four-or three-member group was missing. Although most of the focus was on how the groups functioned together and how they could perform better, the ideal would have been to listen to all group members' voices when studying group work. However, participation was voluntary, and 10 students did not agree to take part in the study. As a researcher, I certainly noticed that some of those 10 students who did not participate tended toward social loafing and thus caused frustration and challenges to their groups. Even though other surveys and interviews with research participants somewhat revealed the thoughts, behaviors, and work patterns of these

students who contributed less, these secondary sources were not be as rich as actual interviews with these sometimes lower-performing students would have been. Although other students perceived some of these non-participants as the primary "troublemakers" in their groups, the students may have encountered unidentified challenges during the group work and may have had legitimate reasons for contributing less as group members. If it were possible in future research, it would be very helpful to explore these missing voices.

Second, some of the data that would more perfectly reveal findings and answer questions are realistically hard to obtain. As the scope of the projects was large, working on them required a constant and intensive commitment, and the process was quite complicated; using the tools that a typical course management system provides does not enhance effective communication and group work. It is absolutely impossible to require students to use only the tools that researchers can observe and trace. Although Moodle was used as the course management system, and it worked well for tying the whole course together, the most convenient communication tools for students in terms of frequent access and technological affordance were email and Skype. Although all the collected data from multiple resources helped me establish a significant understanding of the communication and group work processes, following all the emails exchanges and attending all the group meetings would be the best way to capture the process.

Third, an important next step of this research project would be to explore the sustainability, transferability and generalizability of the outcomes of this design research project. Although design principles, design/implementation strategies, and enacted course components and interventions were well applied in the third iteration of this course through iterative cycles of design, implementation and redesign, the outcomes should be sustainable at the local level without the presence of design researchers. In addition, an important goal that any educational

design research project pursues is enabling the application of design research outcomes beyond local contexts (Gravemeijer & Cobb, 2006; Plomp & Nieveen, 2009). To do so, in later stages of design research projects, researchers ideally attempt to apply and test the solutions and design principles in varied settings and wider domains (Plomp & Nieveen, 2009). In this project, if there had been more time, the next step could have been to test for outcomes in the same course without the presence of design researchers, and then to test the outcomes in a variety of settings such as other online evaluation courses or courses using comparable pedagogical approaches.

Recommendations for future practice. During this design research project, I considered three important criteria regarding the course and developed design principles: usefulness (Edelson, 2002); sustainability at the local level without the presence of researchers (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006); and generalizability of findings and design principles in broader contexts (Gravemeijer & Cobb, 2006; van den Akker et al., 2006). With respect to usefulness, it is important to note that the project was to develop an entire course and make it work by focusing primarily on optimizing students' collaborative group work. This online course design would be particularly useful for instructors who want to convert a face-to-face course to an online version, although it could also be useful to online instructors wishing to improve their students' collaborative group work. With respect to sustainability at the local level, after the third iteration, the instructor/practitioner turned the course over to a new instructor. The new instructor certainly maintained the focus on group work and authentic tasks, but the course reverted to a face-to-face model offered at only the originating university. With respect to generalizability of the findings, that will be examined as part of my own future research agenda as well as by any other researchers who are encouraged by this study to conduct inquiry in a similar vein.

For the most part, the findings of this study would be best applied to online courses that have an application-oriented nature with goals focused on fostering effective application and transfer of knowledge and skills to real world contexts. I believe that the design principles and strategies identified in my study are robust because most were used in the second and third iterations during which their usefulness was corroborated in optimizing students' experiences. However, from the designer and course facilitator's perspectives, the final version of the course and the design principles that emerged had some additional limitations.

First, although I believe the final version of the course is sustainable, this belief was not verified with an additional iteration without the researchers' presence. The reason I believed so is twofold: first, the structures, activities, resources, and interventions have already been developed and applied. Second, there were not many interventions during the third iteration in which the design researchers were actually engaged. Rather, the instructor was able to implement most of the course activities and interventions independently. However, such a conclusion is mere conjecture until it is tested.

Second, the application of design principles and strategies has yet to be examined in a similar environment. When thinking of their application in broader contexts, online evaluation courses are good candidates because many evaluation course instructors use an experiential learning approach (Trevisan, 2004). The major pedagogical approach of any courses to which the findings of my study are applied should be authentic learning tasks (Herrington, et al., 2010). I also believe that, depending on the context in which an instructor uses these design principles and strategies, he or she will likely need to adjust these components. For example, students in this course were not from the same institution or country. Many of them did not know each other at all before the course, and they were dispersed over the world. These circumstances definitely

presented many challenges. However, in graduate studies, students from the same program usually take courses together. If it is not their first semester, friendships are often already established because of the cohort system. In such cases, instructors may be able to omit some of the strategies related to time zones or building a sense of community.

One of the strengths of the outcomes of this research is that the course used very familiar and free technologies. For instance, Moodle was used as a course management system. However, for designing and implementing an online evaluation course with the interventions, design principles, and strategies used in this course, an instructor should be able to employ another course management system his or her school commonly uses as long as the course management system offers a space for discussions, resources, and presentations of students' weekly activities. The purpose for Moodle was to tie the course components together. Students' primary tools for group work were their personal emails and Skype, and their group collaboration did not necessarily take place in the Moodle space. Therefore, although Moodle Wiki was used, another tool can be substituted.

In terms of courses on topics other than evaluation, courses involving a semester-long authentic project with clients can be candidates for application. Online instructional design courses are one type that can use the design principles and strategies derived from this study.

Conclusion

This two-year multi-phased educational design study was initiated by the aspiration of one instructor who wanted to offer his evaluation course to students in other institutions and provide them with learning opportunities. The two primary pedagogical approaches, authentic learning tasks and collaborative group work, were not always unproblematic for his students during the 15 years of face-to-face classes. However, it was important to him that these online

students have meaningful learning experiences of the same richness that students had previously experienced. By carrying out three iterative cycles of design, implementation, data collection, data analysis, and redesign, by the third iteration the course was well delivered to students. With the extensive data collection from diverse sources, the findings revealed challenges that students encountered, attributes of effective and ineffective groups, and ways to scaffold online groups when working on authentic projects. Hopefully, the seven design principles and thirty associated strategies that emerged from my study will help instructors who may be hesitant to put one of their courses online because they have felt their course was too application-oriented for an online version, or who may have struggled with the quality of instruction that they could deliver online compared with their face-to-face class.

References

Baker, M., Hansen, T., Joiner, R., & Traum, D. (1999). The role of grounding in collaborative learning tasks. In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 31–63). Oxford: Pergamon.

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher, 32*(1), 21-24.

Bernard, R. M., Rojo de Rubalcava, B., & St-Pierre, D. (2000). Collaborative online distance learning: Issues for future practice and research. *Distance Education. 21*(2), 260-277.

Brewer, S. & Klein, J. D. (2006). Types of positive interdependence and affiliation motive in an asynchronous, collaborative learning environment. *Educational Technology Research & Development, 54*(4), 331-354.

Charmaz, K. (1998). *Constructing grounded theory: A practical guide through qualitative analysis.* London: Sage.

Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher, 32*(1), 9-13.

Cole, J., & Foster, H. (2007). *Using Moodle: Teaching with the popular open source course management system* (2nd ed.). Sebastopol, CA: O'Reilly Media.

Collins, A. (1992). Towards a design science of education. In E. Scanlon & T. O'Shea (Eds.), *New directions in educational technology* (pp. 15-22). Berlin, Germany: Springer.

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research (3ed.).*Thousand Oaks, CA: Sage Publications.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.). *Collaborative-learning: Cognitive and Computational Approaches* (pp.1-19). Oxford: Elsevier.

DBRC. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher, 32*(1), 5-8.

Edelson, D. C. (2002). Design research: What we learn when we engage in design. *Journal of the Learning Sciences, 11*(1), 105-121.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: John Wiley & Sons.

Glazer, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Chicago: Aldine.

Graham, C. R., & Misanchuk, M. (2004). Computer-mediated learning groups: Benefits and challenges to using groupwork in online learning environments. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 181-202). Hershey, PA: Information Science Publishing.

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 17-51). London: Routledge.

Harasim, L. (1990). Online education: An environment for collaboration and intellectual amplification. In. L. Harasim (Ed.), *Online education: Perspectives on a new environment* (pp. 39-66). New York: Praeger.

Hathorn, L. G., & Ingram, A. L. (2002). Online collaboration: Making it work. *Educational Technology, 42*(1), 33–40.

Haythornthwaite, C., Kazmer, M. M., Robins, J., & Shoemaker, S. (2000). Community development among distance learners: Temporal and technological dimensions. *Journal of Computer-mediated Communication, 6*. Retrieved on October 10, 2010 from http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2000.tb00114.x/full

Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.

Hostetler, K. (2005). What is "Good" educational research? *Educational Researcher, 34*(5), 16-21.

Johnson, D. W., & Johnson, R. T. (2005). New developments in social interdependence theory. *Psychology Monographs, 131*, 285-358.

Johnson, D. W., & Johnson, F. (2006). *Joining together: Group theory and group skills* (9th ed.). Boston, MA: Allyn & Bacon.

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher. 38*(5), 365-379.

Jonassen, D. H., Lee, C., B., Yang, C, -C., & Laffey, J. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (pp. 247-270). New York: Cambridge University Press.

Joseph, D. (2004). The practice of design-based research: Uncovering the interplay between design, research, and the real-world context. *Educational Psychologist, 39*(4), 235-242.

Kelly, A. (2006, March). Professor of Educational Psychology, George Mason University, Interview (Is Design-based Research a method on its own?) Video file retrieved from http://projects.coe.uga.edu/dbr/expertinterview.htm

Kirschner, P. A. (2002). Can we support CCSL? Educational, social and technological affordances for learning. In P. A. Kirschner (Ed.), *Three worlds of CSCL: Can we support CSCL* (pp. 7–47). Heerlen: Open Universiteit Nederland

Kreijns, K., & Kirschner, P.A. (2004). Designing sociable CSCL environments: Applying interaction design principles. In J.W. Strijbos, P.A. Kirschner, & R.L. Martens (Vol. Eds.), *Computer-supported collaborative learning: Vol 3. What we know about CSCL and implementing it in higher education* (pp. 241-263). Boston, MA: Kluwer Academic Publishers.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2002). Sociability in computer-supported collaborative learning environments. *Educational Technology and Society, 5*, 8-22.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A Review of the Research. *Computers in Human Behavior, 19*, 335-355.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

Maxwell, J. A. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher, 33*(2), 3-11.

McConnell, D. (2006). *E-Learning groups and communities.* Berkshire: The Society for Research into Higher Education & Open University Press.

McKenney, S., Nieveen, N., & van den Akker, J. (2006). Design research from a curriculum perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 67-90). London: Routledge.

Merriam, S. B. (1998). Qualitative research and case study application in education. San Francisco: Jossey-Bass.

Merriam, S. B. & Associates (2002). *Qualitative research in practice*. San Francisco: Jossey-Bass.

Nam, C. W., & Zellner, R. D. (2011). The relative effects of positive interdependence and group processing on student achievement and attitude in online cooperative learning, Computers *& Education, 56*(3), 680–688

Paulus, T.M. (2009). Online but off-topic: Establishing common ground in small learning groups. *Instructional Science, 37*(3), 227-245.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd Ed.). Thousand Oaks, CA: Sage.

Plomp, T., & Nieveen, N. (Eds.). (2009). An introduction to educational design research. Enschede, The Netherlands: SLO. Retrieved April 16, 2009, from http://www.slo.nl/downloads/2009/Introduction_20to_20education_20design_20research.pdf/

Reeves, T. C. (2000). Socially responsible educational technology research. *Educational Technology, 40*(6), 19-28.

Reeves, T. C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 52-66). London: Routledge.

Reeves, T. C., Herrington, J., & Oliver, R. (2002). Authentic activities and online learning. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality conversations: Research and Development in Higher Education* (Vol. 25, pp. 562-567). Jamison, ACT: HERDSA.

Reeves, T. C., Herrington, J., & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research & Development, 52*(4), 13-65.

Roberts, T. S. (Ed.). (2004). O*nline collaborative learning: Theory and practice*. Hershey, PA: Information Science Publishing.

Roberts, T. S., & McInnerney, J. M. (2007). Seven problems of online group learning (and their solutions). *Educational Technology & Society*, *10*(4), 257-268.

Roschelle, J., & Teasley, S. D. (1995). The construction of shared knowledge in collaborative problem solving. In C. O'Malley (Ed.), *Computer-supported collaborative learning* (pp. 69-100). Berlin: Springer-Verlag.

Rovai, A. P. (2001). Classroom community at a distance. A comparative analysis of two ALN-based university programs. *Internet and Higher Education, 4*(2), 105–118.

Russo, T. C., & Campbell, S. W. (2004). Perceptions of mediated presence in an asynchronous online course: Interplay of communication behaviors and medium. *Distance Education, 25*(2), 215-232.

Strauss, A. L., & Corbin, J. M. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Strijbos, J. W., Martens, R. L., & Jochems, W. M. G. (2004). Designing for interaction: six steps to designing computer-supported group-based learning. *Computers & Education, 42*(4), 403–424.

Thompson, L. & Ku, H-Y. (2006). A case study of online collaborative learning. *The Quarterly Review of Distance Education, 7*(4), 361–375.

Trevisan, M. S. (2004). Practical training in evaluation: A review of the literature. *American Journal of Evaluation, 25*(2), 255-272.

Tu, C-H., & McIssac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education. 16*(3). 131-150.

van den Akker, J. (1999). Principles and methods of development research. In J. van den Akker, N. Nieveen, R. M. Branch, K. L. Gustafson & T. Plomp (Eds.), *Design methodology and developmental research in education and training* (pp. 1-14). The Netherlands: Kluwer Academic Publishers.

van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006) *Educational design research*. London: Routledge.

Wang, F., & Hannafin, M. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research & Development, 53*(4), 5-23.

Wang, Q. (2009). Design and evaluation of a collaborative learning environment, *Computers & Education, 53,* 1138–1146

Yin, R. K. (2006). Case study methods. In J. L. Green, G. Camilli, and P. B. Elmore, (eds.), *Handbook of Complementary Methods in Education Research* (pp. 111-122). Washington, DC: American Educational Research Association; Mahwah, NJ: Lawrence Erlbaum.

CHAPTER FIVE

CONDUCTING EDUCATIONAL DESIGN RESEARCH AS A DOCTORAL STUDENT: PROCESS AND LESSONS LEARNED[3]

[3] Oh, E., & Reeves, T. C. To be submitted to *Educational Designer*

Abstract

Recently, much attention has been given to educational design research as an alternative approach to traditional research that can contribute to the enhancement of educational practice and further advance the body of knowledge that can guide further innovation. Even though design research requires a longer and more intensive commitment to disciplined inquiry than some other approaches, it is important for young researchers such as doctoral students to learn more about educational design research. A shared foundation for this approach is still evolving, and doctoral students may contribute to this foundation through their own educational design research. Although there are many challenges, educational design research is feasible for a dissertation study when doctoral students aspire to pursue investigations in collaboration with practitioners and plan ahead. In this paper, I would like to share my educational design research experience during my doctoral program by reflecting on the process and lessons that I learned through my mistakes, struggles, and achievements.

Educational Design Research

Problems and issues regarding teaching and learning at all levels of education are persistent and cannot be easily understood or resolved by isolating one factor from another. Environments for teaching and learning whether physical classrooms or online courses are exceedingly complex, involving myriad processes and phenomena that interact in often-unpredictable ways. Traditionally, educational research has focused more on the rigor of a study's design and control of the methodology over other aspects of the research (Reeves, 2011). However, those studies that typically pursued theoretical or predictive goals have consistently produced a "weak link with practice" (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006, p. 4) and often have yielded *no significant difference* with respect to students' learning (Reeves, 2006; Reeves, Herrington, & Oliver, 2005). Additionally, studies grounded in the qualitative research tradition that have interpretivist research goals often produce descriptive knowledge that may be interesting in its own right, but is often not sufficiently useful for solving the problems that practitioners confront (Savenye & Robinson, 2004; van den Akker, 1999). Moreover, innovations developed by practitioners alone are often ineffective because those designs are not likely to be based on "empirically grounded theories" (van den Akker et al., 2006, p. 3). Most educational researchers strive to be rigorous in their own way, yet have not conducted research that is relevant enough to the needs of educational practitioners.

Since the early 1990s, there has been an important movement toward conducting educational research relevant to improving educational practice as well as including the rigor needed for contributions to the body of scholarly knowledge (Reeves, 2011). The efforts of educational researchers to move toward pursuing this new "educational design research" paradigm (van den Akker et al., 2006) are based on the aspirations of many of them to conduct

more "socially responsible research" (Reeves, 2000; Reeves et al., 2005). Proponents claim that educational design research is a viable alternative to more traditional approaches that have largely failed to improve the effectiveness, impact, and/or efficiency of real world teaching and learning. Over two decades, this approach has been discussed very actively in communities of educational scholars (Kelly, Lesh, & Baek, 2008; van den Akker et al., 2006). A conceptual consensus on this emerging research paradigm is being constructed through publications, workshops, graduate courses, and conference sessions regarding its essential characteristics, definitions, terminologies, procedures and study cases (Oh & Reeves, 2010). Although discussion on this approach continues to proceed, many scholars would agree that educational design research is

> a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories. (Wang & Hannafin, 2005, p. 6)

In pursuit of a balance between rigor and relevance in educational research (Reeves, 2011), design research aims to accomplish the dual goals of improving teaching, learning, assessment, and so forth in specific locales while at the same time establishing empirically grounded and sharable theories, design principles, and models that capture the essence and patterns of teaching and learning beyond the local situations, and which ideally can be applied in broader settings (Bannan-Ritland, 2003; Barab & Squire, 2004; DBRC, 2003; Edelson, 2002; Gravemeijer & Cobb, 2006;Kelly, Lesh, & Baek, 2008; Reeves, 2000, 2006; Tabak, 2004; van den Akker, 1999; van den Akker et al., 2006; Wang & Hannafin, 2005). Educational interventions enacted by design researchers include "programs, teaching-learning strategies and materials, products and systems as solutions for complex problems in educational practice" (Plomp & Nieveen, 2009, p.13). Theories and design principles include both "knowledge about

the characteristics of these interventions and the processes of designing and developing them" (Plomp & Nieveen, 2009, p.13).

In addition to its unique twofold goals, design research is also distinguished from traditional research approaches by various characteristics. According to van den Akker et al. (2006), design research is characterized as 1) interventionist, 2) iterative, 3) process-oriented, 4) utility-oriented, and 5) theory-oriented. Wang and Hannafin (2005) identified the characteristics of design-based research as 1) pragmatic, 2) grounded, 3) interactive, iterative, and flexible, 4) integrative, and 5) contextual. Reinking and Bradley (2008) discussed the defining features of formative and design experiments as 1) intervention-centered in authentic instructional contexts, 2) theoretical, 3) goal oriented, 4) adaptive and iterative, 5) transformative, 6) methodologically inclusive and flexible, and 7) pragmatic. Although some differences exist in descriptive language, scholars in this area share a common understanding about the essential characteristics of design research. Design research is grounded in theory and naturalistic settings. Researchers conduct design research studies for pragmatic purposes to improve actual educational practices. Interventions are enacted based on existing literature and theories, and the theories used for design frameworks and enacted interventions continue to be refined through iterative processes. As a genre of research rather than a single methodology, educational design research is inclusive in integrating a variety of methods from different research traditions. Design researchers must seek to be adaptive and flexible in both research and design from one iteration to another or even within one iteration, depending on the pressing needs and changing dynamics of the naturalistic settings in which the research is undertaken.

In light of these goals and characteristics of design research, the Design-Based Research Collective (2003) asserted that educational design research could bring benefits in the following areas:

1) Exploring possibilities for creating novel learning environments
2) Developing theories of learning that are contextually based
3) Advancing and consolidating design knowledge
4) Increasing the educational community's capacity for educational innovation. (DBRC, 2003, p. 8)

The field of Educational Technology is "first and foremost a design field" (Reeves, 2006, p. 61). It is the type of applied field in which demonstrable changes can be made through the design of innovative interventions and the associated knowledge that comes from reflective inquiry. Through such design research endeavors, both theory and practice in this field can be improved in the four areas listed above.

The purpose of this paper is to discuss my experience as a doctoral student who has carried out an educational design research project for my dissertation. While studying about the field, I was especially inspired by the admonition to conduct more socially responsible research that could advance both educational practice and the body of knowledge in my chosen field (Reeves, 2000). While conducting a design research project for my dissertation, I appreciated the potential of conducting research in a way that could make a real contribution to the field. However, as a young researcher with great passion for the field and research—yet one who was, for the most part, still becoming a researcher by actually engaging in research—dealing with the complexity of conducting a complex educational design research study in a naturalistic setting was not easy. Educational design research requires a longer time commitment than traditional studies, and throughout the planning, design, and data collection processes, I encountered many challenges that often resulted in frustration and that required deep reflection and timely actions to

surmount. Despite the many difficulties I experienced, I still firmly believe that educational design research is the approach that has helped, is helping, and will continue to help me become the kind of researcher that I desire to be. Above all, I seek to contribute to the wellbeing of our students and teachers. In this paper, I will briefly introduce my project and its process, and discuss the lessons learned during the three phases of implementation so that other doctoral students may benefit from my experience during those first steps as a design researcher.

A Design Research Project Case

As a doctoral student, I was interested in how to design better online learning environments for adult learners to support their collaborative group work, especially when they engage in authentic tasks. Educational design research begins with specific problems or needs practitioners have in their educational practice; therefore, it is important to locate a partnering practitioner whose interests in improving his or her teaching and student learning are in areas that align with the researchers' interest and expertise. My design research project grew from a course instructor's desire and need to design his face-to-face evaluation course as a completely online version. The primary pedagogy of the course has always been, "authentic learning tasks" (Reeves, Herrington, & Oliver, 2002), in which students in groups of two to four work with real clients to plan, conduct, and report an evaluation of an interactive instructional product. To complete authentic evaluation projects of this scope, group work is an integral aspect. A major concern of the instructor was for the new online course to be as effective as the face-to-face version, while continuing to use authentic learning tasks as the primary pedagogy. To provide an equivalent quality of learning experience, supporting students' group work on their evaluation projects was identified as a major factor in making the learning experience successful. (Another

doctoral student also joined the design research team, albeit with a focus on enhancing student self-regulation rather group work.)

After discussion with the instructor, who was also my advisor, he and I agreed that this particular setting would be well suited for both of us: for me as an appropriate research setting and for him as a new teaching environment. Through two early meetings, we established a common understanding on the purpose and direction of the project: to optimize adult learners' collaborative group work (and ultimately learning) in an online learning environment. The guiding question was "How can successful collaborative group work be supported in an online learning environment?" To establish a greater in-depth understanding of how effective groupwork can be supported within an online learning environment, the following aspects were explored: 1) challenges learners encounter when they work in online groups, 2) attributes of groups working well together in groups and not working well together, and 3) supports or scaffolding learners need during the group work process.

The project was launched in summer 2007. The entire project continued for two years until spring 2009. I adopted the framework of Bannan-Ritland's (2003) Integrative Learning Design model as a guide for the project process; the design research proceeded in four stages: 1) exploration, 2) enactment 3) implementation, and 4) dissemination. Each stage had sub-activities. Figure 5.1 presents the full process of this design research project.

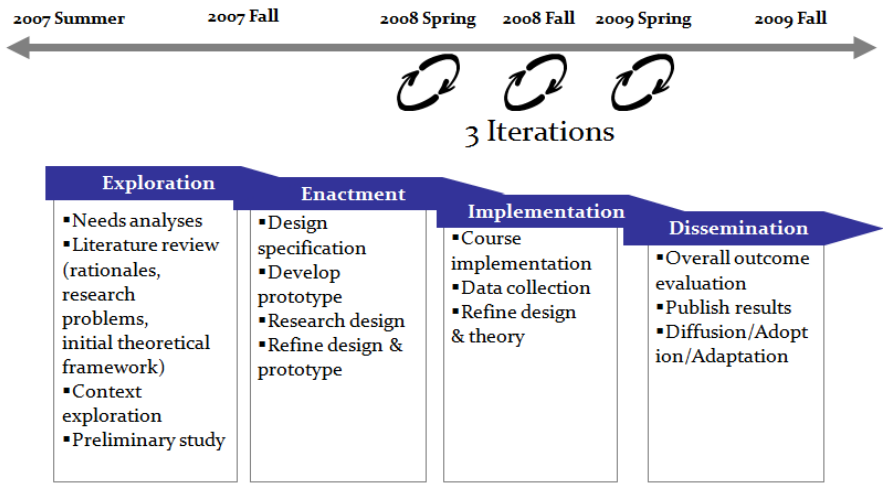


Figure 5.1. The full process of this design research.

The four stages often overlapped with each other because one activity in a previous stage often influenced another activity in later stages and proceeded in a cyclical manner. Thus, these four stages did not progress linearly. As illustrated in Figure 5.1, in educational design research, the design and research processes are interwoven and influence each other synergistically (Wang & Hannafin, 2005). Each stage and its sub-activities guided both design and research decisions. The online E-Learning Evaluation course was first offered in spring 2008. Based on the findings of the data collection during the first iteration, the design specifications and initial design theories were refined for the second iteration that began in fall 2008. After revisions based on the second iteration findings, the third iteration of the course was offered in spring 2009.

Lessons Learned from Engaging in Educational Design Research as a Doctoral Student

As a doctoral student who had for the most part learned about educational design research through a doctoral seminar course and through reviewing the literature, conducting design research for the first time was a great learning opportunity to finally understand more deeply the discussions and claims in the growing body of design research literature. At the same time, it was very challenging to learn design research by actually engaging in it for a dissertation study. I

believe that my reflections as a novice design researcher during these two years have yielded some important points with which to begin the discussion. After my attempt to conduct design research, a number of students in my program have chosen a design research approach for their dissertation research. I have received many questions from them regarding the difficulties or dilemmas they are encountering, which often had reflected my experience as well. I hope that sharing my perspective will benefit doctoral students and novice researchers who decide to conduct educational design research for the first time. Among the many valuable lessons I learned, I have selected six major lessons for this paper: 1) multiple roles of a design researcher, 2) disorder and complexity of a naturalistic setting, 3) demands of active engagement in design and research, 4) systematic documentation and data management, 5) longer timeline and commitment in dissertation research, and 6) importance of collaboration.

Multiple roles of a design researcher

First, compared to traditional researchers, design researchers must play multiple roles that present several challenges (McKenney, Nieveen, & van den Akker, 2006; Plomp & Nieveen, 2009). Perspectives on this particular dilemma have been discussed from different points of view in the literature (e.g, DBRC, 2003; McKenney et al., 2006). The greatest difficulty for a design researcher arises from conflicts in his or her roles: in one, the goal is to resolve a problematic educational situation with a creative and innovative intervention design; in another, the most important goal is to explore and evaluate the value of the implemented interventions, and in a third, the goal is to identify reusable design principles of value to others. Without doubt, there are methodological concerns stemming from the researcher's involvement as designer, implementer/tester, and theorist. When a researcher is a participant observer in a traditional research setting, concerns can include possibilities such as the Hawthorne effect or hypothesis

guessing (McKenney et al., 2006). A design researcher's involvement in the research setting is even more active, critical, and influential; thus, there could be conflicts of interest among those roles. In this instance, I was a designer who enacted interventions and design components based on design principles, a course facilitator who assisted the instructor and students, and a researcher who collected data from the students and instructor with whom I worked. Playing these multiple roles kept me extremely busy during the three iterations and often put me in a quandary of having to choose one role over another.

In this project, exploring students' challenges when working in online groups was a critical area to examine in order to enact supporting interventions and refine design principles. If I had been only a researcher who observed and collected data, my only concern would have been collecting data regarding the students' challenges. However, as a design researcher whose goal was to eventually optimize students' collaborative group work, I had to make decisions as to whether I would let students deal with challenges on their own so that I could collect the data I needed or whether I would help them so that they could overcome those challenges, despite the possibility that my action might cloud data. When encountering such a challenge, this question arises: which role is more important? To what extent should a design researcher intervene and facilitate the group work process? It clearly had been my primary question during the course implementation period, and others could not help me or offer advice regarding the decisions that should be made. I do not know what other design researchers consider their primary role in this type of situation because I believe that the nature of this dilemma differs from project to project and obviously individual researchers differ as well. I personally thought my role as the designer and the course facilitator should take priority over my role as researcher because the purpose of design research is to improve educational practice. Therefore, instead of letting students struggle

and resolve challenges on their own, I chose to help them as much as I could as the course facilitator. However, I do not believe that any of the extra efforts I made to help students undermined or invalidated the strategies that I and my collaborators identified as having the potential to enhance group work in this type of online course.

Messiness and complexity of a naturalistic setting

Design research is conducted in a naturalistic setting, which usually brings to the fore the real-world messiness and complexity much as we experience in our daily lives (McKenney, Nieveen, & van den Akker, 2006; Plomp & Nieveen, 2009; Reinking and Bradley, 2008). Design research requires both a macro level master plan and micro level details because its scope is larger than other research approaches, and each project stage include multiple activities that often require micro managing. However, no matter how much researchers plan ahead, researchers can still experience unpredicted and uncontrollable events rendering the plans messy. In those cases, researchers need to revise their initial plan. Thinking and making decisions promptly is crucial because researchers collect data at the same time they are implementing interventions. No matter whether a plan needs to revise some aspect of the research or of the intervention design, researchers must be flexible throughout the process in terms of design, implementation, and data collection methods.

For example, during the first iteration of course implementation, eight students were from all over the world including Australia, South Africa, USA, and Cyprus. Including the instructor, eight of these nine people experienced major events in their personal lives, including natural disasters, sudden moves from one country to another, and deaths of family members. Although I was studying how groups worked, the groups themselves could not function well because so many individuals were forced to leave the course for a period of time to deal with personal

issues. This factor along made the first iteration particularly difficult for me due to so many uncontrollable factors. Yet, this messiness also highlighted for me the limitations of traditional quasi-experimental and laboratory research.

In addition, many differences in students' characteristics existed from one iteration to another, which resulted in differences in group work processes. Whenever I enacted or refined aspects of the interventions, they were based on reflection of findings from the previous iteration. Although these refinements were carefully designed and planned, I sometimes had to change planned interventions on the fly because the ways students were working differed from my expectations. Changes in aspects of the data collection were necessary as well. Even with a master plan, depending on how the course went and each group worked, revisions in data collection methods and interview questions had to be made. I learned that design researchers must be prepared to be adaptable and flexible. Design research scholars have emphasized the need for these characteristics to create more synergy between research and practice (McKenney et al., 2006). It is important to be "open to adjustments in the research design if project progress so dictates" and to allow "the study to be influenced, in part, by the needs and wishes of the partners, during what is usually a long-term collaborative relationship" (McKenney et al., 2006, p. 84). At the same time, design researchers should constantly think about what necessary yet unexpected changes will potentially add value to or threaten the quality of interventions and the rigor of the research. The literature suggests a number of guidelines for conducting design research to help design researchers monitor and guard the rigor of the research aspect while maintaining relevance for the research context (McKenney et al., 2006; Plomp & Nieveen, 2009). These guidelines include the following: 1) have an explicit conceptual framework, 2) develop a congruent study design 3) use triangulation, 4) apply both inductive and deductive data

analysis, 5) use full, context-rich descriptions of the context, design decisions, and research results, and 6) conduct member checks (Plomp & Nieveen, 2009, p. 32) (also, c.f. McKenney et al., 2006, pp. 85-87).

Demands of active engagement in design, implementation and research

As illustrated in Figure 5.1, my research project required a significant number of activities. Design researchers must be actively engaged in design, implementation, and research (DBRC, 2003; van den Akker et al., 2006). As can be imagined, it is very demanding to actively engage in design, implementation, and research, along with dealing with issues from all three areas. For the two years of the project, there was a heavy workload not only during the semester, but also between terms. For instance, design researchers usually use multiple data collection methods. In terms of research, I divided one semester into three phases—pre-group work, during-group work, and post-group work. I used four data collection methods: interviews, surveys, archival data and observations, and drew on twenty different data sources during each iteration, although not all data sources were used in every semester. For more information regarding data collection methods and sources, please see the Table 5.1. At the same time I was collecting these data, I was also facilitating the course by supporting the students and instructor. I was constantly thinking about why certain interventions and course components were or were not working and whether and how they should be refined either during that term or in the following one. Without thorough planning and careful organization, it would be impossible to think of and do everything.

Table 5.1.

Data collection methods and sources for all three iterations.

Data Collection Methods	Data sources	Iteration One	Iteration Two	Iteration Three
Interviews	Students: Pre-group work	√√√	√√√	√√√
	Students: During- group work	√√√	√√√	√√√
	Students: Post- group work	√√√	√√√	√√√
	Instructor: Informal conversational meetings	√√√	√√√	√√√
	Instructor: formal, after semester	√√√	√√√	√√√
Surveys	Evaluation Skills Inventory	√√	√√	√√
	Student Profile Survey	√√	√√	√√
	Assessment of Team and Process	√√	√√	
	Peer and Self evaluation	√√	√√	√√
	Course evaluation		√√	√√
Archival data	Individual Quiz Results		√√	√√
	Evaluation Plan and Feedback	√√	√√	√√
	Evaluation Report and Feedback	√√	√√	√√
	Course materials	√	√	√
Observations	Weekly discussion	√	√	√
	Group meetings			√
	E-mails	√	√	√
	Wiki	√	√	√
	Group Work Forum	√	√	√

√√√: Major data sources
√√: Secondary data sources
√: Supplementary data sources
Empty cell: No use of data collection method

In addition to activities during the iterations, there are more activities occurring between iterations. During this phase, design researchers must complete data analyses, integrate findings, reflect upon them, and refine design and theory. One especially vexing challenge I faced stemmed from the fact that there was too little planning time between the second and the third iterations because the second iteration ended in December and the third one started in January. More time between iterations for a complete data analysis to refine design and theoretical principles would have been desirable, but in design research, the exigencies of the client's world must take precedence.

Systematic documentation and data management

Design research experts emphasize that it is important to record context-rich descriptions of the research setting, instructional and learning situation, design decisions, and research results (McKenney et al., 2006; Plomp & Nieveen, 2009; Wang & Hannafin, 2005). Indeed, design researchers need to document detailed records for themselves and others. Without detailed records of design decisions, the research process, and the results, it is not easy to maintain a project due to the massive amounts and diversity of data in a typical design research context. For example, every meeting or casual conversation with the practitioners or other project team members should be recorded because many decisions are made during these events. Detailed information regarding research participants and students should also be recorded. What happened in the course during the semester also needs to be documented in some manner, whether on a weekly basis or immediately following critical events. Extensive documentation will be generated during design research, and the researchers must consider in advance how to best keep track of the processes and outcomes of design and research.

Another important reason for documentation is to provide sufficient information to other researchers and practitioners in the future. Although a primary goal of design research is to resolve practitioners' local level problems, design research also aims to enhance the adaptability and scalability of solutions successful at the local context when applied in broader settings (Oh & Reeves, 2010; Wang & Hannafin, 2005). Generalizability of the research findings is a vital criterion in applying design theories in broader contexts (Gravemeijer & Cobb, 2006; Oh & Reeves, 2010; Plomp & Nieveen, 2009). It is recommended that design researchers document and maintain detailed records and context-rich descriptions of the research process and results: how design researchers have established initial theories; how they have designed and enacted

interventions; how those innovations have or have not worked; why certain research instruments were used and refined in certain iterations; how those innovations and design theories have been refined in relation to their particular local context (DBRC, 2003; Oh & Reeves, 2010). This will enable other instructors and researchers to transfer and apply design principles, findings, and interventions to their own situation. Keeping track of process and outcome, and recording both, is a great deal of work; therefore, researchers must consider, in advance, how to systematically document and manage data while also carrying out other important design, implementation, and research activities.

Timeline and commitment in dissertation research

Design research has an iterative nature (Kelly et al.,2008; McKenney et al., 2006; Plomp & Nieveen, 2009; Reinking and Bradley, 2008; van den Akker et al., 2006; Wang & Hannafin, 2005). Therefore, when doctoral students choose a design research approach for dissertation studies, they should be prepared to commit to a longer period of time and work more intensively on their dissertation research. In my case, the length of my project timeline and my commitment seemed to greatly exceed that of students involved in traditional dissertation research. For example, the project included four consecutive semesters of data collection, three iterations of the course, and the preliminary study I conducted to investigate the research context. However, it must be admitted that this is a subjective judgment, and I do not intend to demean in any way the research undertaken by my peers during this same time.

In general, when planning a design research project, it is necessary to consider how many iterations would be sufficient for resolving problems in selected research settings and how large should the scope of the project be. These are not easy issues to clarify in advance, yet they are important questions to ask when a doctoral student considers a design research approach for his

or her dissertation. Conducting design research seeks to impact a local context in a positive way while at the same time enhancing theoretical knowledge. My recommendation for doctoral students is to keep these twin purposes in mind, yet have a timeline and project scope sufficiently realistic for them to manage during their doctoral programs. In my opinion, the minimum requirement is to conduct two iterations and one preliminary study to explore the research context. My study required a long commitment because each iteration lasted one full semester, and it was not until the third iteration that my collaborators and I agreed that the course had reached its goals of engaging students in productive group work while tackling difficult authentic tasks. However, depending upon the types of interventions designed and the manner in which they are implemented and evaluated, each iteration can certainly be shorter than the iterations in my study.

In any case, my research team and I had originally planned for three iterations, in addition to a preliminary study. Interestingly, as noted above, it took all three iterations to achieve an actual outcome sufficiently close to the intended outcome. The first iteration was really a trial iteration with a formative nature to see whether the enacted designs and design principles/strategies would work. After the first iteration, we substantially revised both theory and design for the second iteration. After the second iteration, some refinement was necessary for the third iteration, but not as much as previously. Between iterations, we modified design principles and strategies. Based on the changes, we either refined or added interventions and course components. After the second iteration, most design principles remained because many had worked well during the second iteration. However, to more effectively enact those design principles, some strategies were added or adapted. In some cases, a strategy was retained, but associated course components or interventions under the strategy were added or strengthened. To

summarize, in my case, the second iteration was critical for the research team to see the usefulness and relevance of the interventions and design principles. The third iteration played a more confirming role, although there were a few things that were refined even after the third iteration.

Scholars have discussed different models in the design research process, yet most of them have yielded stages similar to the *assessment* (summative evaluation) and the *systematic reflection and documentation* stage at the end of the project (McKenney et al., 2006; Plomp & Nieveen, 2009). These stages are for exploring the transferability of the outcomes of design research: That is, to determine whether the solutions and design principles can be applied as effectively in a variety of settings (e.g., effects studies) beyond the local context (Gravemeijer & Cobb, 2006; Plomp & Nieveen, 2009). Although design principles should be considered as *heuristics* rather than *certainties* (Plomp & Nieveen, 2009), many researchers consider these stages important for achieving generalizability and scalability of the results of a design research. However, depending on the duration of each iteration and timeline of a dissertation, doctoral candidates may not be able to reach this point as a part of their dissertation projects. In my case, I am confident that the third iteration course went very well and the collaborative group work was positively and effectively supported. My collaborators agreed. Additionally, I am confident that the design principles and strategies will be useful for this evaluation course as well as for other courses with similar instructional dimensions. However, although three iterations of design and implementation were conducted, it was not clear that the course processes and results would be sustainable in future courses without the presence and support of design researchers. I also was unable to test the outcomes of my design research project in other online evaluation courses or other courses using authentic learning tasks and collaborative group work as primary pedagogies.

I am aware of the importance of these later stages, and investigating these issues are my next steps in research. How much is realistic for a dissertation? The individual doctoral candidate and his/her committee must determine how much he or she can or should do, while also considering the impact he or she wants to bring through his or her research and the timeline and commitment that he or she can realistically have. It is also important to be guided by the needs of the practitioners, although my case was unique in that the practitioner with whom I collaborated was also the chair of my dissertation committee.

Collaboration

Collaboration between researchers and practitioners is a unique as well as fundamental aspect of educational design research (Kelly et al.,2008; McKenney et al., 2006; Oh & Reeves, 2010; Plomp & Nieveen, 2009; Reinking and Bradley, 2008; van den Akker et al., 2006; Wang & Hannafin, 2005). Without practitioners, researchers cannot conduct design research. Ideally, a project should originate from issues practitioners encounter in their educational practice, and practitioners should be key members of the design research team. McKenney and colleagues (2006) emphasized that close collaboration and mutually beneficial activities help design researchers to gain trust from practitioners and a thorough understanding of the research context. In my experience, one of the most critical factors for the success of a design research project is meeting a collaborating practitioner who is very enthusiastic about his or her teaching and students' learning and who is willing to make a long-term commitment. I worked with my practitioner very closely, although my case was unique in that he was also the chair of my doctoral committee. We emailed each other continually and I spoke with him in person at least twice each week to discuss design and implementation decisions. Another important outcome of the design research process is that it can provide significant professional development experience

(McKenney et al., 2006). My practitioner, an instructional technology expert with more than 30 years in the field, often told me that this project helped him in numerous ways, including gaining a much better sense of the possibilities of enhancing the quality to students learning experiences online.

Of course, collaboration with practitioners also raises issues. Whose ideas hold precedence when there are differences of opinions and ideas during collaboration? Both researchers and practitioners are experts, although they have different areas of expertise. It is the practitioners who deal with problems and who will use the interventions to address these problems. Interventions and solutions should be realistic and sustainable for practitioners, and should also represent their goals. It is important to acknowledge their expertise and for the researcher not to force his or her notions on them because the researcher believes his or her proposals will be effective for the practitioners' teaching. The interventions should be viable after the researcher leaves, and thus the researcher must ensure that the hopefully improved learning environment can run successfully without him or her.

When there are differences of opinion, I think it is important to acknowledge the practitioners' perspectives and be open-minded to them. When the researcher strongly believes that his or her ideas will have a significant impact in their classrooms, the researcher should share his or her ideas about the potential benefits from those new interventions through frequent and meaningful discussion and negotiation. The literature on design research rarely reports on the power relationships between design researchers and practitioners. It is perhaps because those researchers are prominent scholars who have much established achievement in their areas. As a doctoral student, if the researcher also does not have professional experience in the practitioners' areas, difficulty in working with practitioners may stem from a lack of credibility in their arena.

My setting was a graduate level online course in higher education, and my practitioner was the professor who had taught the course for many years in face-to-face environments and was also an expert evaluator. I have significant experience working in online learning environments, and collaborative group work. However, I needed to make additional efforts to fill in the discrepancy in my knowledge and skills so that I could be a truly helpful partner with my practitioner.

In addition to working with an enthusiastic practitioner, I was fortunate to have a peer design researcher who also worked on this project with me. Her area of research was different from mine, but she is a critical friend (Plomp & Nieveen, 2009) and research partner who worked with me from the beginning of the project. We had countless conversations over the two years to discuss most design and research aspects of the project and, along with the practitioner, to make decisions on design and implementation. We supported each other and reviewed each others' instruments. Also, for the most part, we collected data together by combining our questions into one survey instrument or by integrating each other's interviews. Good collaboration with my critical friend helped both of us produce more effective solutions for the difficult situations we encountered, resolve uncertainties in the design research process, and remain persistent in the sometimes daunting task of conducting educational design research as a doctoral student.

Closing Remarks

Learning about design research by conducting it has been very valuable, but I admit that conducting it for the first time sometimes made for a rough journey. I made mistakes and learned through them. Some students asked me whether using a design research approach for a dissertation study was really worthwhile, considering that it requires much more work to earn the same degree. I also admit that I sometimes thought about whether my choice of conducting

design research was too ambitious particularly when I was experiencing struggles and challenges and when I had to cope with a multitude of work demands. However, in retrospect, I firmly believe that our collaborative efforts were worthwhile. My design research project resulted in design principles and heuristic strategies, many successful interventions in the online E-learning course, and professional development. Research findings revealed that this project brought a positive impact to the students who took the course; otherwise, they could not have taken that evaluation course online or the course would have not been of this quality. Design principles and strategies are being shared with scholars and instructors who will teach online evaluation courses and other courses using similar pedagogies through a series of presentations and articles emerging from the project. I particularly appreciate the tremendous professional development that all the project team members, including me, experienced during the two years. Thus, I will continue to seek new opportunities to conduct design research throughout my career. I hope sharing my honest reflections and lessons learned are helpful to other doctoral students and young scholars who aspire to conduct educational design research for the first time.

References

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher, 32*(1), 21-24.

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *Journal of the Learning Sciences, 13*(1), 1-14.

DBRC. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher, 32*(1), 5-8.

Edelson, D. C. (2002). Design research: What we learn when we engage in design. *Journal of the Learning Sciences, 11*(1), 105-121.

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 17-51). London: Routledge.

Kelly, A., Lesh R., & Baek, J. (Eds.). (2008). *Handbook of design research methods in education*. New York: Routledge.

McKenney, S., Nieveen, N., & van den Akker, J. (2006). Design research from a curriculum perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 67-90). London: Routledge.

Oh, E., & Reeves, T. C. (2010). The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners. *Educational Media International, 47*(4), 263-275.

Plomp, T., & Nieveen, N. (Eds.). (2009). An introduction to educational design research. Enschede, The Netherlands: SLO. Retrieved April 16, 2009, from

http://www.slo.nl/downloads/2009/Introduction_20to_20education_20design_20research.pdf/

Reeves, T. C. (2000). Socially responsible educational technology research. *Educational Technology, 40*(6), 19-28.

Reeves, T. C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 52-66). London: Routledge.

Reeves, T. C. (2011). Can educational research be both rigorous and relevant? *Educational Designer, 1*(4). 1-24. Retrieved March 20, 2011, from http://www.educationaldesigner.org/ed/volume1/issue4/article13/

Reeves, T. C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 96-115.

Reinking, D., & Bradley, B. A. (2008). *Formative and design experiments: Approaches to language and literacy research.* New York, NY: Teachers College Press.

Savenye, W. C., & Robinson, R. S. (2004). Qualitative research issues and methods: An introduction for educational technologists. In D. H. Jonassen, (Ed.), *Handbook of research for educational communications and technology* (pp. 1045-1071). Mahwah, NJ: Lawrence Erlbaum Associates.

Tabak, I. (2004). Reconstructing context: Negotiating the tension between exogenous and endogenous design. *Educational Psychologist, 39*(4), 225-233

Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006) *Educational design research*. London: Routledge.

Wang, F., & Hannafin, M. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research & Development, 53*(4), 5-23.

CHAPTER 6

CONCLUSION

Summary of the Project

The five different chapters including the three journal manuscripts describe one educational design research effort to improve the design of online learning environments for adult learners who need and want to continue their professional development. This two-year multi-phased educational design study was initiated by the aspiration of one instructor who wanted to offer his evaluation course to students in other institutions and provide them with learning opportunities that they would not have otherwise had. The two primary pedagogical approaches, authentic learning tasks and collaborative group work, were not always unproblematic for his students during the 15 years of face-to-face classes. However, it was important to him that his new online students should have meaningful learning experiences of the same richness that his students had previously experienced. Therefore, my research was guided by the principle that students working in groups collaboratively to complete authentic tasks constitute a pedagogically strong approach that can improve the quality and effectiveness of current online learning. By carrying out three iterative cycles of design, implementation, data collection, data analysis, and redesign, we were able to deliver the course to the satisfaction of the instructor and most of the students by the third iteration. With the extensive data collection from 23 graduate students and one instructor through diverse sources, the findings revealed challenges that students encountered, attributes of effective and ineffective groups, and ways to scaffold online groups when working on authentic projects.

In writing this dissertation, my intended primary audience is instructors who teach or would like to teach online courses in higher education, particularly those who would like to use authentic learning tasks and collaborative learning effectively to ensure the quality of the learning experience that their students will have. The three journal papers in the dissertation have different audiences. The second chapter, *A Conceptual Framework for Online Collaborative Group Work in Higher Education,* presents the study's conceptual framework. I wrote this paper for researchers and practitioners who are engaged in online learning in general and online collaborative learning in particular. The third chapter, *Teaching an Online Graduate Level Evaluation Course: Supporting Collaborative Group Work,* presents the design framework of an optimal online learning environment for teaching a graduate level online E-Learning Evaluation course by employing collaborative group work. The paper specifically focuses on teaching evaluation and the intended audience is evaluation educators in higher education institutions. The fifth chapter, *Conducting Educational Design Research as Doctoral Students: Process and Lessons Learned.* This reflection and implication paper presents my design research project experience for an audience of doctoral students and young scholars who aspire to conduct educational design research.

Outcomes of the Design Research Project

According to McKenney and her colleagues (2006), who conducted a design research project in curriculum domain, design research produces three major outputs: design principles which are generated knowledge in the field, curricular products or programs that contribute to the educational practice of local as well as broader settings, and professional development of participants. Similarly, my two years of efforts in collaboration with the research partner and the practitioner on this design research project resulted in a number of desirable outcomes. First,

there are theoretical outcomes. *A model for online collaborative group work for adult learners* and seven design principles and 30 associated design/implementation strategies can guide and contribute to practice and research of online collaborative group work among adult learners. In summary, these design principles to optimize group work include guidance on the following: communication, the learning community, technology, the group work process, positive interdependence, individual accountability and engagement, and individual learning. Second, there are practice outcomes, which are the developed e-learning evaluation course and all the interventions enacted and embedded in the course to support online collaborative group work in this e-learning evaluation course as well as broader contexts. These broader contexts include other online evaluation courses as well as online courses in other domains using semester-long authentic learning tasks and collaborative group work as their primary pedagogical approaches. Finally, there is the professional development of the participants. These participants include me and my colleagues as design researchers who played multiple roles during the project, the instructor who was the collaborating practitioner, and the students, particularly those who participated in the research study by sharing their stories during three interviews. By engaging in this research project, I learned a great deal about the topic that I studied—online collaborative group work, online as a learning environment, online learners who were novice evaluators, and educational design research. These learning experiences will be the cornerstone for my future research as well as for my teaching practice. Figure 6.1 illustrates the three outcomes of my educational design research EDR project.

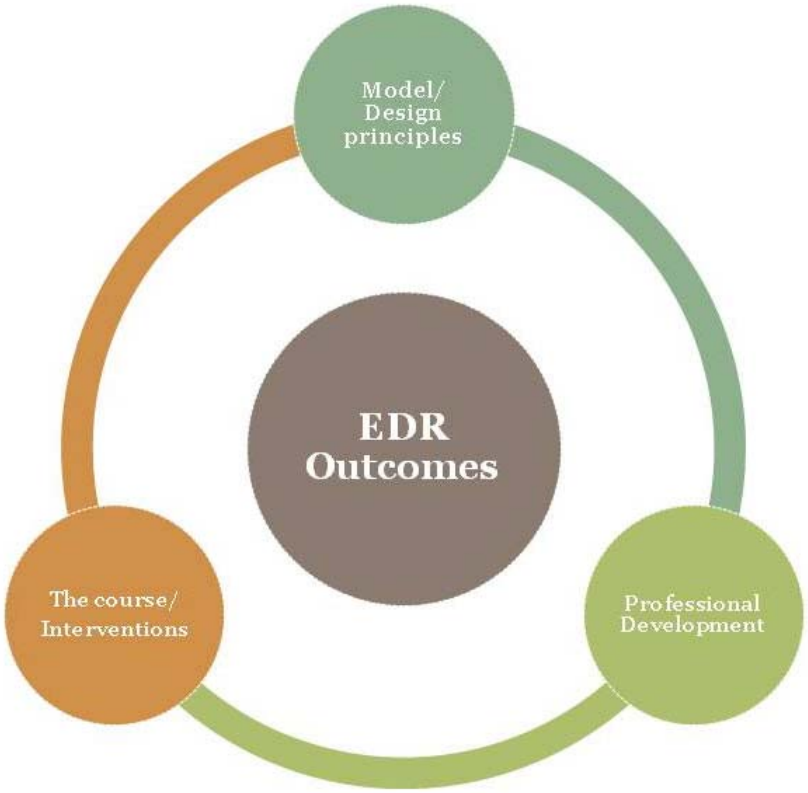


Figure 6.1. Three outcomes of the educational design research study.

Closing Remarks

As a design researcher, my next step following this dissertation is to explore the sustainability, transferability and generalizability of the outcomes of the project. Although design principles, design/implementation strategies, and enacted course components and interventions were well applied in the third iteration of this course through the iterative cycles of design, implementation, and redesign, it would be valuable to investigate where these outcomes are sustainable at the local level without the presence of design researchers. In addition, an important goal that any educational design research project pursues is enabling the application of design research outcomes beyond local contexts (Gravemeijer & Cobb, 2006; Plomp & Nieveen, 2009). To do so, in later stages of design research projects, researchers ideally attempt to apply and test

the solutions and design principles in more varied settings and wider domains (Plomp & Nieveen, 2009). In this project, if there had been more time, the next step could have been to see if the same outcomes could be attained in the same course without the presence of design researchers, and then to test the outcomes in a variety of settings such as other online evaluation courses or courses using comparable pedagogical approaches. Although this type of follow-up investigation was beyond the scope of this dissertation, I will continue to conduct studies to explore sustainability, transferability and generalizability of the design research outcomes and make efforts to disseminate the results for contributing to both communities of practice and other scholars working in this area.

Learning about educational design research by conducting it has been very valuable, but I admit that conducting it for the first time sometimes made for a rough journey. I made mistakes and learned through them. Some students asked me whether using an educational design research approach for a dissertation study was really worthwhile, considering that it requires much more work to earn the same degree. I also admit that I sometimes thought about whether my choice of conducting design research was too ambitious, particularly when I was experiencing struggles and challenges and when I had to cope with a multitude of work demands. However, in retrospect, I firmly believe that our collaborative efforts were worthwhile. My design research project resulted in a guiding model, design principles and heuristic strategies, many successful interventions in the online e-learning evaluation course, and valuable professional development for many people. The research findings revealed that this project brought a positive impact to the students who took the course; otherwise, they could not have taken that evaluation course online and the course would have not been of this quality. Design principles and strategies are being shared with scholars and instructors who will teach online evaluation courses and other courses

using similar pedagogies through a series of presentations and articles emerging from the project. I particularly appreciate the tremendous professional development that all the project team members, including me, experienced during the two years. Thus, I will continue to seek new opportunities to conduct educational design research throughout my career. I hope that sharing my journey from multiple perspectives—conceptual framework, teaching practice, process and outcome, and reflection of the methodology and project experience—is helpful to my intended audiences.

References

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 17-51). London: Routledge.

McKenney, S., Nieveen, N., & van den Akker, J. (2006). Design research from a curriculum perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 67-90). London: Routledge.

Plomp, T., & Nieveen, N. (Eds.). (2009). An introduction to educational design research. Enschede, The Netherlands: SLO. Retrieved April 16, 2009, from http://www.slo.nl/downloads/2009/Introduction_20to_20education_20design_20research.pdf/

APPENDICES

APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL

The University of Georgia
Office of The Vice President for Research
DHHS Assurance ID No. : FWA00003901

Institutional Review Board
Human Subjects Office
612 Boyd GSRC
Athens, Georgia 30602-7411
(706) 542-3199
Fax: (706) 542-5638
www.ovpr.uga.edu/hso

APPROVAL OF RENEWALS / CHANGES

Request Date: 2007-03-05 **Project Number:** 2007-10468-1

Name	Title	Dept/Phone	Address	Email
Ms. Eun Jung Oh	PI	Educational Technology and Instructional Technology 604 Aderhold Hall	706-621-9332	graceoh@uga.edu
Dr. Thomas C. Reeves	CO	Educational Technology and Instructional Technology 603D Aderhold Hall 706-542-3849		treeves@uga.edu
Ms. Ying Liu	CO	Educational Psychology & Instructional Technology Aderhold 630 + 7144 706-410-0869	210 Rogers Rd. Apt. Q305 Athens, GA 30605	yliu@uga.edu

Title of Study: Group learning in online environments

Renew : No

45 CFR 46 Category: Continuing Review
Parameters:
APPROVAL OF ABOVE NOTED CHANGES.

Change(s) : Added Co-PI Ying Liu. Changed Recruitment Letter. Added & Changed Interview Questions. Added Observing & Audio-Taping Group Meetings. Added Review of Students' Artifacts and Documents from Class. Revised Consent Document(s);

Approved : 2007-03-12 Begin date : 2007-03-12 Expiration date : 2012-02-12

NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.

Number Assigned by Sponsored Programs:

Funding Agency:

Form 310 Provided: No

Your request for approval of renewal and/or changes has been approved.

You must report any adverse events or unanticipated risk to the IRB within 24 to 72 hours. Refer to the IRB Guidelines for additional information.

Use the attached Researcher Request Form for requesting renewals, changes, or closures.
Keep this original approval form for your records.

Chairperson or Designee,
Institutional Review Board

APPENDIX B. INFORMED CONSENT FORM FOR RESEARCH STUDY

Title of project: Group learning in online learning environments

Persons in charge:

Professor Thomas C. Reeves, Ph.D.
Department of Educational Psychology and Instructional Technology,
Room 603D, Aderhold Hall
The University of Georgia
Athens, GA 30602
706-542-3849
treeves@uga.edu

Researcher Eun Jung Oh
Department of Educational Psychology and Instructional Technology,
Room 604, Aderhold Hall
The University of Georgia
Athens, GA 30602
706-621-9332
graceoh@uga.edu

I, _____, agree to take part in a study titled "Group Learning in Online Learning Environments' conducted by Eun Jung Oh, investigator from the Department of Educational Psychology and Instructional Technology (706-621-9332) at the University of Georgia under the direction of Dr. Thomas C. Reeves, the Department of Educational Psychology and Instructional Technology at the University of Georgia. I understand that my participation is voluntary. I can stop taking part at any time without giving any reason, and without penalty. I do not have to answer any questions that I choose not to answer. I can ask to have all of the information about me returned to me, removed from the research records or destoyed.

The following points have been explained to me:

1. The study in which I will be participating is part of research intended to investigate students' experience on their group learning in online environments. By conducting this study, researchers hope to understand online group learning from the students' points of view and better serve them in the future.
2. The benefits are as follows: I will be able to reflect upon my own group learning process and experience. I will also have the chance to contribute to improve the design and implementation of current online course, help instructors better understand their students, and eventually help future students to have better learning experiences.
3. Participation in this research will have no affect on my grades.
4. If I volunteer to take part in this study, I will be asked to do the following:
   A. participate in interviews with researchers that will be recorded on audio or archived electronically about my group learning experience.
   B. allow researchers to collect my responses from the surveys.
   C. My interaction log with my group members in group spaces, e-mails and my documents (e.g. my profile, attendance, assignments, evaluations and group projects)will be collected and analyzed by researchers
5. I understand that the interviews will be recorded either in audio or as electronic texts
6. No risk is foreseen, but I may experience some discomfort or stress during the interview with researchers, which will take up to one hour to complete. Also, I may feel uncomfortable in the virtual environments since a researcher is observing me. I know that I have the right to stop the interview based on my situation.
7. Any information obtained about me as a participant in this study, including my identity, will be held confidential. My identity will be protected with a pseudonym (or number). My identity will not be revealed in any publication of the results of this study. Any identity information obtained from this study will not be shared with other persons besides researchers. All data will be stored in a secured location.

8. The researchers, Dr. Thomas C. Reeves, Eun Jung Oh, and Ying Liu, will answer any further questions about the research and can be reached by telephone at (706) 621-9332 or by email at graceoh@uga.edu

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

_____

Signature of Participant Date

_____

Signature of Researcher Eun Jung Oh Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to the Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

APPENDIX C. EXECUTIVE SUMMARY OF NEEDS ANALYSIS

The Current Status of (online) Evaluation Courses

Purpose

The purpose of this paper is to explore the current status of evaluation courses in higher education institutions and identify the need for designing an online instructional product evaluation course.

Process

The process to conduct this part of the needs assessment consists of the following steps:

(1) Select schools → (2) Review the school websites → (3) Contact coordinators/instructors
→ (4) Compile information and summarize

(1) Select Schools
■ Generally, 18 schools in and outside of the U.S. were selected based on the reputation of their online (degree) programs in the field of education. Schools with strong reputations in the area of evaluation were also included. ■ The following schools were reviewed: California State University, Edith Cowan University, Florida State University, Harvard University, Indiana University – Bloomington, Ohio State University, Penn State University, San Diego State University, San Francisco State University, Stanford University, University of Central Florida, University of Florida, University of Georgia, University of Illinois-Urbana Champaign, University of Toronto, University of Maryland, University of Wisconsin-Madison, Western Michigan University
(2) Review the School Websites
■ The designers carefully reviewed the courses, programs, and faculty information available at the university websites accessible from the Internet.
(3) Contact Coordinators/Instructors

- Based on the information gathered about evaluation courses that was provided at the schools of education and related programs, the designers contacted the program coordinators or instructors via email to collect more detailed information pertaining to the following questions:
  - What are the primary instructional strategies and learning activities used in the course?
  - What are the primary assessment methods used in the course?
  - Is the course offered online, hybrid (blended), or face-to-face? If the course is either online or hybrid (blended), what kinds of learning management systems (e.g., Blackboard, Moodle, Sakai) are used?
  - Do you think an online course about instructional product evaluation at the graduate level would be of interest to students in your program or college?

- In addition, syllabi of certain courses were collected when the instructors were willing to share them.

(4) Compile Information and Summarize

- All the information gathered about each school and course was compiled using standardized tables. Some background information offered by the faculty was also examined. Through careful analysis and synthesis, the designers derived some preliminary findings.

Findings

Even though more information will be added later in July as the designers further communicate with the faculty members who have expressed their interest in discussing this project, the primary findings based on the process described above are the following.

Course Offerings

- Even though some schools had evaluation courses, such as program evaluation, or evaluation research in educational leadership, adult education, or an educational measurement type of department/program, not many schools had instructional product evaluation classes in their school (college) of education.

- Even when schools had instructional (educational) technology departments/programs, not many schools had independent evaluation courses. In that case, usually the contents of instructional product

evaluation got touched on elsewhere in their curriculum.

- When instructional (educational) technology departments/programs had evaluation courses in their course lists, in some cases, they had not offered the courses for several years due to budget or manpower limits.

- Currently, there are not many online evaluation courses. Although schools had online degree programs in instructional (educational) technology, an online version of instructional product evaluation or other evaluation classes was not a part of their curriculum.

- Most evaluation courses didn't have sufficient course-related information (e.g. website, syllabus) online. Mostly, only the course title, course number, and a short description were listed. At the very least, the courses were not accessible as open source.

- The evaluation courses were not limited to the field of education, even though most of the courses identified were offered in this field due to the designers' purposeful search.

Learning Management Systems

- Some schools used their own systems (i.e. angel – PSU); others used Blackboard (or WebCT). Those learning management systems are not open sources to the public. They required an ID and PW to access the courses.

- One instructor identified scalability as the primary reason for the adoption of Blackboard at his school.

Primary Instructional Strategies/Learning activities

- Instructional and learning strategies varied from course to course, school to school, ranging from PowerPoint lectures to synchronous chats, from discussion to real-life projects.

- Almost all the courses, no matter whether delivered online synchronously, asynchronously, or in a face-to-face setting, used some form of lectures or tutorials to deliver instructional information in addition to reading and discussion of various topics.

- Planning, developing and implementing a realistic evaluation or research project were another important component in some of these courses. Often such projects were designed to meet the needs of certain stakeholders. However, in some courses, instructors only assigned projects that were academic or theoretical in nature.

- Preferred learning activities also included a critique of evaluation or related research, summative reflection, assignment questions after individual units, quizzes and exams, and presentations.
- Sometimes students were also required to complete unit exercises, problem sets, annotated bibliographies, book reviews, or case studies.
- In general, these courses were based on both individual and team-based activities.
- In one case, online mentors were assigned for each team to assist in the completion of projects.

Primary Assessment Strategies

- In the cases that schools offered evaluation courses, their assessment strategies were aligned with their primary instructional strategies. The instructors usually used multiple methods to assess student learning outcomes.

Interests in International Online Instructional Product Evaluation Class

- Some schools were interested as they believed that students who wished to explore evaluation in depth would find this a good opportunity when their needs could not be served locally due to lack of resources, expertise or other constraints.
- Some schools were not interested because they believed that the content of evaluation is included in several different courses even though they did not have independent instructional product evaluation courses.
- The others did not identify their needs and interests. The designers conjecture that it is because the respondents are not in a position where they can provide answers to this question.

Conclusion

In conclusion, the above information tells us the following:

First, the need for an evaluation course focusing on assessing instructional product does exist because students interested in evaluation, evaluation pertaining to instructional technology in particular, want to develop a wide array of evaluation skills and experience for their future career or other reasons. However, because of financial, instructional, logistic and administrative limitations, this need hasn't been adequately met in the many higher education institutions that we contacted.

Second, although evaluation courses with various concentrations were provided at multiple institutions of higher learning, few of these courses were accessible to an audience beyond the locally registered students.
Therefore, the online provision of an instructional product evaluation course would be not only beneficial but also necessary in order to extend the opportunity to world-wide learners with similar interests.

Based on the preliminary findings and conclusion, the designers propose the following steps to further this project:

- Conduct learner surveys (including both previous and potential learners) to identify needs, interests, and preferences
- Conduct instructor interviews to understand important issues in teaching evaluation courses
- Explore learning management systems that can be independently used by individual learners without being adopted by higher education institutions.

APPENDIX D. SAMPLE RECRUITMENT LETTER

Department of Educational Psychology and Instructional Technology (EPIT)
College of Education, 604 Aderhold Hall, Athens, GA 30602-7144
February 9, 2009

Dear Students Enrolled in the E-learning Evaluation Course,

We are doctoral students conducting research under the direction of Dr. Thomas C. Reeves in the Department of Educational Psychology and Instructional Technology at the University of Georgia. This letter is a request for your assistance in better understanding your online learning experience in terms of groupwork and self-regulation. We hope you will be interested in helping with our research effort.

Learning at a distance can be challenging. Working on group projects with your group members can be even more challenging because of the separation of time and location. However, we know that online learning is often the only choice for some students due to a variety of reasons (e.g., job, family, location, etc.). In this sense, our ultimate goal, as educational researchers, is to design the optimal learning environments to serve people like you and make their learning experience more meaningful. We have been working on moving this evaluation course from face-to-face to online delivery while maintaining the emphasis on learning through authentic tasks. We seek to understand better how you learn about evaluation through self-regulated efforts, how you work with your teammates to accomplish your evaluation project, and how you feel about all these learning processes and experiences. By doing so, we believe that we can improve this learning environment for future semesters. Frankly, we even hope to use your input to improve the last part of this semester's course.

To this end, we invite you to participate in this study. Participating in this study consists of three interviews (face-to-face, phone or chat) lasting up to one hour, analysis of your participation in the forums and group space, your interactions with your group members and the instructor, the online participant surveys you completed and your documents (e.g., your group project outcomes). Participation in this research project will hopefully provide an opportunity for you to reflect on your online learning experience as well as help future students in this course.

If you are interested in participating in this study or have any questions, please feel free to email Eunjung Oh, graceoh@uga.edu and Ying Liu, yliu@uga.edu. Additional contact information is provided below. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 612 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

Thank you in advance for your consideration with respect to participating in this study. Without an understanding of your perspectives and listening to your voice about online group learning, it is difficult to improve the current practice. We look forward to working with you and learning valuable lessons from your online learning experience in this course.

Sincerely,

Eunjung Oh & Ying Liu
Department of Educational Psychology and Instructional Technology,
604 Aderhold Hall, The University of Georgia,
Athens, GA 30602
Tel: (706) 621-9332, (706) 410-0869
graceoh@uga.edu, yliu@uga.edu

Professor Thomas C. Reeves, Ph.D.
Department of Educational Psychology and Instructional Technology,
603D Aderhold Hall, The University of Georgia,
Athens, GA 30602
Tel: (706) 542-3849, treeves@uga.edu

APPENDIX E. INTERVIEW PROTOCOLS (FIRST, SECOND, AND THIRD ITERATIONS)

First Iteration: Spring 2008

<Student Interview Protocol>

First Interview: Pre-group work phase

1) Could you tell me about your previous group work experience?
2) If you had group work experience online, how did you like working with your group members online to accomplish the projects? How was the size of the group? What tools did you use at that time?
3) What did you liked about it the most and what did you like the least? Could you also explain why?
4) In general, how do you like group learning versus individual learning? Why is that?
5) When you work with other people for group project, what kinds of roles are you likely to play (e.g., leader, follower)? Why is that?
6) What have you learned from the previous group learning experience that you can apply for this upcoming group work?

Second Interview: During-group work phase

1) Please tell me about your group project.
2) Please tell me about your group members.
3) In terms of process, please tell me about how your group members worked on the first task?
4) How did your team make decisions? Any conflicts or disagreements?
5) What tools have you been using? Tell me about their strengths and weaknesses?
6) What have you concerned the most during this group learning process?
7) How have you resolved those concerns?
8) How has your group influenced those resolving process? If your group has not resolved your concern, how would you deal with it during the rest of the semester?
9) What would have made your group work easier during evaluation planning?
10) What do you think is the most important thing for your group to work better for the rest of the semester?

Third Interview: Post-group work phase

1) Please tell me your overall group work experience in this class?
2) How did your group work in general? Could you explain work process of your group?
3) How did this group work influence your learning about evaluation in this class? How do you think your understanding or knowledge has changed as a result of this collaborative group work?
4) How did your teammates influence your learning about evaluation in this class? How do you think you create personal constructions of new knowledge as a result of discussion/interactions within the group?
5) How was your group work experience with culturally different group members?

6) How did this group work experience differ from one you had before?
7) How did the group work toward accomplishing its goals? To what extent are you satisfied with team productivity?
8) Tell me about your personal engagement in this group work process. How engaged were you during the group work and what affected your level of engagement?
9) What did you like the most about this group work experience?
10) What did you like the least about this group work experience?
11) What challenges did you experience during the group work process? How did you or your group overcome those challenges during the learning process?
12) What would have made your overall group work easier?
13) Based on your experience, what do you think the critical factors of a successful online learning environment for group work?
14) In terms of learning environments, what do you consider to be effective supports for your group to work better?
15) In terms of the instructor, what do you consider to be effective supports for your group to work better?
16) What specific strategies would you recommend to better support your group work?

<Instructor Interview Protocol>

After the semester (after finishing grading)

1) Overall, what do you think about the course this semester?
2) What do you think of the quality of students' evaluation projects outcome this semester?
3) What was the biggest challenge or issues for you as an instructor in this semester?
4) In your opinion, what was the biggest challenge for students in this semester?
5) Could you tell me your perception about each student group?
6) Personally, what do you think as most important factors for successful group work?
7) Why do you think collaborative group work is important in this class?
8) What do you think the important roles of online instructor to facilitate collaborative group work on authentic tasks? What do you consider to be the effective facilitation strategies in this class?
9) What did you learn from this iteration of the online course?
10) What should we as a project team improve for the next semester to better support students?

Second Iteration: Fall 2008

<Student Interview Protocol>

First Interview: Pre-group work phase

1) Could you tell me about your previous group work experience?
2) How did that group work helped your learning in that class?
3) If you had group work experience online, how did you like working with your group members online to accomplish the projects? How was the size of the group? What tools did you use at that time?
4) What did you liked about it the most and what did you like the least? Could you also explain why?
5) In general, how do you like group learning versus individual learning? Why is that?
6) In general, how do you think you learn in class? What influence your learning?
7) When you work with other people for group project, what kinds of roles are you likely to play (e.g., leader, follower)? Why is that?
8) What have you learned from the previous group learning experience that you can apply for this upcoming group work?
9) What is your biggest concern about group work in this class?
10) How have you been communicated with your team members so far? What would be the best way to either monitor or observe your team progress?

Second Interview: During-group work phase

1) Please tell me about your group project.
2) Please tell me about your group members.
3) Please tell me, in terms of project, where your group is this week.
4) Could you share your group's weekly work or communication routine, if any, by using one of the weeks as an example? I am curious about your group work process or style.
5) Please tell me about your group's relationship with the client.
6) In terms of communication, please tell me about how your group members have been working so far.
7) How did your team make decisions so far? Have you experience any conflicts or disagreements?
8) What tools have you been using? Tell me about their strengths and weaknesses?
9) How is social interaction of your group? (Belongingness)
10) How is group dynamic of your group? (Cohesiveness)
11) What have you concerned the most while you worked with your group members so far?
12) How have you resolved those concerns?
13) How has your group influenced those resolving process? If your group has not resolved your concern, how would you deal with it during the rest of the semester?
14) What would have made your group work easier during evaluation planning?
15) What do you think is the most important thing for your group to work better for the rest of the semester?
16) To what extent, are you satisfied with your group work so far?

Third Interview: Post-group work phase

1) Please tell me about your overall group work experience in this class?
2) How did this group work experience differ from one you had before?
3) How did your group work in general?
4) Could you explain the work processes of your group, in particular after the second interview? Were there any changes in terms of work patterns or work processes after the second interview?
5) How was the dynamic of your group during the second half of the semester?
6) What was the most difficult/challenging part while you work with your group members?
7) Have we (instructor or course facilitators) helped you to resolve those challenges? Have you asked for any help?
8) To what extent are you satisfied with team productivity? Was it successful group work? If so/if not, why is that?
9) How was your group work experience with culturally different group members? Have you experienced any cultural differences?
10) Tell me about your personal (individual) learning about evaluation in this class. If you conduct an evaluation project on your own, would you be able to achieve it? What was the most helpful part of this class for you to learn about evaluation?
11) Have your group members or your group work helped you to learn about evaluation?
12) Do you think you have contributed to your group members' learning about evaluation?
13) Tell me about your personal engagement in this group work process. How engaged were you during the group learning and what have affected your level of engagement?
14) What did you like the most about this group work experience?
15) What did you like the least about this group work experience?
16) What would have made your overall group work easier?
17) Based on your experience, what do you think the critical factors of a successful online learning environment for group work?
18) In terms of course design and structure, how could we improve it to support our students better? What kinds of scaffolding would be helpful to support students' group work in this course?
19) In terms of the instructor, what do you consider to be effective supports for your group to work better?
20) What advice do you have for students who will take this course next semester regarding group work in this class?

<Instructor Interview Protocol>

After the semester (after finishing grading)

1) Overall, what do you think about the course this semester?
2) What was the main features of the design and implementation of the course this semester? What was your main pedagogical focus?
3) What do you think of the quality of students' evaluation projects outcome this semester?

4) Could you compare the quality of students' projects outcomes with those from the last semester?
5) What was the biggest challenge or issues for you as an instructor in this semester?
6) In your opinion, what was the biggest challenge for students in this semester?
7) Could you tell me your perception about each student group? Best group/ worst group? What contributes to such perception?
8) How did you support each group?
9) What is your personal stance about group work in general?
10) Were there any changes in your personal stance about group work after this online version of the course?
11) What do you think the important roles of online instructor to facilitate collaborative group work on authentic tasks?
12) What do you consider to be the effective facilitation strategies in this class?
13) What did you learn from this iteration of the online course?
14) What should we as a project team improve for the next semester to better support students? How would you like to improve the class next semester?

Third Iteration: Spring 2009

<Student Interview Protocol>

First Interview: Pre-group work phase

1) Could you tell me about your previous group work experience?
2) How did that group work help your learning in that class?
3) If you had group work experience online, how did you like working with your group members online to accomplish the projects? How was the size of the group? What tools did you use at that time?
4) What did you liked about it the most and what did you like the least? Could you also explain why?
5) In general, how do you like group learning versus individual learning? Why is that?
6) In general, how do you think you learn in class? What influence your learning?
7) When you work with other people for group project, what kinds of roles are you likely to play (e.g., leader, follower)? Why is that?
8) What have you learned from the previous group learning experience that you can apply for this upcoming group work?
9) What is your biggest concern about group work in this class?
10) How have you been communicated with your team members so far? What would be the best way to either monitor or observe your team progress?

Second Interview: During-group work phase

1) Please tell me about your group project.
2) Could you tell me about your group members?
3) In your opinion, what makes a good group member?
4) Could you share your group's weekly work or communication routine, if any, by using one of the weeks as an example? I am curious about your group work process or style.
5) In terms of communication, please tell me about how your group members have been working so far.
6) What are the ground rules of your group? Do you think that you have been keeping those in your mind when you work with group members? Have been helpful for you?
7) Please tell me about your group's relationship with the client.
8) How did your team make decisions so far? Have you experience any conflicts or disagreements? (evaluation plan questions)
9) What tools have you been using? Tell me about their strengths and weaknesses?
10) How is social interaction of your group? (Belongingness)
11) How is group dynamic of your group? (Cohesiveness)
12) What have you concerned the most while you worked with your group members so far?
13) How have you resolved those concerns?
14) How has your group influenced those resolving process? If your group has not resolved your concern, how would you deal with it during the rest of the semester?
15) What would have made your group work easier during evaluation planning?

16) What do you think is the most important thing for your group to work better for the rest of the semester, in data collection, analysis, and evaluation report writing?
17) To what extent, are you satisfied with your group work so far?
18) What do you think that it needs to be changed in your group?
19) What do you think that we (instructor or course structure) needs to be changed?

Third Interview: Post-group work phase

1) Please tell me your overall group work experience in this class?
2) How did this group work experience differ from one you had before?
3) How did your group work in general? → could skip depend on the participants
4) Could you explain work process of your group, in particular after the second interview? Were there any changes in terms of work pattern or work process after the second interview?
5) How was the dynamic of your group during the second half of the semester?
6) What was the most difficult/challenging part while you work with your group members? Or work on group project? Have your group experienced any difficulty/challenge?
7) Have we helped you to resolve those challenges? Have you asked any help?
8) What challenges did you experience during the group work process? How did you or your group overcome those challenges during the learning process?
9) To what extent are you satisfied with team productivity? Was it successful group work? If so/if not, why is that? Would you like to work with them again?
10) How was your group work experience with culturally different group members?
11) Tell me about your personal learning about evaluation in this class. What was the most helpful part of this class for you to learn about evaluation?
12) Have your group members (or this group work) helped you to learn about evaluation?
13) Do you think you have contributed to your group members' learning about evaluation?
14) If you conduct evaluation project on your own, would you be able to conduct one?
15) Tell me about your personal engagement in this group work process. How engaged were you during the group work and what affected your level of engagement?
16) What did you like the most about this group work experience?
17) What did you like the least about this group work experience?
18) Who did what parts in the evaluation report?
19) What would have made your overall group work easier?
20) Based on your experience, what do you think the critical factors of a successful online learning environment for group work?
21) In terms of course design and structure, how could we improve it to support our students better? What kinds of scaffolding would be helpful to support students' group work in this course?
22) In terms of the instructor, what do you consider to be effective supports for your group to work better?
23) What specific strategies would you recommend to better support your group work?
24) What did you learn from this experience?
25) What advice do you have for students who will take this course next semester regarding group work in this class? In case of leader, to leaders?

<Instructor Interview Protocol>

After the semester (after finishing grading)

1) Overall, what do you think about the course this semester?
2) What was the main features of the design and implementation of the course this semester? What was your main pedagogical focus?
3) What do you think of the quality of students' evaluation projects outcome this semester?
4) Could you compare the quality of students' projects outcomes with those from the previous semesters? Out of all three semesters, whose projects outcomes (which group) do you satisfy the most?
5) How do you define students' learning in this class? How do you know that your students learn what they are supposed to learn? How about students learning compared to that of students in previous semesters?
6) What was the biggest challenge or issues for you as an instructor in this semester?
7) In your opinion, what was the biggest challenge for students in this semester?
8) Could you tell me your perception about each student group? Best group/ worst group? What contributes to such perception?
9) How did you support each group? Were there new scaffoldings that you used?
10) Were there any changes in your personal stance about group work after this online version of the course?
11) What did you learn from this iteration of the online course?
12) You mentioned that you would like to go back to face-to-face version. Why is that?
13) When you look back all three iteration, how do you think that the design and implementation of each iteration has been refined and progressed?
14) If you teach this course one more time, what would you like to change in this course?

APPENDIX F. SURVEY INSTRUMENTS

<Evaluation Skills Inventory>

Please rate your knowledge and skills related to evaluation with respect to each of the following items using a scale ranging from 0=non-existent to 10=expert.

Your Name:

1. Interpret research and evaluation reports as reported in the professional literature.
2. Write a comprehensive literature review.
3. Interact with evaluation clients in a face-to-face context to obtain the information you need for evaluation planning.
4. Interact with evaluation clients in an online context to obtain the information you need for evaluation planning.
5. Prepare an evaluation plan.
6. Incorporate a specific "evaluation model" into your evaluation plan.
7. Conduct a needs assessment.
8. Develop a questionnaire for a program evaluation.
9. Develop an interview protocol for a program evaluation.
10. Develop a focus group protocol for a program evaluation.
11. Conduct a heuristic evaluation of an e-learning program.
12. Conduct a usability test of an e-learning program.
13. Use expert review as an evaluation strategy.
14. Conduct an online survey using software such as SurveyMonkey or QuestionPro.
15. Understand the principles of descriptive statistical analysis.
16. Apply the principles of descriptive statistical analysis.
17. Understand the principles of inferential statistical analysis.
18. Apply the principles of inferential statistical analysis.
19. Implement an evaluation plan.
20. Prepare an evaluation report.

Please list any other knowledge and skills you have that you believe we should know about in the context of this "E-Learning Evaluation" course.

Thank you.

<Student Profile Survey>

Student Profile Survey

Please complete this online survey at your earliest convenience. This information will provide the "E-learning Evaluation" course instructor with background information that will enable him to work with you more effectively. Thanks!

1. Your name:

2. Age:

- ☐ 18-25
- ☐ 26-35
- ☐ 36-45
- ☐ 46-60
- ☐ 61 or older

3. Gender:

- ☐ F
- ☐ M

4. Your area of study:

5. What degree are you pursuing?

- ☐ Masters
- ☐ Doctoral
- ☐ Other

6. How many online courses have you taken previously?

7. Please rate your technology skills on a scale ranging from 0 (non-existent) to 10 (expert),

especially in the context of an online course.

Scale	0	1	2	3	4	5	6	7	8	9	10

8. If you have previous experience with online courses, what were the most positive aspects of that learning experience?

9. If you have previous experience with online courses, what were the most challenging aspects of that learning experience?

10. Have you had any group work or projects in online course?

- ◉ Yes
- ○ No

11. If you had group work or projects in online courses, what kinds of activities did you do?

12. Please rate your group work experience, from 0 (negative/unsuccessful) to 10 (positive/successful).

Rate	0	1	2	3	4	5	6	7	8	9	10

13. What is your motivation to take this course? You may relate it to your long-term goals if needed.

14. What are your expectations for this course?

15. Please rate your confidence in doing well in this course from 0 (very low) to 10 (very high).

Rate	0	1	2	3	4	5	6	7	8	9	10

16. Do you have any needs, concerns, or considerations that your instructor should be made aware of?

This information will be very useful. Thank you for your input!

<Sample Assessment of Team and Process: Fall 2008>

We would like to know your evaluation of your group and the evaluation planning process thus far and would like to support you more in the future activities. Your answers to the questions below will be greatly appreciated. Thank you.

1) Please rate your level of satisfaction with communication among your evaluation team members.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could be done by you or others to improve communication within your evaluation team?

2) Please rate your level of satisfaction with how your team is making progress on your evaluation project.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could be done by you or others to improve progress on your evaluation project?

3) Please rate your level of satisfaction with interaction with your clients.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could be done by you or others to improve interaction with your clients?

4) Please rate your level of satisfaction with interaction with the course instructor.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could be done by you or others to improve interaction with the course instructor?

5) Please rate your level of satisfaction with your own contributions to your evaluation project so far.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could you do to improve your contributions to your evaluation project?

6) Please rate your level of satisfaction with the workload in this course so far.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What should be done to change the workload in this course?

7) Please rate your level of satisfaction with the course resources (content, Moodle site, etc.) so far.

Unsatisfied 1 2 3 4 5 6 7 8 9 10 Satisfied

What could be done to improve the course resources?

8) Please tell us about anything else that you feel that we should know about you, your group, your group project, the instructor, or other aspects of this course at this mid-point of the semester.

9) Your Group is

- ☐ Group 1
- ☐ Group 2
- ☐ Group 3
- ☐ Group 4

<Sample Peer and Self Assessment: Spring 2009>

Thank you for all your hard work in this course. We need to include your voice in the assessment of learning in this course. In this survey, we will ask you about your opinions concerning the performance of each member of your team as well as your own performance. Please fill out the rest of the survey and share your perspective with us. Your ratings will not be shared with other students and all comments will be held in confidential. Thank you.

Dr. Thomas Reeves
Ying Liu
Eunjung Oh

Your Name :

Please write the name of your first group member:

1. Interest in Learning	Shows little interest in learning.	1 2 3 4 5	Shows great interest in learning.
2. Performance Improvement	Not interested in working to improve performance.	1 2 3 4 5	Aware of deficiencies and actively tries to improve performance
3. Personal responsibility for learning	Does not accept responsibility for own learning.	1 2 3 4 5	Accepts responsibility for own learning.
4. Willingness to work	Reluctant to take on assignments and responsibilities.	1 2 3 4 5	Willing to take on assignments and responsibilities.
5. Professionalism	Deficient in professional behavior	1 2 3 4 5	Highly developed professional behavior
6. Critical Thinking	Deficient in critical thinking	1 2 3 4 5	Highly skilled in critical thinking
7. Participation in Group processes	Passive participation in group processes	1 2 3 4 5	Active participation in group processes
8. Respect for others	Show lack of respect for viewpoints and feelings of others	1 2 3 4 5	Show respect for the viewpoints and feelings of others
9. Capacity for negotiation	Unwilling (or has difficulty to negotiate when disagreements)	1 2 3 4 5	Identifies misunderstandings and helps to resolve conflicts
10. Responsiveness	Unresponsive in communication	1 2 3 4 5	Responsive in communication
11. Communication with Peers	Deficient in communicating with peers	1 2 3 4 5	Skillful in communicating with peers
12. Contribution to Group knowledge construction	Contributes little to group's knowledge construction	1 2 3 4 5	Make important contributions to group's knowledge construction

13. Please give one concrete example of this person's contribution to the evaluation project.

14. Please add Please rate this person's overall performance as a team member this semester.

15. Please add any other comments you wish to make about this group member.

Please write the name of your Second group member:

1. Interest in Learning	Shows little interest in learning.	1 2 3 4 5	Shows great interest in learning.
2. Performance Improvement	Not interested in working to improve performance.	1 2 3 4 5	Aware of deficiencies and actively tries to improve performance
3. Personal responsibility for learning	Does not accept responsibility for own learning.	1 2 3 4 5	Accepts responsibility for own learning.
4. Willingness to work	Reluctant to take on assignments and responsibilities.	1 2 3 4 5	Willing to take on assignments and responsibilities.
5. Professionalism	Deficient in professional behavior	1 2 3 4 5	Highly developed professional behavior
6. Critical Thinking	Deficient in critical thinking	1 2 3 4 5	Highly skilled in critical thinking
7. Participation in Group processes	Passive participation in group processes	1 2 3 4 5	Active participation in group processes
8. Respect for others	Show lack of respect for viewpoints and feelings of others	1 2 3 4 5	Show respect for the viewpoints and feelings of others
9. Capacity for negotiation	Unwilling (or has difficulty to negotiate when disagreements)	1 2 3 4 5	Identifies misunderstandings and helps to resolve conflicts
10. Responsiveness	Unresponsive in communication	1 2 3 4 5	Responsive in communication
11. Communication with Peers	Deficient in communicating with peers	1 2 3 4 5	Skillful in communicating with peers
12. Contribution to Group knowledge construction	Contributes little to group's knowledge construction	1 2 3 4 5	Make important contributions to group's knowledge construction

13. Please give one concrete example of this person's contribution to the evaluation project.

14. Please add Please rate this person's overall performance as a team member this semester.

15. Please add any other comments you wish to make about this group member.

Please write the name of your third group member:

1. Interest in Learning	Shows little interest in learning.	1 2 3 4 5	Shows great interest in learning.
2. Performance Improvement	Not interested in working to improve performance.	1 2 3 4 5	Aware of deficiencies and actively tries to improve performance
3. Personal responsibility for learning	Does not accept responsibility for own learning.	1 2 3 4 5	Accepts responsibility for own learning.
4. Willingness to work	Reluctant to take on assignments and responsibilities.	1 2 3 4 5	Willing to take on assignments and responsibilities.
5. Professionalism	Deficient in professional behavior	1 2 3 4 5	Highly developed professional behavior
6. Critical Thinking	Deficient in critical thinking	1 2 3 4 5	Highly skilled in critical thinking
7. Participation in Group processes	Passive participation in group processes	1 2 3 4 5	Active participation in group processes
8. Respect for others	Show lack of respect for viewpoints and feelings of others	1 2 3 4 5	Show respect for the viewpoints and feelings of others
9. Capacity for negotiation	Unwilling (or has difficulty to negotiate when disagreements)	1 2 3 4 5	Identifies misunderstandings and helps to resolve conflicts
10. Responsiveness	Unresponsive in communication	1 2 3 4 5	Responsive in communication
11. Communication with Peers	Deficient in communicating with peers	1 2 3 4 5	Skillful in communicating with peers
12. Contribution to Group knowledge construction	Contributes little to group's knowledge construction	1 2 3 4 5	Make important contributions to group's knowledge construction

13. Please give one concrete example of this person's contribution to the evaluation project.

14. Please add Please rate this person's overall performance as a team member this semester.

15. Please add any other comments you wish to make about this group member.

Self Assessment

Please rate yourself as a team member in this course by responding to the items below and adding comments wherever you wish.

1. Interest in Learning	Shows little interest in learning.	1 2 3 4 5	Shows great interest in learning.
2. Performance Improvement	Not interested in working to improve performance.	1 2 3 4 5	Aware of deficiencies and actively tries to improve performance
3. Personal responsibility for learning	Does not accept responsibility for own learning.	1 2 3 4 5	Accepts responsibility for own learning.
4. Willingness to work	Reluctant to take on assignments and responsibilities.	1 2 3 4 5	Willing to take on assignments and responsibilities.
5. Professionalism	Deficient in professional behavior	1 2 3 4 5	Highly developed professional behavior
6. Critical Thinking	Deficient in critical thinking	1 2 3 4 5	Highly skilled in critical thinking
7. Participation in Group processes	Passive participation in group processes	1 2 3 4 5	Active participation in group processes
8. Respect for others	Show lack of respect for viewpoints and feelings of others	1 2 3 4 5	Show respect for the viewpoints and feelings of others
9. Capacity for negotiation	Unwilling (or has difficulty to negotiate when disagreements)	1 2 3 4 5	Identifies misunderstandings and helps to resolve conflicts
10. Responsiveness	Unresponsive in communication	1 2 3 4 5	Responsive in communication
11. Communication with Peers	Deficient in communicating with peers	1 2 3 4 5	Skillful in communicating with peers
12. Contribution to Group knowledge construction	Contributes little to group's knowledge construction	1 2 3 4 5	Make important contributions to group's knowledge construction

13. Please give one concrete example of this person's contribution to the evaluation project.

14. Please add Please rate this person's overall performance as a team member this semester.

15. Please add any other comments you wish to make about this group member.

What have you learned about evaluation? Please rate your learning for each of these following objectives:

16. Generate and refine a definition of evaluation.

    (Low)1 2 3 4 5 (High)

17. Develop and defend a rationale for evaluation.

    (Low)1 2 3 4 5 (High)

18. Compare and contrast various evaluation "models."

    (Low)1 2 3 4 5 (High)

19. Distinguish between/among various evaluation concepts.

    (Low)1 2 3 4 5 (High)

20. Implement various functions of e-learning evaluation.

    (Low)1 2 3 4 5 (High)

21. Write an evaluation plan for an e-learning program.

    (Low)1 2 3 4 5 (High)

22. Evaluate an e-learning program in a practical context.

    (Low)1 2 3 4 5 (High)

23. Report your evaluation of an e-learning program.

    (Low)1 2 3 4 5 (High)

24. Work with clients to plan, implement and report an evaluation of an e-learning program.

    (Low)1 2 3 4 5 (High)

25. Plan for further development of your evaluation Knowledge, Skills, and Attitudes.

    (Low)1 2 3 4 5 (High)

26. To what extent have you achieved what you wanted to achieve in this course?

    (Low)1 2 3 4 5 (High)

27. Please add any comments you wish to make about your experience in this course.

    (Low)1 2 3 4 5 (High)

<Sample Course Evaluation: Spring 2009>

Course Evaluation for EDIT 8350 – E-Learning Evaluation – Spring 2009

Your frank responses to this course evaluation instrument will help make this a better course in the future. Professor Reeves will not see the results of this course evaluation until all grades have been turned in for the course, so the feedback you provide will not affect your grades. Thank you.

1. I took this course as a __Masters Student __Doctoral Student

2. On average, how many hours per week did you devote to this course? ___ hours per week

3. Please indicate your level of agreement with each of the following statements:

1= Strongly Disagree 2= Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree

a. I read each of the chapters in the Reeves/Hedberg book during the week it was assigned.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

b. I read each of the extra readings during the week it was assigned.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

c. I viewed each of the narrated PowerPoint presentations during the week it was assigned.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

d. I participated in the weekly online discussion forum to the best of my ability.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

e. The assignments in this course were clearly related to course goals.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

f. I would recommend this course to other students at my level.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

g. The Reeves/Hedberg book helped me learn in this course.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

h. The extra readings helped me learn in this course.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

i. The narrated PowerPoint presentations helped me learn in this course.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

j. The weekly online discussion forum helped me learn in this course.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

k. The team evaluation project helped me learn in this course.

(Strongly Disagree) 1 2 3 4 5 (Strongly Agree)

Add comments here:

4. The assessment scheme for the course allocates 60points for the team evaluation project. Would you recommend fewer or more points for the evaluation project? Why or why not?

5. The assessment scheme for the course allocates 20 points for three quizzes. Would you recommend fewer or more points for quizzes in the course? Why or why not?

6. The assessment scheme for the course allocates 20 points for participation (including Self, Peer, and Team Assessments). Would you recommend fewer or more points for participation in the course? Why or why not?

7. What was the worst thing about this course?

8. What was the best thing about this course?

9. What evaluation topics did you want to learn that were not provided in this course?

10. Please describe any specific ideas you have for improving this course.

11. What advice do you have for future students in this course?

12. Please add any other comments you wish to make about the course.

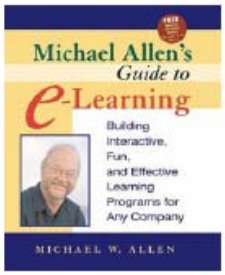
APPENDIX G. COURSE SYLLABUS AND WEEKLY ACTIVITIES OUTLINE (THRID ITERATION: SPRING 2009)

EDIT 8350: E-Learning Evaluation Syllabus

Course Leader: Thomas C. Reeves, Ph.D.
Professor of Learning, Design, and Technology, Department of Educational Psychology & Instructional Technology, College of Education, The University of Georgia, 604 Aderhold Hall, Athens, GA 30602-7144 USA
Tel: (706) 542-3849; Fax: (706) 542-4032; E-mail: treeves@uga.edu; WWW: http://it.coe.uga.edu/~treeves/

Course Facilitator:
Ying Liu
Ph.D. Student
The University of Georgia
Email: yliu@uga.edu

Course Facilitator:
Eunjung Oh
Ph.D. Student
The University of Georgia
Email: graceoh@uga.edu



"It would be very surprising if even 10% of organizations using e-learning actually conducted any well-structured and executed evaluations."

Introduction

This course focuses on the evaluation of e-learning programs, both those that are commercially produced and those that a college instructor or trainer might develop for his/her own students. Quite frankly, the KSA's (knowledge, skills, and attitudes) of a competent evaluator are so numerous that a single course or even a sequence of courses is inadequate preparation. Instead, disciplined study and extensive practical experience are required before you can develop the technical, communication, and political skills necessary for effective and efficient evaluation.

Despite these limitations, this online course has ambitious goals for providing a blend of learning opportunities, didactic, exploratory, and most importantly experiential to enable you to make progress toward becoming a competent evaluator. The emphasis is decidedly on the experiential rather than the didactic, and perhaps it will seem that you are more responsible for guiding your own learning in this course than in other graduate courses. This is intentional. Above all, we shall pursue "authentic achievement."

Pedagogy

The pedagogical design of this course is based upon the principles of authentic learning environments as defined by Dr. Jan Herrington of the University of Wollongong:

- Provide an authentic context that reflects the way the knowledge will be used in real-life
- Provide authentic activities
- Provide access to expert performances and the modeling of processes
- Provide multiple roles and perspectives
- Support collaborative construction of knowledge
- Promote reflection to enable abstractions to be formed

- Promote articulation to enable tacit knowledge to be made explicit
- Provide coaching and scaffolding at critical times
- Provide for integrated assessment of learning within the tasks.

Open and frank communications are encouraged. Feel free to contact Professor Reeves or one of the other course facilitators via e-mail or phone if you have any questions or problems concerning this course. Professor Reeves can be reached via email at: treeves@uga.edu or by phone at 1-706-542-3849. Open and frank communication will be essential to our collaboration in making this a successful learning experience for all.

We'll depend on the Moodle-based course web site as both a vehicle for communications and an environment for learning. The URL for the course web site is: http://school.coe.uga.edu/ The course is primarily asynchronous in terms of delivery and interaction, but synchronous communications may be initiated by you whenever you wish. Professor Reeves will be available to "meet" with you individually or in small groups via phone, Skype, or in person here at The University of Georgia.

Despite a heavy travel schedule, rest assured that this online e-learning evaluation course is a high priority for Professor Reeves this semester. Professor Reeves' teaching, learning and social "presence" in the course will be as strong as possible. His teaching approach is well aligned with the seven principles for good teaching practice by Arthur W. Chickering and Zelda F. Gamson:

1. encourages contact between students and faculty,
2. develops reciprocity and cooperation among students,
3. encourages active learning,
4. gives prompt feedback,
5. emphasizes time on task,
6. communicates high expectations, and
7. respects diverse talents and ways of learning.

Objectives

After completing this course, you should be able to:

1. Generate and refine a definition of evaluation.
2. Develop and defend a rationale for evaluation.
3. Compare and contrast various evaluation "models."
4. Distinguish between/among various concepts such as:
    a. measurement and evaluation
    b. criteria for evaluating input, context, process and outcomes of e-learning programs
    c. intrinsic and extrinsic evaluation
    d. norm-referenced and criterion-referenced measurement
    e. formative and summative evaluation
5. Implement various facets of e-learning evaluation:
    a. review
    b. needs assessment
    c. formative evaluation

   d. effectiveness evaluation
   e. impact evaluation
   f. maintenance evaluation
6. Write an evaluation plan for an e-learning program.
7. Evaluate an e-learning program in a practical context.
8. Report your evaluation of an e-learning program.
9. Work with clients to plan, implement, and report an evaluation of an e-learning program.
10. Plan for further development of your evaluation knowledge, skills, and attitudes.

Tasks

1. You will work with a team of other participants in this course to prepare an evaluation plan for an e-learning program for real clients in an authentic context (worth 20 points).

2. You will work with your team to implement your evaluation plan and prepare an evaluation report for your clients (worth 40 points).

3. You will successfully pass four quizzes (worth 20 points).

4. You will participate fully in the course through discussions, self-assessment, peer assessment, team assessment, and other activities (worth 20 points).

Assessment

Effort will go a long way in this course. Expect to work hard. Use your imagination and take risks! The amount of yourself you are willing to invest in this course will be directly proportional to how much you will learn in terms of knowledge, skills, and attitudes. It is assumed that this is not a "required" course for any of the participants, and that you are primarily enrolled in this course to enhance your knowledge, skills, attitudes, and drive with respect to e-learning evaluation. Motivation to learn is difficult to measure, and the best proxy assessment is probably behavior. Your learning will be determined by the extent to which you maintain a high level of commitment in terms of 1) keeping up with the readings, 2) viewing the various class presentations, 3) collaborating with members of your team in completing the authentic task of evaluating an e-learning program for a real client, and 4) contributing to the online discussion of course content held each week.

We shall strive to develop and nurture a learning community in this course. The development of a strong learning community in an online learning environment is not guaranteed by technology. Instead, it requires the active engagement of each participant in this course to contribute to a "culture" of sharing and trust. This culture may not be evident in the first weeks of this semester long course, but hopefully by the mid-point of the semester, you will feel fully involved in a unique and powerful learning community. If not, please let Professor Reeves know how he can enhance your learning opportunities.

Grades (marks) will be based upon the following points scheme:

Task	Points
1 – Evaluation Plan	20 points
2 – Evaluation Implementation and Report	40 points
3 – Quizzes	10 points
4 – Participation (Discussions as well as Self, Peer, and Team Assessments)	20 points

A = 90-100; B = 80-89; C = 70-79; D = 60-69; F = Below 60.

(Grades will be converted to the local marking system at the institution where you are enrolled for credit.)

The rubric for Task 1 can be found in Appendix A.

The rubric for Task 2 can be found in Appendix B.

The rubric for Task 4 can be found in Appendix C.

We're all in this together!

References

Allen, M. W. (2003). *Michael Allen's guide to e-learning*. New York: John Wiley.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. American Association for Higher Education Bulletin, *39*(7), 3-7. Retrieved August 15, 2008, from http://www.johnsonfdn.org/Publications/ConferenceReports/SevenPrinciples/SevenPrinciples_pdf.pdf

Appendix A

Rubric for Task 1 – Evaluation plan

Each criterion will be graded on a 10 point scale.

CRITERIA	DESCRIPTION	POINTS
Introduction and Background	A brief orientation to the evaluation context and an overview of the organization of the plan are provided. The evaluand, clients, and evaluators are identified. The reader can understand the nature of the evaluand and the context for the evaluation.	
Purposes	The purposes of the evaluation are delineated clearly, including both formative and summative aspects if they are relevant.	
Stakeholders	Relevant primary and secondary stakeholders in the evaluation are identified.	
Decisions and Questions	The decisions that may be influenced by the evaluation as well as the specific questions addressed by the evaluation are identified. The articulation between decisions and questions is sound.	
Methods	The methods to be used in the evaluation are thoroughly described. Methods are appropriate within the constraints of evaluation resources such as time, budget, and personnel.	
Sample	The participants from whom data will be collected for the evaluation are identified. Participants might include students, teachers, instructional designers, and/or managers. The participants are appropriate to the purposes of the evaluation and the sample size is adequate to questions and methods.	
Instrumentation	The evaluation instruments and tools to be used are described and a rationale for their use is provided. Reliability and validity are addressed. Draft instruments are provided in appendices.	
Limitations	Limitations to the interpretation and generalizability of the evaluation as well as potential threats to the reliability and validity of the design and instrumentation are described.	
Logistics and Time Line	The parties responsible for various aspects of data collection, analysis, and reporting are clarified. Additional information about how the evaluation will be conducted should be included if it is necessary to communicating a clear plan. A reasonable schedule for implementation of the report is planned, including adequate time for analysis and report preparation.	
Budget	An adequate (hypothetical) budget has been allocated for the evaluation. The amount to time required to conduct the evaluation and the fees associated should be estimated.	
TOTAL	POSSIBLE: 100 points	

Appendix B

Rubric for Task 2 – Evaluation Report

Each criterion will be graded on a 10 point scale.

CRITERIA	DESCRIPTION	POINTS
Introduction and Background	A brief orientation to the evaluation context and an overview of the organization of the plan are provided. The evaluand, clients, and evaluators are identified. The reader can understand the nature of the evaluand and the context for the evaluation. (Screen captures and other graphics may be used to clarify the nature of the evaluand.)	
Purposes and Stakeholders	The purposes of the evaluation are delineated clearly. The primary and secondary stakeholders for the evaluation are identified.	
Decisions and Questions	The decisions that may be influenced by the evaluation as well as the specific questions addressed by the evaluation are identified. The articulation between decisions and questions is clear.	
Methods	The methods used in the evaluation are thoroughly described. Methods are appropriate within the constraints of evaluation resources such as time, budget, and personnel. (A matrix may be used to illustrate the relationships between questions and methods.)	
Instrumentation	The evaluation instruments and tools used in the evaluation are described and a rationale for their use is provided. Reliability and validity are addressed. Sample instruments are in appendices.	
Limitations	Limitations to the interpretation and generalizability of the evaluation as well as potential threats to the reliability and validity of the design and instrumentation are described.	
Analysis	Data processing and analysis processes are described. Analysis adhered to the guidelines of the particular methods used. Appropriate data synthesis strategies and statistics are used.	
Results	The results are presented in a clear and coherent manner. Tables and figures are used appropriately.	
Discussion	Informative discussion of the results is provided.	
Recommendations	Feasible recommendations appropriate to the clients' needs are made.	
TOTAL	POSSIBLE: 100 points	

Appendix c

Rubric for Task 4 – Participation

(Additional rubrics for self and peer assessment will be disseminated later.)

Excellent (90 - 100 points)

- The participant consistently posted insightful comments and questions that prompted additional on-topic discussion among the seminar participants.
- The participant consistently helped clarify or synthesize other group members' ideas.
- If disagreeing with another participant's ideas, the participant stated disagreements or objections clearly, yet politely.

Good (71 - 89 points)

- The participant was sometimes lacking in one or two of the items listed for "Excellent" level participation.
- The participant sometimes had to be prompted or coaxed to participate.
- The participant usually, but not always, expressed herself or himself clearly.

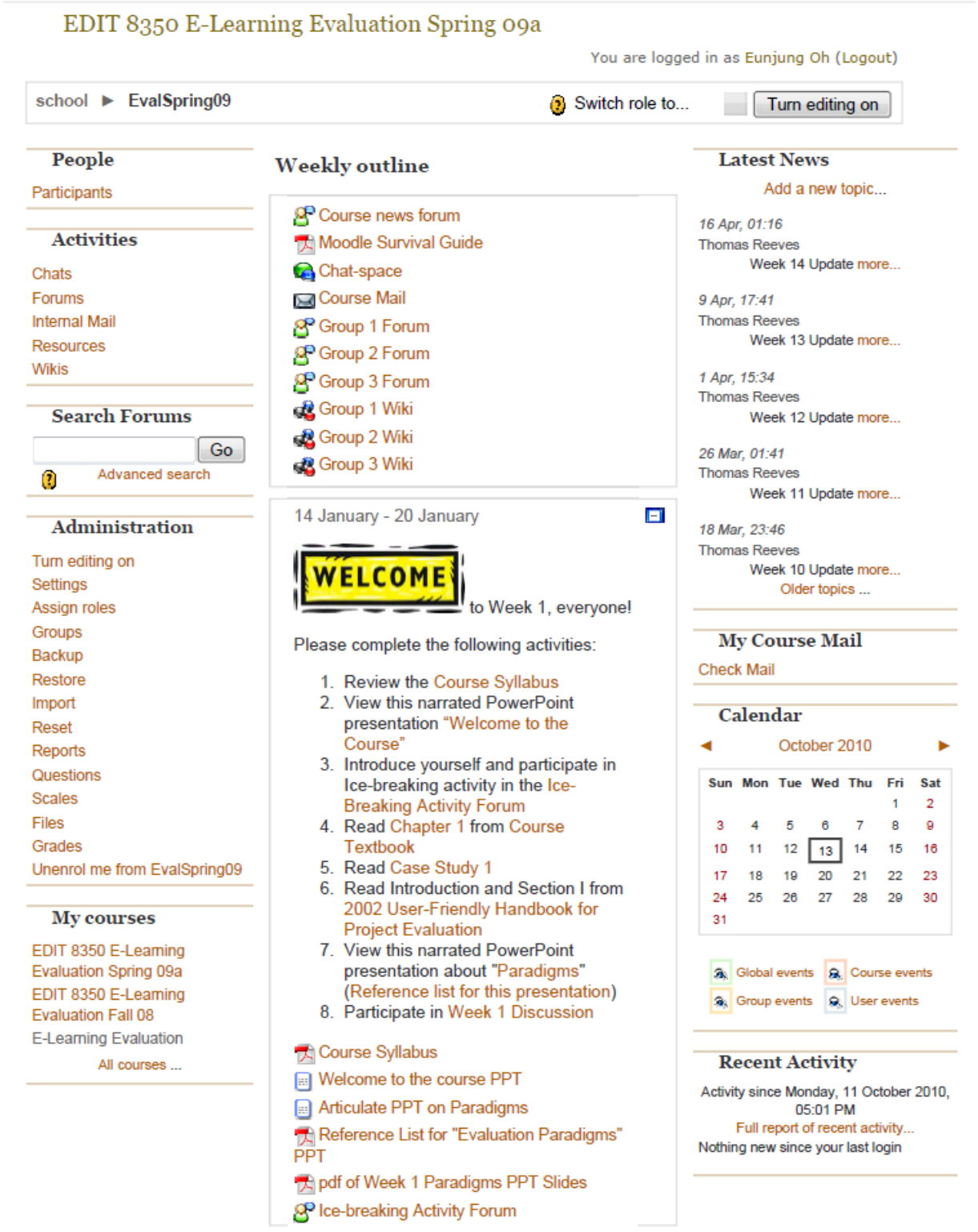
Below Expectations (61 - 70 points)

- The participant was often lacking in three or more of the items listed for "Excellent" level participation.
- The participant often had to be prompted or coaxed to participate.
- The participant rarely expressed herself or himself clearly.

Failure (0 - 60 points)

- The participant was often lacking in all of the items listed for "Excellent" level participation.
- The participant was extremely reluctant to participate, even when prompted.
- The participant was rude or abusive to other course participants.

< Weekly Activities Outline: Spring 2009>



Week 1 Discussion

Course Text : E-Learning Evaluation by Reeves & Hedberg

21 January - 27 January

Please complete the following activities for Week 2:

1. Read Chapter 2 from Course Textbook
2. Read Case Study 2
3. Read Section II from 2002 User-Friendly Handbook for Project Evaluation
4. View the narrated PowerPoint presentation about "Evaluation Models" [Reference list for this presentation]
5. Watch the movie about Wiki
6. Review:
   a. 7 things you should know about Wikis,
   b. 7 things you should know about virtual meetings, and
   c. 7 things you should know about collaborative editing
7. Review your team assignment and "Meet" online with your team-mates using both synchronous and asynchronous tools. Decide on a Name for your team, e.g., "SuperEvaluators"
8. Review the general advice about the E-learning Evaluation course and tips for successful online groupwork
9. Pick a team leader
10. Participate in Week 2 Discussion

PPT on Evaluation Models

pdf of Week 2 "Models" PPT slides

References for Week 2 "Evaluation Models" PPT

Week 2 Discussion

28 January - 3 February

Please complete the following activities for Week 3:

1. Collaborate with your team members in "meeting" with your client to begin evaluation planning.
2. Read Chapter 3 from Course Textbook
3. Read Case Study 3
4. Read Section III from 2002 User-Friendly Handbook for Project Evaluation
5. View the narrated PowerPoint presentation about "Six Facets of Instructional Product Evaluation" [Reference list for this presentation]

6. Participate in Week 3 Discussion Forum

PPT on 6 facets of Instructional Product Evaluation
pdf of Week 3 "Six Functions" PPT slides
References for Week 3 "Six Functions" PPT
Week 3 Discussion

4 February - 10 February

Please complete the following activities for Week 4:

1. Continue to collaborate with your team members in planning your evaluation
2. Read Chapter 4 from Course Textbook
3. Read Case Study 4
4. Read Section IV from 2002 User-Friendly Handbook for Project Evaluation
5. Read Hints for Designing Effective Questionnaires by Robert B. Frary
6. View the narrated PowerPoint presentation about "Survey Design"
7. Participate in Week 4 Discussion Forum

PPT on Survey Design
pdf of week 4 "Survey Design" PPT slides
Week 4 Discussion

11 February - 17 February

Please complete the following activities for Week 5:

1. Submit evaluation plan outline to Professor Reeves that includes the following:
    1. Brief description of product or program being evaluated
    2. Decisions that the evaluation will address
    3. One of more questions associated with each decision
    4. Ideas about possible methods
2. Read Chapter 5 from Course Textbook
3. Read Case Study 5
4. View the narrated PowerPoint presentation about "Heuristic Review"
5. View first "Online Survey" Tutorial
6. Participate in Week 5 Discussion Forum

PPT on Heuristic Review
pdf of Week 5 "Heuristic Review" slides
Week 5 Discussion

18 February - 24 February

Please complete the following activities for Week 6:

1. Submit draft evaluation plan for review by Professor Reeves [pay attention to the Evaluation Plan Rubric in course syllabus].
2. View the narrated PowerPoint presentation about the "Air Force Academy Case Study" [Note: This particular presentation requires the use of Internet Explorer as a browser.]
3. Read Chapter 6 from Course Text
4. Read Case Study 6
5. Read How to Conduct a Heuristic Evaluation by Jakob Nielsen
6. Participate in Week 6 Discussion Forum

Week 6 Discussion

25 February - 3 March

Please complete the following activities for Week 7:

1. Submit second draft evaluation plan to Professor Reeves for review. As you finalize your evaluation plans, the biggest challenge you face may be developing the instruments such as questionnaires, interview protocols, usability test protocols, etc. You can find some sample data collections instruments at this Tools website.
2. Read Chapter 7 from Course Text
3. Read Case Study 7
4. View the narrated PowerPoint presentation about the "Usability Testing"
5. View this video tour of the "E-Learning Usability Testing Lab" at Tamkang University in Taiwan. This video is narrated in Chinese, but you can use this English translation to guide you through it. Some of the graduates from our doctoral program at UGA work at TKU.
6. View this "Paper Prototype Usability Test" video.
7. Participate in Week 7 Discussion Forum

pdf of Week 7 "Usability Testing" PPT slides

Additional resources about e-learning evaluation

Week 7 Discussion

4 March - 10 March

Please complete the following activities for Week 8:

1. Your client should receive and sign off on a final copy of the evaluation plan this week. Here is an example of a Sign-Off Form.
2. In lieu of a narrated PowerPoint presentation this week, I would like those of you who need it to develop or refresh your knowledge of basic statistical concepts by going through the first two chapters of this HyperStat Online Statistics Textbook [1. Introduction to Statisics and 2, Describing Univariate Data].
3. Read Chapter 8 from Course Text
4. Read Case Study 8
5. Participate in Week 8 Discussion Forum

Week 8 Discussion

11 March - 17 March

18 March - 24 March

Please complete the following activities for Week 10:

1. Read Chapter 9 of the Course Text
2. Read, but not necessarily word for word, *Evaluating Online Learning Challenges and Strategies for Success* from the U.S. Department of Education
3. Review this sample evaluation report by Walton, Chen, & Wang.
4. Complete Quiz 1. It is due by Thursday morning, March 26, at 5 PM. Please email your completed quiz to Professor Reeves.
5. View the narrated PowerPoint presentation about the "Enhancing Surveys"
6. Look at these two guides about Types of Survey Questions and Survey Scales from the University of Texas
7. Continue working with your team members and clients on your evaluation project - Hopefully, your client has approved your evaluation plan by now and your team is beginning to collect data - Please let your course instructor know when you need help

8. Participate in Week 10 Discussion Forum

PPT on Enhancing Surveys
pdf of Week 9 "Enhancing Surveys" PPT slides
pdf of Week 10 Data Analysis Part I PPT slides
Week 10 Discussion
Quiz 1

25 March - 31 March

Please complete the following activities for Week 11:

1. Continue working with your team members and clients on your evaluation project and don't forget to let your course instructor know when you need help.
2. View the narrated PowerPoint presentation about the "Data Analysis - Part I"
3. Read: Pitfalls of Data Analysis
4. Participate in Week 11 Discussion Forum

pdf of Week 11 Data Analysis Part 2 PPT slides
Week 11 Discussion

1 April - 7 April

Please complete the following activities for Week 12:

1. Continue evaluation project collaboration
2. View the narrated PowerPoint presentation about the "Data Analysis - Part II"
3. View the narrated PowerPoint presentation about the "Ethical Issues"
4. In lieu of the second Quiz, please go to the online survey URL below and complete the survey as if you are a professor teaching courses online. Then send me a critique of the survey in an email message. Please let me know if anything about the survey confused you and feel free to suggest changes in the survey if needed. Faculty Perceptions of Online Student Assessment
5. This resource shows an examples of how to code qualitative data: Qualitative Data Analysis . This resource is based upon this book: Johnson, B., & Christensen, L. Educational research: Quantitative, qualitative, and mixed approaches (3d

ed.). Thousand Oaks , CA: Sage Publications.

6. Check out this list of Qualitative Data Analysis Software
7. Read "Evaluating What Really Matters in Computer-Based Education" by Professor Reeves paper
8. Access the *Guiding Principles for Evaluators* website
9. Participate in Week 12 Discussion Forum

pdf of Week 12 Ethical Issues PPT slides

Week 12 Discussion

8 April - 14 April

Please complete the following activities for Week 13:

1. Continue evaluation project collaboration with your team and your client
2. View narratted PowerPoint presentation about "Reports and Recommendations"
3. Here is a new resource about usability: http://www.usabilitybok.org/
4. Participate in Week 13 Discussion Forum

Week 13 Discussion

pdf of Week 13 Evaluation Report PPT slides PDF document

Narrated PPT on Evaluation Reports and Recommendations

15 April - 21 April

Please complete the following activities for Week 14:

1. Please send outline of Final Report to Professor Reeves. This will basically be a table of contents that will serve as a template for the team's final report.
2. Continue evaluation project collaboration
3. Participate in Week 14 Discussion Forum
4. Complete quiz 3. Please email your completed quiz to Professor Reeves (treeves@uga.edu) by Wednesday, April 29, 2009 at 10 PM.

Week 14 Discussion

22 April - 28 April

Please complete the following activities for week 15:

1. Submit first draft of evaluation report for review by Professor Reeves.
2. Participate in Week 15 Discussion Forum

Week 15 Discussion Forum

29 April - 5 May

Please complete the following activities for Week 16:

1. Please submit final evaluation report to Dr. Reeves by Wednesday, May 6, at 5 PM. After review, Dr. Reeves will advise each team regarding dissemination of the report to the team's client. If you team needs more time, please let Dr. Reeves know as soon as possible.
2. Complete online course evaluation and peer and self evaluation instruments.

Online Course Evaluation

Peer and Self Evaluation

6 May - 12 May

Course is over! Have a great summer!

APPENDIX H. PREVIOUSLY PUBLISHED JOURNAL ARTICLE

Oh, E., & Reeves, T. C. (2010). The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners. *Educational Media International, 47*(4), 263-275.

Note: The article is included in this dissertation with the permission of the publisher.

Educational Media International
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713698864

The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners

Eunjung Oh[a]; Thomas C. Reeves[a]
[a] Educational Psychology and Instructional Technology, The University of Georgia, Athens, USA

Online publication date: 10 December 2010

To cite this Article Oh, Eunjung and Reeves, Thomas C.(2010) 'The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners', Educational Media International, 47: 4, 263 — 275
To link to this Article: DOI: 10.1080/09523987.2010.535326
URL: http://dx.doi.org/10.1080/09523987.2010.535326

The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners

Eunjung Oh and Thomas C. Reeves

Educational Psychology and Instructional Technology, The University of Georgia, Athens, USA

Eunjung Oh is a Ph.D. candidate in the Learning, Design, and Technology Ph.D. program in the Department of Educational Psychology and Instructional Technology, The University of Georgia, USA. She is a former human resources development specialist at Samsung in Korea and has participated in many design, development and evaluation projects for the past 10 years. Her research interests include online learning environments that support collaborative group work, authentic learning environments that help students' real life problem solving, students' motivation and engagement in online learning environments, and educational design research methods.

Thomas C. Reeves is a Professor Emeritus of Learning, Design, and Technology in the Department of Educational Psychology and Instructional Technology, The University of Georgia, USA. Since receiving his Ph.D. at Syracuse University, he has designed, developed and evaluated numerous interactive learning programs for education, training, and performance support. In addition to numerous presentations and workshops in the USA, he has been an invited speaker in 27 other countries. His current research interests include evaluation of instructional technology for education and training, authentic tasks for online and blended learning, socially responsible research goals and methods in education, and applications of instructional technology in developing countries.

Contact information of authors: Correspondence to Eunjung Oh: graceoh@uga.edu

Eunjung Oh, EPIT Dept., 622 Aderhold Hall, The University of Georgia, Athens, GA 30602-7144 USA. Tel: 1-706-542-3810; Fax: 1-706-542-4032; Email: graceoh@uga.edu

Thomas C. Reeves, EPIT Dept., 604 Aderhold Hall, The University of Georgia, Athens, GA 30602-7144 USA. TEL: 1-706-542-3849; FAX: 1-706-542-4032; E-mail: treeves@uga.edu

The implications of the differences between design research and instructional systems design for educational technology researchers and practitioners

Design Research (DR) has been an emerging research paradigm in the field of educational technology as well as in education generally for two decades. Educational design research integrates design and research into a socially responsible approach to inquiry related to learning and teaching. Given its still relative novelty, design research requires further discussion regarding what it is and how it can be effectively executed. Instructional Systems Design (ISD) is one of the major activities carried out by educational technologists. Both ISD and design research deal with the enactment of design to improve educational practice. This paper describes the differences and similarities between these two activities and addresses the implications of these differences and similarities for educational technology researchers and practitioners.

Keywords: design research, instructional systems design

Introduction

Since its conception in the early 1990s (Brown, 1992; Collins, 1992), design research has slowly gained attention as an emerging research paradigm in the educational technology field as well as in education generally (Kelly, Lesh, & Baek, 2008; Richey & Klein, 2007). The definition, essential characteristics, and major processes of this approach have been discussed in the literature (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). Educational technology researchers have been actively discussing the new paradigm and sharing a few research cases using this approach (Bannan-Ritland, 2003; Jonassen, Cernusca, & Ionas, 2006; Plomp & Nieveen, 2009; Reeves, 2006).

According to Wang and Hannafin (2005), design research is

> a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories (p. 6)

Traditionally, in educational technology research, design and research have been two distinctive activities, in which the former yields craft-based practice and the latter science-based theoretical principles. However, in educational design research, design and research are inseparable and synergistically interact to improve practice and generate refined design principles and theories.

The contribution of traditional educational technology research methods, both experimental and interpretive, to educational practice have been limited (Reeves, 2006). Many educational technology studies conducted and published for decades are media comparison research (e.g., e-learning vs. face-to-face instruction), despite strong arguments that such studies are ill advised (Clark, 1983). Whenever a new medium has been introduced, educational technologists, as well as other educationists, have rushed to conduct media comparison studies, but the results have

most often tended to show "no significant differences" in students' learning (Russell, 1999). Clark (1999) comments that moving away from media comparison research may require a "conversion" process that many cannot achieve. Meanwhile, over the past twenty years, there has been an enormous expansion of interpretivist approaches to educational technology research using qualitative methods such as case studies and ethnographies (Savenye & Robinson, 2004). These studies have produced numerous examples of descriptive knowledge, but this knowledge has not been shown to be very useful for solving the unique problems most practitioners confront (Maxwell, 2004; Reeves, 2006).

Given the sterility of both media comparison and interpretivist educational technology research, educational researchers aspire to conduct more "socially responsible research" (Reeves, 2000; Reeves, Herrington, & Oliver, 2005), which could actually improve the effectiveness, impact, and/or efficiency of real world teaching and learning. However, design research, as an emerging paradigm, requires further discussion and clarification regarding what it is and how it can be effectively executed. While a general consensus about the differences and similarities among design research and other research paradigms has been established to an extent, there is a lack of understanding regarding the design aspect of the design research. Educational technology is largely conceived of as a design field. Reiser (2002) proposed that the field be named Instructional Design and Technology, and Instructional Systems Design (ISD) is one of the field's major activities. Clearly, both ISD and design research deal with enactment of design in educational settings, and design researchers regularly incorporate tools and strategies from ISD. However, design research and ISD are very different with respect to their underlying paradigmatic assumptions, as well as how they are practiced. Jonassen et al. (2006) highlight just one of the many dissimilarities:

> The design process that design researchers use is different from the one instructional designers use. Rather than beginning with task analysis, design research starts with a "thought experiment" (Cobb, 2001, p. 456), which uses instructional design theory and methods to develop a tentative, provisional, and revisable learning trajectory that describes both the potential learning routes and the means to support and scaffold learning along them. (p. 48)

With these and other distinctions in mind, it is important to clarify what ISD and design research have in common and how they differ so that practitioners and researchers can better understand the potential they have for collaboration. In this paper, the goals, assumptions, conceptualization of design, participation, methods/processes, implementation, role of evaluation, criteria for success, and scalability of ISD and design research are contrasted and compared to promote a better understanding among educational technologists of the differences and similarities between these two methodologies.

Goals

To identify the differential goals of ISD and design research, it is vital to define these terms. The literature contains multiple definitions and interpretations of both terms. Regarding ISD, Reigeluth (1983a) views instructional design as a discipline that "prescribes optimal methods of instruction to bring about desired changes in student knowledge and skills" (p. 4) and distinguishes instructional design from instructional development. In his perspective, instructional design is concerned with constructing optimal "blueprints" to prescribe how

learning should occur to produce desired outcomes in instructional settings, whereas instructional development constitutes the application of those blueprints in an actual instructional context. However, Dick, Carey, and Carey (2005) describe instructional design both as an "umbrella term" (p. 3) that encompasses the entire ISD process and as one sub-phase during the ISD process. Considering the purpose of this paper, the broader umbrella interpretation by Dick, Carey, and Carey is more appropriate. ISD is used in diverse settings such as K-12 schools, higher education, and corporate training. Regardless of the area in which it is utilized, the ultimate goal of ISD is to develop effective instruction to reduce the deficiency in learners' knowledge and skills in those particular educational settings.

Like ISD, design research is also employed in diverse areas. However, its goals remain consistent across those areas. First of all, design research deals with design of innovative interventions for improving educational practice similar to ISD. However, an important difference is that design research also aims to generate and instantiate empirically grounded theories and identify new generalizable design principles during its iterative process (Bannan-Ritland, 2003; Barab & Squire, 2004; Design-Based Research Collective (DBRC), 2003; Edelson, 2002; Gravemeijer & Cobb, 2006; Kelly, Lesh, & Baek, 2008; van den Akker et al., 2006). The integrated theoretical goal of design research and its application in a local context is the most apparent difference in comparison to the goal of ISD of creating innovative solutions for the practical needs of clients at the local level without consistent concern for application of or refinement of theory.

Assumptions

According to Dick (1995), "At the most general level, ISD is a process for determining what to teach and how to teach it" (p. 13). This statement reveals several underlying assumptions. First, ISD is goal-oriented (Gustafson & Branch, 2002), and that goal is assumed to be instruction. ISD has a pragmatic goal because it generally begins with a needs assessment focused on what learners need to learn or instructors need to teach in a particular context. The instructional designers and/or their clients believe that instruction is required to fill gaps caused by deficiencies of knowledge and skill. In that sense, ISD also has a prescriptive goal because it aims to produce optimal outcomes to fulfill specific needs in specific contexts (Reigeluth, 1983a).

Second, while many different ISD models exist, they share common processes, although these processes are modified according to the context. The processes they have in common typically involve five core components: analysis, design, development, implementation, and evaluation (ADDIE) (Branch, 2009). Each ADDIE component has a set of sub-activities depending on their context of use. Early ISD models demanded a more rigid process with designers following steps from analysis to evaluation in a linear way; however, newer models tend to be more flexible, circular, and iterative (Gustafson & Branch, 1997).

Third, as seen in its name, ISD is grounded on the systems approach (Dick et al., 2005; Gagne et al., 1992; Gustafson & Branch, 2002). Dick et al. (2005) stated the following:

> A system is technically a set of interrelated parts, all of which work together toward a defined goal. The parts of the system depend on each other for input and output, and the entire system

> uses feedback to determine if its desired goal has been reached. If it has not, then the system is modified until it does reach the goal. (pp. 1-2)

The ISD process is a systems approach as it involves a number of inputs, steps, and outputs that are interdependent. The output of one step influences the decisions of the next step and often becomes input for the next step. These inputs and outputs interact with each other to achieve defined goals (Gagne et al., 1992).

Finally, ISD is almost always a collaborative and integrative process (Gustafson & Branch, 2002). Although the scope and context of projects may differ, ISD requires diverse expertise including subject matter, instructional design, management, media production, and evaluation. ISD is usually a team effort with different types and levels of know-how coming into play throughout the integrative process.

Design research also has fundamental assumptions. Based on a literature review, Wang and Hannafin (2005) proposed the following five characteristics of design research: *pragmatic; grounded; interactive, iterative and flexible; integrative; and contextual.*

First, design research has more pragmatic goals than traditional educational research. Design research has an interventionist nature that aims to solve problems in educational practice by designing innovative interventions and enacting and refining theories and design principles (DBRC, 2003; van den Akker et al., 2006; Wang & Hannafin, 2005). The nature of the problems tackled by design researchers is clarified by close and on-going collaboration with practitioners. While the practicality of ISD is gained from designing the most effective instruction for given situations, design research produces numerous kinds and levels of innovative practices to enhance learning. Designing instruction per se may not always be the single or most appropriate solution in design research.

Second, design research is grounded in both theory and real world settings. Design research is theory-driven (Cobb et al., 2003; diSessa & Cobb, 2004; Reinking & Bradley, 2008; van den Akker et al., 2006). It begins with problem definition arrived at in concert with practitioners and integrated with in-depth investigation and analysis of the current literature to enact conjectured initial theories. These enacted theories are continuously elaborated throughout the intertwined processes of design and research, and they also function as a design framework for interventions throughout the process (Cobb et al., 2003; van den Akker et al., 2006). Since the purpose of design research is improvement of educational practice, all these processes are embedded in naturalistic settings where complex variables associated with real problems and complicated dynamics of multiple stakeholders exist (Collins, 1992; Reinking & Bradley, 2008; Wang & Hannafin, 2005). ISD is also grounded in real-world settings, and ideally it can be grounded in theory. However, ISD is typically conducted by people who do not pursue theoretical goals or who may not be knowledgeable enough to apply, much less generate, theory.

Third, design research is interactive, iterative, and flexible. Design research requires intensive interactive collaboration among researchers and practitioners (Reeves, 2006) whereas ISD usually involves collaboration among various types of experts and their clients. Design research involves the continuous iterative cycle of "design, enactment, implementation, analysis, and redesign" (DBRC, 2003, p. 5). This iterative cycle comes from the "prospective and reflective"

nature of design research (Cobb et al., 2003, p. 10). Design researchers design and implement their interventions constructed on theory based conjectures. These "embodied conjectures" (Sandoval, 2004, p. 215) are refined through the process of implementation and analysis along with reflection (Cobb, et al., 2003) to support the revision of design. This prospective and reflective nature also makes design research flexible. At the same time that enacted designs are implemented, data continuously collected, and initial conjectures tested with designs, design and research plans can be modified flexibly based upon changing needs and conditions. As noted above, ISD traditionally tends to be somewhat linear, although newer approaches are more iterative. In addition, ISD is likely to be less flexible in instances where it tends to stick to the plans that are determined based on the decisions from the previous stages or data from evaluation.

Fourth, design research is integrative since researchers utilize multiple research methods and approaches from multiple sources to enhance the "objectivity, validity, and applicability of the ongoing research" (Wang & Hannafin, 2005, p. 10). Compared to other methodologies, which utilize certain dominant methods to collect and analyze data, any approach can be appropriate, depending on the design researcher's needs and justification (Reinking & Bradley, 2008). That is, design researchers may use different methods and approaches at different stages to address emerging needs and issues as the focus of research is adjusted. Instructional designers also collect data from multiple sources and use multiple methods. In typical ISD practice, those data are collected mostly in the analysis and evaluation phases to identify needs, revise the current design, and estimate the effectiveness of the designed program. The purpose of data collection in ISD is not to conduct research that produces useful design knowledge and artifacts, but to support the design of instruction. ISD data collection methods tend to be simpler, less exhaustive and less rigorous. Also, the analysis of data in ISD tends to be simpler than in design research.

Finally, design research is contextual because "research results need to be connected with both the design process through which results are generated and the setting where research is conducted" (Wang & Hannafin, 2005, p. 11). Design research is conducted in naturalistic settings in which the designed intervention is implemented and researched in an environment in which complex dynamics, interactions and variables exist. Design researchers co-design interventions and learning environments with practitioners, study about them deeply throughout implementation of interventions, experience the learning contexts, and gain insights into how best to employ, revise and adopt interventions in new settings (Kelly et al., 2008). They become a part of the research context while also playing many roles.

Conceptualization of Design

Educational technology is an applied design science in which the foremost goal is to improve educational practice. The essential way the field of educational technology can improve educational practice is through design of innovative interventions to resolve educational problems and produce design knowledge (Reeves, 2006). Rowland (1993) defines design as

> a disciplined inquiry engaged in for the purpose of creating some new thing of practical utility. It involves exploring an ill-defined situation, finding – as well as solving – a problem(s), and specifying ways to effect change. Design is carried out in numerous fields and will vary

> depending on the designer and on the type of thing that is designed. Designing requires a balance of reason and intuition, and impetus to act, and an ability to reflect on actions taken. (p. 80)

Rowland views instructional design (ID) as a type of design focused on designing new instruction of practical utility. He identified two perspectives in ID. The rational view regards ID as a "logical rational and systematic" process following a certain set of "rules, principles, and procedures," while the creative view regards ID as "intuitive, creative, or artistic" (Rowland, 1993, p. 88). Viewing ID as rational process that is prescriptive and scientific is the more dominant perception of ID in the field (Dick et al., 2005; Reigeluth, 1983b). In ID, design is a strategic "goal-directed process" (Rowland, 1993, p. 80) and a knowledge application process to produce optimal instruction for target learners. Although design is used as knowledge in the ISD process, producing design knowledge is neither an intended goal nor an outcome of ISD. Rather, research as a knowledge construction activity and design as a knowledge application activity are usually separated (Cobb et al., 2003).

In design research, design also functions as both a type of knowledge and a strategy. Design knowledge derived from the literature guides the design research process, and enacted design grounded in the real world provides a basis for developing and refining multiple theories such as design frameworks and design methodologies (Brown, 1992; Edelson, 2002). Design researchers constantly engage in design and redesign, striving to maximize the possibility of designing better solutions to the problems of practitioners while seeking opportunities to better understand the implication of design theory and principles.

Participation

Both design research and ISD require collaboration among professionals. As both are driven by real-life problems in various domains, the people involved in and influencing the process may differ from context to context. The clear difference between the two approaches is that specialists with different areas of expertise collaborate in ISD, while academic researchers and practitioners (e.g., teachers) collaborate in design research. In ISD, designers tend to be professional instructional designers; however, in design research, educational researchers often deal with the design process by playing dual roles as researchers and designers (Bannan-Ritland, 2003). Additionally, both approaches commonly engage subject matter experts, media specialists (if technology-enhanced environments are involved), and learners. Regarding learners, as design research is actually conducted in naturalistic real-world settings, researchers collect data from actual learners. However, in ISD, much data is collected from more or less representative learners rather than the actual target learners, particularly in formative evaluations. The design research literature also identifies policy makers, administrators, graduate students, curriculum developers, and assessment experts as primary actors in the process (Bannan-Ritland, 2003; Joseph, 2004). One clear difference in design research from ISD is professional development of participants during the design research process is an important outcome in design research (McKenney, Nieveen, & van den Akker, 2006). Through collaboration or participation in the design and data collection process, practitioners or participants have opportunity to reflect more on their teaching and learning. In design research, data collection methods "can be structured to stimulate dialogue, reflection or engagement among participants" (McKenney et al, 2006, p.74).

Methods/Processes

Discussing the methods/processes that ISD and design research employ also helps our understanding of the extent to which they are similar and different. From a macro view, Reeves (2000) distinguishes between design research methods and traditional predictive research methods. According to Reeves (2006), design research goes through the following stages: "analysis of practical problems by researchers and practitioners in collaboration," "development of solutions informed by existing design principles and technological innovation," "iterative cycles of testing and refinement of solutions in practice," and "reflection to produce design principles and enhance solution implementation" whereas traditional predictive educational research involves "hypotheses based upon observation or existing theories," "experiments designed to test hypotheses," "theory refinement based on test results," and "application of theory by practitioners" (p. 59). The principal failure of traditional educational research is in the last stage; practitioners are rarely able to apply theory in their practice for a host of reasons, but primarily because the theory is under-informed by substantial and practical understanding of the contexts in which practitioners practice.

While different design research models exist, the Integrated Learning Design Framework (ILDF) by Bannan-Ritland (2003) and Bannan-Ritland and Baek (2008) provides valuable insight into understanding design research process as well as perceiving how the process of design research differs from other approaches. Instead of introducing an entirely new set of methods, the ILDF integrates several existing design and research traditions. The stages of ISD are also included in the procedures of her model. She divides the process into four phases: "informed exploration, enactment, local impact evaluation, and broader impact evaluation" (Bannan-Ritland, 2003, p. 22).

First, in the informed exploration stage, researchers identify problems through needs analysis, investigate literature, develop a conjectured theory, and characterize the audience. Design researchers conduct performance/needs analysis, context analysis, survey experts, and employ other appropriate research methods to explore the learning environments and establish initial design theories and principles. In ISD, during this kind of exploration stage, designers usually conduct needs analysis activities including identifying instructional goals, conducting instructional analysis, and analyzing learners and contexts (Dick et al., 2005). Compared to ISD, in design research "more intensive and systematic preliminary investigation of tasks, problems, and context is made, including searching for more accurate and explicit connections of that analysis with state-of-the art knowledge from literature" (van den Akker, 1999, p. 7).

The second stage is enactment, in which researchers design and develop design interventions. The initially designed prototypes are articulated, refined, and developed toward a more substantial design (Bannan-Ritland, 2003). Evaluations conducted in the next stage (local impact) significantly influence development of design. Also, design is influenced by ongoing data collection from the discussion and analysis among participants (researchers and practitioners). This stage goes through a number of microcycles of design and analysis for a considerable time period (Gravemeijer & Cobb, 2006). In ISD, designers design and develop instruction by identifying performance objectives, developing assessment instruments, choosing instructional strategies, and producing instructional materials (Dick et al., 2005).

In the third stage of Bannan-Ritland's (2003) ILDF, evaluation of local impact is conducted to see whether the designed interventions fulfill the practitioner needs. Researchers conduct formative evaluations of the enacted designs, refine conjectured local theories and systems, and implement interventions. This stage also includes iterative processes. As previously mentioned, results of formative evaluations impact the enacted designs from the prior stage, and connect design and theories in interaction with each other for refinement throughout the implementation of interventions. In ISD, designers conduct formative evaluation of developed instruction, and the results of this evaluation influence the revision of instruction (Dick et al., 2005). Depending on the outcomes, designers may revisit the previous steps from analysis through development, but this is rare. After revision, the redeveloped instruction is implemented. Summative evaluation of ISD is conducted after implementation to verify the effectiveness and efficiency of the instruction designed for clients (Dick et al., 2005; Morrison et al., 2001). Results from summative evaluations are used for making decisions on maintenance of programs (Dick et al., 2005; Morrison et al., 2001). This process is not usually a part of the design process, and an external evaluator typically conducts this evaluation (Dick et al., 2005).

The final stage in the ILDF, evaluation of broader impact, results in the dissemination of outcomes from the research. The major steps are publishing results and adoption/adaptation/ diffusion of designs and theories from the local level to the broader context. Design researchers document the design process continuously, systematically, and comprehensively (Edelson, 2002; Gravemeijer & Cobb, 2006). This cumulative documentation throughout the design research process is critical in retrospective analysis, publication, and eventually application in broader contexts. The results of design research are used for the needs analysis in the next iteration of the same project or as underlying information for needs analysis of other projects. In ISD, the final stage is the summative evaluation, which is more similar to an evaluation of the local rather than broader impact. Sometimes, well-designed educational programs are commercialized to target learners in broader settings; however, evaluation of the broader impact is not usually a focus of ISD and the results of summative evaluations are rarely published.

Implementation

Implementation of interventions also differs in design research and ISD. The nature of intervention varies, as instruction may not be the intervention developed in design research, whereas instruction is always the intervention in ISD. Also, the types of data collected during the implementation process differ. Various data are used to improve conjectured theories and to establish generalizable design principles and methodologies in implementation of design research. By contrast, learners' outcomes are the primary data gathered in implementation of ISD, and these data will be used with other data from summative evaluations to determine the effectiveness of the instruction developed (Wang & Hannafin, 2005). Another significant difference is that whereas in design research researchers remain actively engaged during implementation, in ISD instructional designers usually assume a more hands-off stance with respect to implementation of the program by their clients.

Role of Evaluation

In both ISD and design research, evaluation plays an essential role. Formative evaluation is important because its goal is to identify gaps, issues, and problems that need to be revised for the design to be more effective and useful (Bannan-Ritland, 2003; Dick et al., 2005; Gagne et al., 1992; Morrison et al., 2001; van den Akker, 1999). Typically, formative evaluation deals with local level design issues (Edelson, 2002; Reigeluth & Frick, 1999; van den Akker, 1999; Wang & Hannafin, 2005) and seeks to enhance the design for implementation through iterative cycles of revision. Both approaches collect formative data using various methods and sources. In general, formative evaluation as applied by instructional designers does not deliberately pursue theory refinement; however, in design research, formative evaluation eventually contributes to theory refinement during the iterative process.

In ISD, the purpose of summative evaluation is to identify weaknesses and strengths of the designed instruction and to help clients make decisions about further use of the instruction (Bannan-Ritland, 2003; Dick et al., 2005; Gagne et al., 1992; Morrison et al., 2001). Summative evaluators usually are brought in from outside of the project so that they can be more objective during the evaluation. These experts collect data and evaluate whether the materials and programs actually fulfill the goals of organizations and whether they are effective for learners to achieve intended learning outcomes (Dick et al., 2005). Design researchers rarely conduct summative evaluations as such; instead, they engage in ever more rigorous forms of formative evaluation. The results of the increasingly thorough evaluations are used to refine design principles as well as improve the local solutions. Also, the process of design research and the results of evaluation are shared through publications in both academic and practitioner journals (Bannan-Ritland, 2003).

Criteria for Success

Whether or not an activity is successful depends on its goals. The goal of ISD is to develop effective instruction, and the results of summative evaluation inform whether the developed instruction is successful. Since determining the effectiveness of the instruction is not an easy task, evaluators conduct numerous analyses, such as congruence analysis, content analysis, feasibility analysis, design analysis, current user analysis, and outcome analysis (Dick et al., 2005). Information gathered from these various analyses determines the success of design from ISD.

The goals of design research are to generate useful design interventions and refine theories. Edelson (2002) views the criteria for successful design research as the "novelty and usefulness" (p. 118) of designs and theories to resolve defined problems. The outcomes of design research should be innovative and should produce "demonstrable changes at the local level" (Barab & Squire, 2004, p. 6). Methodological criteria, such as objectivity and validity of data, and rigor and credibility of the research process, are critical to meeting criteria and standards for scientific educational research of any kind, including design research (Wang & Hannafin, 2005). Design researchers usually actively support the implementation of designed innovations with the practitioners with whom they have collaborated (Fishman et al., 2004). However, sustainability of interventions is important so that interventions continue to impact educational practices of

practitioners in the local context without the support and the presence of researchers. Finally, generalizability of the findings is a vital criterion as design research aims to utilize interventions and apply theories in broader contexts (Gravemeijer & Cobb, 2006).

Scalability

Both ISD and design research projects aim to fulfill local needs. ISD often involves clients who seek design and development of instruction to fill an identified gap in their own context. Unless either designers or clients desire to expand their solutions into broader settings, typically local needs are the major focus. In the case of design research, although it focuses on problems identified by practitioners in local settings, application of its outcomes in a broader setting is a major goal (Edelson, 2002; Gravemeijer & Cobb, 2006; Wang & Hannafin, 2005).

Often, design researchers need to document and maintain detailed records of their research process and results regarding how they have designed and enacted interventions and theories, how the interventions have or have not worked, and how they have been refined in relation to the research context (DBRC, 2003). This extensive documentation illustrates how those processes and outcomes are related to each other and how they have progressed. This same documentation eventually guides other design researchers and ultimately contributes to the scalability of the intervention (Gravemeijer & Cobb, 2006).

In addition, established theories and design principles help design researchers not only support improvement in local practice, but also enhance adaptability and scalability of solutions in broader settings. Design principles with context-rich descriptions help scalability of design research outcomes. ISD is applied at many levels of scale ranging from an individual trainer developing better training materials to large-scale projects funded by huge corporations or large government agencies. Design researchers usually tackle projects of an intermediate scale because of the intensive effort required to (1) establish an explicit conceptual framework; (2) document context-rich descriptions of the research context, designs, and process during both design and retrospective analysis phases; and (3) analyze data in a way that enhances reliability and validity (McKenney et al., 2006).

Implications for Educational Technology Researchers and Practitioners

Educational practice requires various kinds of design endeavors for its improvement. Ideally, educational technologists should desire to contribute both to the design of innovative interventions and to their associated learning theories. Some educational technologists focus primarily on the design of effective instruction through the processes inherent in ISD. Other educational technologists have focused on the application of educational research methods, both quantitative and qualitative, to the programs and products that result from ISD, albeit with woefully little impact on practice. Fortunately, a new generation of researchers in our field is attracted to design research as an approach that combines both innovative design and socially responsible inquiry.

Some important benefits may be realized through greater interest in design research among educational technology researchers and practitioners. For example, the theories generated from

design research can guide "craft-based" (Burkhardt, 2006, p. 122) ISD, advance associated research on ISD (Richey & Klein, 2007), and improve ISD practice (Edelson, 2002; Reigeluth & Frick, 1999; Richey & Klein, 2007). In contrast to traditional research, design research creates outcomes "to be transformed into educational practice" (Reeves et al., 2005, p. 107). Learning designs and learning theories synergistically respond to real-world problems at the local level and eventually produce changes in broader contexts. Design research could also be applied to the problems faced by instructional designers just as they are now being applied to the problems of teachers and other practitioners.

Another issue that simmers just below the surface of many discussions among educational technology practitioners and researchers alike is that ISD may simply be an insufficient approach in many of today's complex teaching, learning, and performance contexts. Increasingly, practitioners realize that the straightforward delivery of instruction is rarely enough to be a successful solution to the challenges they face. From the onset, design research has the advantage of getting its metaphorical hands dirty in the complexities of real world practice and maintaining hands-on engagement throughout the process of designing innovative interventions based upon design principles that in turn remain as open to refinement as the interventions themselves. This is not to suggest that design research should replace ISD as the primary method applied by educational technology practitioners. But it does seem reasonable to suggest that in particularly complex contexts where ISD has failed to transform practice, design research may ultimately have more impact. At the same time, we urge educational technology researchers, especially doctoral students and their mentors, to consider design research as a research approach that has considerably more potential as a socially responsible enterprise than more traditional experimental and interpretive approaches.

Design research is still in a state of development (Plomp & Nieveen, 2009). Some progress has been made in the adoption of design research by educational technology researchers, but many challenges remain. Various terminologies and definitions proliferate, and there remains a lack of consensus among researchers about how design research should be conducted. More specifically, the literature regarding how to actually conduct design research has been rapidly growing, but as yet is insufficient to guide young educational technology researchers and graduate students who aspire to learn about and conduct it (Joseph, 2004). As described above, design research requires intensive, long-term collaboration among researchers and practitioners to design and refine prototype learning environments, as well as enhanced design principles. Doctoral students often face formidable barriers with respect to time and resources to engage in design research agendas. More guidance is needed concerning how these challenges can be met so that the positive opportunities of design research can be realized by doctoral students and their academic advisors alike. To provide this guidance, design researchers must put more effort into publishing not only the findings of their research, but also the process through which those findings were obtained and the challenges encountered along the way. As noted above, scalability is another major challenge that design researchers continuously need to address. Meeting these and other challenges will not be easy, but the educational technology research community must tackle them to ensure the continued relevance and viability of this field.

References

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher, 32*(1), 21-24.

Bannan-Ritland, B., & Baek, J. Y. (2008). Investigating the act of design in design research. In A. E. Kelly, R. A. Lesh, & J. Y. Baek (Eds.), *Handbook of design research Methods in Education: Innovations in Science, Technology, Engineering, and Mathematics Learning and Teaching* (pp. 299-319). New York: Routledge.

Barab, S., MaKinster, J. G., Moore, J., Cunningham, D. J., & the ILF Design Team (2001). Designing and building an online community: The struggle to support sociability in the Inquiry Learning Forum. *Educational Technology Research and Development, 49*(4), 71-96.

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *Journal of the Learning Sciences, 13*(1), 1-14.

Branch, R. M. (2009). *Instructional design: The ADDIE approach*. New York: Springer.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2*(2), 141-178.

Burkhardt, H. (2006). From design research to large-scale impact: Engineering research in education. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 121-150). London: Routledge.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445-459.

Clark, R. E. (1999). Foreword: Bloodletting, media, and learning. In T. L. Russell, *The no significant difference phenomenon* (i-iv). Raleigh, NC: North Carolina State University Press.

Cobb, P. (2001). Supporting the improvement of learning and teaching in social and institutional context. In S. Carver. & D. Klahr (Eds.), *Cognition and Instruction: Twenty-Five Years of Progress* (pp. 455-478). Mahwah, NJ: Lawrence Erlbaum Associates.

Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher, 32*(1), 9-13.

Cobb, P., & Gravemeijer, K. (2008). Experimenting to support and understand learning processes. In A. E. Kelly, R. A. Lesh, & J. Y. Baek (Eds.), *Handbook of design research Methods in Education: Innovations in Science, Technology, Engineering, and Mathematics Learning and Teaching* (pp. 68-95). New York: Routledge.

Collins, A. (1992). Towards a design science of education. In E. Scanlon & T. O'Shea (Eds.), *New directions in educational technology* (pp. 15-22). Berlin, Germany: Springer.

DBRC. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher, 32*(1), 5-8.

Dick, W. (1995). Enhanced ISD: A response to changing environments for learning and performance. In B. B. Seels (Ed.), *Instructional design fundamentals: A consideration* (pp. 13-20). Englewood Cliffs, NJ: Educational Technology Publications.

Dick, W., Carey, L., & Carey, J. O. (2005). *The systematic design of instruction* (6 ed.). Boston: Allyn and Bacon.

diSessa, A. A., & Cobb, P. (2004). Ontological innovation and the role of theory in design experiments. *Journal of the Learning Sciences, 13*(1), 77-103.

Edelson, D. C. (2002). Design research: What we learn when we engage in design. *Journal of the Learning Sciences, 11*(1), 105-121.

Gagne, R. M., Briggs, L., & Wager, W. W. (1992). *Principles of instructional design.* (4th ed.). New York: Holt, Rinehart and Winston.

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 17-51). London: Routledge.

Gustafson, K. L., & Branch, R. M. (1997). Revisioning models of instructional development. *Educational Technology Research & Development, 45*(3), 73-89.

Gustafson, K. L., & Branch, R. M. (2002). What is instructional design? In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (pp. 16-25). Upper Saddle River, NJ: Merrill Prentice Hall.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development*, *48*(3), 23-48.

Jonassen, D. H., Cernusca, D., & Ionas, I. G. (2006) Constructivism and instructional design: The emergence of the learning sciences and design research. In R. Reiser & J. Dempsey (Eds.), *Trends and issues in instructional design and technology* (pp. 45-52). Columbus, OH: Merrill/Prentice-Hall.

Joseph, D. (2004). The practice of design-based research: Uncovering the interplay between design, research, and the real-world context. *Educational Psychologist, 39*(4), 235-242.

Kelly, A., Lesh R., & Baek, J. (Eds.). (2008). *Handbook of design research methods in education*. New York: Routledge.

Kirby, J., Hoadley, C., & Carr-Chellman, A. A. (2005). Instructional systems design and the learning sciences: A citation analysis. *Educational Technology Research and Development, 53*(1), 37-48.

Maxwell, J. A. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher, 33*(2), 3-11.

McKenney, S., Nieveen, N., & van den Akker, J. (2006). Design research from a curriculum perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 67-90). London: Routledge.

Morrison, G. R., Ross, S. M., & Kemp, J. E. (2001). *Designing effective instruction* (3rd ed.). New York: John Wiley & Sons.

Plomp, T., & Nieveen, N. (Eds.). (2009). An introduction to educational design research. Enschede, The Netherlands: SLO. Retrieved April 16, 2009, from http://www.slo.nl/downloads/2009/Introduction_20to_20education_20design_20research.pdf/

Reeves, T. C. (2000). Socially responsible educational technology research. *Educational Technology, 40*(6), 19-28.

Reeves, T. C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational Design Research* (pp. 52-66). London: Routledge.

Reeves, T. C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 96-115.

Reigeluth, C. M. (1983a). Instructional design: What is it and why is it? In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status* (Vol. 1, pp. 3-36). Hillsdale, NJ: Lawrence Erlbaum Associates.

Reigeluth, C. M. (Ed.). (1983b). *Instructional-design theories and models: An overview of their current status* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates.

Reigeluth, C. M., & Frick, T. W. (1999). Formative research: A methodology for creating and improving design theories. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional technology* (Vol. 2, pp. 633-651). Mahwah, NJ: Lawrence Erlbaum Associates.

Reinking, D., & Bradley, B. A. (2008). *Formative and design experiments: Approaches to language and literacy research.* New York: Teachers College Press

Reiser, R. A. (2002). What field did you say you were in? Defining and naming our field. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology*. Upper Saddle River, NJ: Merrill Prentice Hall.

Richey, R. & Klein, J. D. (2007). *Design and development research: Methods, strategies, and issues.* Mahwah, NJ: Lawrence Erlbaum Associates.

Rowland, G. (1993). Designing and instructional design. *Educational Technology Research & Development, 41*(1), 79-91.

Russell, T. L. (1999). *The no significant difference phenomenon*. Montgomery, AL: International Distance Education Certification Center.

Sandoval, W. A. (2004). Developing learning theory by refining conjectures embodied in educational designs. *Educational Psychologist, 39*(4), 213-223.

Savenye, W. C., & Robinson, R. S. (2004). Qualitative research issues and methods: An introduction for educational technologists. In D. H. Jonassen, (Ed.), *Handbook of research for educational communications and technology* (pp. 1045-1071). Mahwah, NJ: Lawrence Erlbaum Associates.

van den Akker, J. (1999). Principles and methods of development research. In J. van den Akker, N. Nieveen, R. M. Branch, K. L. Gustafson & T. Plomp (Eds.), *Design methodology and developmental research in education and training* (pp. 1-14). The Netherlands: Kluwer Academic Publishers.

van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (2006). *Educational design research*. London: Routledge.

Wang, F., & Hannafin, M. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research & Development, 53*(4), 5-23.