FACULTY MEMBERS’ DECISIONS ABOUT ONLINE ASSESSMENT STRATEGIES: A MIXED-METHODS INVESTIGATION

by

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(Under the Direction of Thomas C. Reeves)

ABSTRACT

In recent years, more and more online institutions have emerged in response to market demand. In addition, traditional institutions began expanding their online educational programs to attract more students. However, the lack of understanding about how faculty members make decisions about online assessment has impeded the improvement of online learning. This knowledge gap has also reduced opportunities for maximizing the benefits of new technologies while assessing students online. This mixed-method study has endeavored to fill this knowledge gap by surveying and interviewing faculty members who have taught online courses about their decisions regarding online assessment. This study was also an exploratory effort to reveal differences between the implementation of online assessment by faculty members from traditional universities and faculty members from online commercial institutions.

Phase I of the study involved collecting data via an online survey from faculty members who taught online courses at either traditional research high universities or online commercial institutions. Statistically significant relationships were discovered among factors such as the nature of the discipline, type of institution, epistemological worldviews, variety of online assessment strategies, and the purpose of using a specific online assessment strategy.
Phase II of this study involved interviews with 13 faculty members recruited at the end of phase I. This phase addressed questions about how faculty members chose their online assessment strategies, their beliefs toward teaching, learning and assessment, their specific understanding about issues such as test dishonesty in online learning, and their recommendations for improvement of online assessment tools within current Course Management Systems.

The results of this study provide insights into how faculty members make decisions about online assessment. The differences between the implementation of online assessment in the two different types of institutions indicate the need for changing the current faculty reward system in higher education. The results of this study have the potential to be a theoretical foundation for a faculty training model for the design and implementation of effective online assessment. Lessons drawn from this study may also help guide the design of future studies related to how student learning is assessed in online courses.

INDEX WORDS: Online learning, Online assessment, Faculty perspectives, Mixed-methods research
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To my parents, Shiming Hu and Zeying Zhang.

Without your unconditional love and support that sustained me, I would not be the person I am today.
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# TABLE OF CONTENT

ACKNOWLEDGMENTS ........................................................................................................... V

LIST OF TABLES ....................................................................................................................... X

LIST OF FIGURES ................................................................................................................... XII

CHAPTER ONE: INTRODUCTION ......................................................................................... 1

OVERVIEW ............................................................................................................................... 1

BACKGROUND ......................................................................................................................... 2

STATEMENT OF THE PROBLEM ............................................................................................. 5

PURPOSE AND RESEARCH QUESTIONS ............................................................................... 7

THEORETICAL FRAMEWORK ................................................................................................. 9

SIGNIFICANCE OF THE STUDY ............................................................................................ 14

CHAPTER SUMMARY ............................................................................................................. 15

CHAPTER TWO: REVIEW OF THE LITERATURE .................................................................. 16

OVERVIEW ............................................................................................................................... 16

TEACHERS’ BELIEFS ............................................................................................................ 17

EPISTEMOLOGICAL BELIEFS AND WORLDVIEWS ............................................................. 21
ASSESSMENT .................................................................................................................. 41

ONLINE ASSESSMENT .................................................................................................. 56

CHAPTER SUMMARY .................................................................................................... 72

CHAPTER THREE: METHODOLOGY ................................................................................. 74

OVERVIEW ..................................................................................................................... 74

RESEARCH DESIGN ....................................................................................................... 75

RESEARCH CONTEXT ................................................................................................... 77

PARTICIPANTS ............................................................................................................... 79

PILOT STUDIES ............................................................................................................ 80

INSTRUMENTATION ..................................................................................................... 81

DATA COLLECTION PROCEDURES ............................................................................. 88

DATA ANALYSIS PROCEDURES .................................................................................. 90

SUBJECTIVITY STATEMENT ......................................................................................... 95

CHAPTER SUMMARY .................................................................................................. 96

CHAPTER FOUR: RESULTS ............................................................................................. 97

OVERVIEW ..................................................................................................................... 97

AN OVERVIEW OF THE DATA AND A COMPARISON .................................................. 99

ANSWERS TO RESEARCH QUESTIONS IN PHASE I ..................................................... 111

BELIEFS ABOUT ONLINE TEACHING AND ONLINE ASSESSMENT ................................ 132
APPENDIX H  SURVEY USED IN THE PILOT STUDY ......................................................... 225

APPENDIX I  ADDITIONAL CROSS TAB TABLES .......................................................... 235
LIST OF TABLES

Table 1: Summary of Survey Instruments for the Study ................................................................. 86
Table 2: Summary of the Data Types of Variables and Statistics Techniques................................. 92
Table 3: Discipline and Institution Type Crosstabulation .............................................................. 101
Table 4: Independent-Samples T-tests for the Percentages of the Two Levels of Courses Taught ............................................................... 104
Table 5: Faculty Members’ Average Scoring on the Global Pedagogical Orientations.............. 106
Table 6: Independent-Samples T-tests for the Global Pedagogical Beliefs ......................... 107
Table 7: The Number of Respondents for Each of the Online Assessment Strategies with a Certain Purpose ........................................................................................................................................ 111
Table 8: Descriptive Statistics of Total Number of Types of Online Assessment Strategies..... 112
Table 9: Statistically Significant Relationships Discovered by Using ANOVA Analyses ....... 114
Table 10: Independent-Samples T-test for the Effects of Institution Type on the Variety of Online Assessment Strategies ........................................................................................................ 116
Table 11: Descriptive Statistics of Online Percentages of Each Online Assessment Strategy... 117
Table 12: Crosstab Analytic Results between Institution Type and Using Authentic Tasks to Provide Service Learning Opportunities ................................................................................ 118
Table 13: Crosstab Analytic Results between Institution Type and Use of Essays to Assess Students Knowledge and Understanding ................................................................. 120

Table 14: Crosstab Analytic Result between Institution Type and Use of Online Discussion to Assess Students Based on the Number and Quality of Responses ....................................... 122

Table 15: Crosstab Analytic Result between Institution Type and Use of Online Discussion for Students to Express their Ideas and Receive Feedback from Peers ................................... 123

Table 16: Statistically Significant Relationships Revealed in this Study ............................................ 151
LIST OF FIGURES

Figure 1. Personal epistemological beliefs and their relationship to different measurement instruments. ........................................................................................................................................ 23

Figure 2. The flow of the study........................................................................................................................................................................... 78

Figure 3. Distribution of faculty in different discipline categories (N=147). ................................................................. 100

Figure 4. Average course loads for faculty members per year. ............................................................... 103

Figure 5. The frequencies and percentages of four different online delivery types. ............... 107

Figure 6. Number of faculty members using different types of CMSs.................................................. 109

Figure 7. Distribution of total numbers of types of assessment strategies............................................. 113

Figure 8. Plot graph between online percentage of a course and the estimated marginal means of the number of types of online assessment strategies used................................................................. 115

Figure 9. Percentages of faculty members that used authentic tasks as service learning opportunities in each type of institution........................................................................................................... 119

Figure 10. Percentages of faculty members that used essays to assess students’ learning........... 120

Figure 11. Percentages of faculty members who used online discussion to assess students based on the number and quality of responses........................................................................................................ 121
Figure 12. Percentages of faculty members who used online discussion for students’ expression and peer review. ................................................................. 123

Figure 13. Percentages of courses that used authentic tasks to assess students’ performance. .. 125

Figure 14. Percentages of courses using authentic tasks to provide service learning opportunities. ................................................................. 125

Figure 15. Percentages of courses that used online discussion for students to express ideas and receive feedback from the instructor................................................................. 126

Figure 16. Percentages of courses that used online game simulation to assess student learning. ................................................................. 126

Figure 17. Percentage of courses that used online quizzes for instructional effectiveness with different online delivery percentages. ................................................................. 128

Figure 18. Percentage of courses that used authentic tasks to assess students’ performance with different online delivery percentages. ................................................................. 128

Figure 19. Percentages of courses that used online discussion to assess students based on quality and number of responses with different online delivery percentages. ......................... 129

Figure 20. Percentages of courses that used online discussion for posting comments and receiving feedback from peers with different online delivery percentages. ......................... 129

Figure 21. Percentages of courses that used online discussion for feedback from the instructor with different online delivery percentages. ................................................................. 130
Figure 22. Percentages of courses that used online course journal to assess students’ intellectual development with different online delivery percentages. ...................................................... 130

Figure 23. Percentages of courses that used an online course journal to assess emotional engagement of the course with different online delivery percentages. ........................................ 131

Figure 24. Frequencies of use for each type of online assessment strategy. ................................. 141

Figure 25. The framework of the Technological Pedagogical Content Knowledge (TPCK). .... 170
CHAPTER ONE: INTRODUCTION

Overview

Assessment is a critical, but often de-emphasized, factor in the design and implementation of higher education programs and courses (Roksa & Arum, 2011). The rapidly expanding move from traditional classroom instruction to online learning environments around the globe heightens the stakes for assessment. The way that students are assessed shapes not only what they learn, but also how they learn, their perceptions of learning, and whether their motivation for learning is intrinsic or extrinsic. Research by Thomas and Oldfather (1997) indicates that teachers’ epistemological beliefs, which encompass the ways that the teachers define knowledge and learning, shape the ways they assess their students in traditional teaching and learning environments, such as face-to-face classroom instruction. For example, a teacher who believes that knowledge is a matter of social construction would be more likely to use team-based projects as an assessment strategy than a teacher who believes that knowledge is primarily a matter of objective facts about the world that an individual either knows or does not.

Moving from face-to-face to online teaching requires a significant transformation in terms of space, time, media, methods, pedagogies, the roles of students and teachers, and of course, assessment. Each of these factors must be carefully considered and aligned (Reeves,
In this study, my goal was to examine more closely the factors that may affect faculty members’ decisions about how to assess students’ knowledge, skills, and attitudes in an online or blended learning environment. Two factors that most interest me are the epistemological beliefs and global pedagogical orientation of the higher education faculty members who teach such courses.

Background

With widespread use of the Internet taking off in the mid-1990s, online learning began to proliferate in all levels of education. Since then, more and more traditional institutions have adopted online and blended learning while at the same time numerous online universities have emerged. In summarizing the results of a survey of more than 2,500 universities and colleges in the USA, Allen and Seaman (2010) wrote, “Over 5.6 million students were taking at least one online course during the fall 2009 term; an increase of nearly one million students over the number reported the previous year” (p. 2). Enrollments in online courses are increasing by 20 percent per year while growth in actual enrollments in higher education is less than 2 percent (Allen & Seaman, 2010). Of the nearly 19 million students enrolling in higher education in the 2009-2010 academic year, 2.6 million of them enrolled in commercial, for-profit institutions, many of them totally or largely online (Wilson, 2010). The University of Phoenix alone enrolled nearly 450,000 students in 2010 (Blumenstyk, 2011).

As online and blended approaches to higher education teaching and learning have proliferated, interest in online assessment has increased. Assessment options are inevitably
influenced by the tools available to implement different assessment strategies. Commercial course management systems (CMS) such as BlackBoard permit virtually all instructors within institutions that provide such a system with opportunities to design and implement courses that have online components. However, CMSs may also put constraints on what is possible with respect to assessment. For example, these systems may foster the use of traditional assessment strategies in online and blended courses, especially online tests, quizzes, and surveys, perhaps because of their convenience, flexibility of space and time with respect to dissemination, and low cost on delivering and scoring. However, little research has examined the relationships between the affordances of CMS and their effect of how assessment is conducted in online and blended courses. Not enough is known about how instructors teaching online decide to conduct assessment within their courses. Gaytan and McEven (2007) concluded that “Finding effective techniques to assess student learning in online courses has received increased attention but has not yet been thoroughly addressed” (p. 119).

Another issue affecting faculty decisions about how they assess student learning in their online courses is that state-of-the-art of online teaching and technologies used in online courses are rapidly evolving (Christensen, Johnson, & Horn, 2008). Scholarly work in this area may be characterized as a “moving target.” Writing in 2006, Bartley claimed that most online assessments are implemented asynchronously without the instructor’s presence. If this five-year old claim in still valid, this kind of asynchronous assessment probably involves traditional assessment strategies such as multiple-choice tests, although asynchronous online assessments
today may also include essays, authentic tasks, research projects, portfolios, journals, and other strategies. Unfortunately, little is known about how widespread the adoption of these alternative assessments is. In traditional academic courses and programs, electronic portfolios and online discussion have been adopted increasingly by institutions as alternative methods to observe and assess students’ learning (Bloxham & Boyd, 2007; Boud & Falchikov, 2007). But how widespread these two assessment methods are being used in online courses and programs remains unclear.

Synchronous assessments are sometimes used in online education in an attempt to minimize the dishonesty issues that have arisen in some asynchronous online assessment models (Bartley, 2006). In addition, synchronous assessments can enhance the interactivity during the assessment, as well as simulate the real face-to-face assessments. Virtual conferences using telephone, video, chat rooms, and text-messaging tools can be utilized for synchronous assessments (Palloff & Pratt, 2001). Web 2.0 technologies can also allow for role-play and simulations, online games and simulations, and virtual worlds to be adopted for sophisticated assessment (Aldrich, 2009).

Some of the largely untapped advantages of online assessment include aspects such as interactivity, collaboration, and the capacity to include online media such as real-time video, and audio and digital imagery (Reeves, 2000). Indeed, these advantages are among the features touted as advantages of online learning environments in general (Bonk, 2009). However,
problems and challenges are also inherent in attempts to adopt innovative online assessment strategies.

On the positive side, new opportunities to extend or to enhance teaching and learning may arise when innovative assessment strategies are adopted. For example, the technological affordances of online assessment can enable immediate feedback to learners. These strategies may also release instructors from some, if not all, of the workload associated with analysis and grading (Engelbrecht & Harding, 2004). In addition, it usually costs less to mark tests with standard answers, such as automatically graded multiple-choice tests or even automated essay scorers.

On the negative side, there are several significant problems and challenges emerge during the process of online assessment. For example, it is often assumed that cheating and plagiarism are more widespread when online assessment strategies are used (Rowe, 2004). Collaborative assessments inevitably raise issues about equity and fairness among students (Roberts, 2004). Authentic assessments based on having students engage in real world tasks usually require much more careful planning and vigilant monitoring on the part of instructors than traditional assessment methods (Herrington, Reeves, & Oliver, 2010.)

**Statement of the Problem**

According to Allen and Seaman (2007), faculty members are often reluctant to engage in online instruction because of the extra working load of planning and teaching an online course. The authors reported that only 33 of academic leaders believed their faculty members “accept the
value and legitimacy of online education” (Allen & Seaman, 2007, p. 18). Are there factors other than the perceived increase in workload that limit faculty members’ acceptance of online learning? To what extent do the challenges inherent on online assessment contribute to the reluctance of higher education instructors to become more engaged in online teaching and learning?

Assessment is required in virtually all aspects of higher education to monitor the results of both learning and teaching. However, little is known about the main concerns that faculty members have with respect to assessing students’ learning online. Nor do we know how instructors from different disciplines or different types of institutions adopt and implement various assessment strategies online. These issues related to online assessment need to be addressed.

Oosterhof, Conrad, and Ely (2008) pointed out that online assessment tools tend to represent the interests and visions of the computer programmers who create them rather than the needs of their actual participants especially instructors. To design a more user-oriented type of online assessment tool and to enhance the state-of-the-art of online assessment in higher education, researchers and developers must understand instructors’ needs both technically and pedagogically with respect to the design and use of an online assessment tool.

Too little is known about how instructors’ attitudes and knowledge regarding the Internet and their beliefs and practices of assessing students online. Furthermore, researchers need to better understand the current status of online assessment strategies and tools that faculty
members are actually using along with their perceptions are of these tools. Such understanding would help to support faculty members as they adapt to the online teaching and learning environments, as well as help developers and programmers to design more functional and pedagogical oriented online instruction tools.

**Purpose and Research Questions**

This study was conducted in two phases. In the first phase, an online survey was employed to explore faculty members’ decisions and practices of online assessment. In the second phase, interviews and document analysis were used to explore in greater depth the data gathered in the first phase.

**Phase I**

The purpose of Phase I was to explore relationships among faculty members’ online assessment practices, their use of computers and the Internet, their epistemological worldviews and pedagogical orientations, and other demographic information such as institution type, course level, and the nature of disciplines. Research questions for this phase of the study were:

(1a) What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the nature of the discipline, the course level, and the types of online assessment methods and techniques they implement?
What statistically significant relationships are found among faculty members’ experience and expertise with computers and the Internet, and the types of online assessment methods and techniques they implement? 

What statistically significant relationships are found among faculty members’ epistemological worldviews and their pedagogical orientations and the types of online assessment methods and techniques they implement?

**Phase II**

The main goal during phase II of this study was to identify underlying themes related to the following research questions:

How do faculty members make decisions about how to assess students in an online learning environment?

2a) What are faculty members’ perceptions of the role of assessment within their courses?

2b) How do epistemological worldviews and pedagogical orientations influence decisions faculty members make regarding online assessment?

2c) What areas of improvement do faculty members perceive for online assessment tools?

2d) According to faculty members’ perceptions, what improvements should be made to the assessment functions in current course management systems (CMSs)?

2e) What new functions and/or applications should be added to the current online assessment technique menu?
**Theoretical Framework**

The theoretical framework for this study is based on the concepts of epistemological beliefs and pedagogical orientations within a cognitive and sociocultural constructivist view of learning and assessment. Few would dispute that a primary goal of today’s higher education is to prepare future professionals and researchers with a variety of general and specific skills and knowledge to support these skills. Students who graduate from institutions of higher education should possess not only content knowledge and skills of a certain field, but also skills needed for independent learning, life-long learning, and collaboration and social communication (Reeves, 2006). Instructors’ responsibilities include not only supporting the learning of specific content knowledge inherent in their disciplines, but also helping their students develop the skills needed for higher level problem-solving (Arum & Roksa, 2011).

Cognitive theory maintains that learning is to be an active mental process. According to cognitive learning theorists, learners must take primary responsibility for their own learning. Cognitive theorists also maintain that it is through the complex cognitive processes of memory, motivation, and reflection that learners build their knowledge and skills. Sociocultural constructivists, on the other hand, view learning as socially and culturally constructed process. According to social constructivists, social meanings and activities are delivered through culturally-determined signs, such as language and counting, and learners later develop their own knowledge and cognitive skills by internalizing these social interactions. Although cognitive development theory and sociocultural constructivism have different emphases on the process of
learning, both of these theoretical orientations regard learners as the central figure in the cognition process and problem-solving skills to be the ultimate goal of learning.

Assuming that instruction and assessment should align with the constructivist and cognitive developmental framework, many researchers have suggested that assessment activities should be integrated seamlessly into the instructional process in a specific social-interactive context and that students should be involved in the assessment process (Freedman, 1998; Price, O'Donovan, & Rust, 2007; Rust, O'Donovan, & Price, 2005; Shepard, 2000; Shepard, 2001). Shepard (2000) argued that the foundation of the assessment reconstruction toward effective learning should be based upon a “social-constructivist” conceptual framework. Shepard (2001) further suggested that, guided by the constructivist paradigm, instructors should closely assess students' understanding; encourage feedback from peers; and promote student self-assessments as part of the social processes required to help students develop intellectual abilities, construction of knowledge, and formation of identities. Shepard (2001) noted that assessment strategies should be developed with a focus on more open-ended, realistic tasks. Rust, O’Donovan and Price (2005) also proposed a social constructivist assessment model. In this model, the authors recommended important assessment strategies that would engage both students and teachers in the process of selecting or creating assessment criteria and applying them during the assessment, as well as giving feedback. Both Shepard (2001) and Rust, et al. (2005) emphasized the importance of social interaction during the assessment process.
According to the constructivist views on learning and assessment, assessment that facilitates students’ learning should be ongoing, integrated into the instruction, student-centered, and focused on higher level thinking and problem solving skills. The following assessment strategies serve best for these goals. First, formative assessment could be implemented to promote students’ learning. Formative assessment is assessment that happens during students’ learning processes. This type of assessment diagnoses the problems in students’ understanding, provides ongoing feedback to both teachers and students, and finally helps both teachers and students modify their teaching and learning strategies. Formative assessment, therefore, is under the umbrella of the construct of constructivist assessment. Second, peer assessment and self assessment involve students in the assessment process. Self assessment includes promoting students’ responsibility for the identification of criteria or standards of assessment as well as making judgments on the extent to which they met the standards and criteria (Boud, 1995a). Peer assessment involves students making judgments about the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status (Topping, 1998). Third, alternative assessment techniques involve the instructor’s assessment of students’ problem solve skills and critical thinking, such as authentic-task-based assessment, portfolios, reflective journals, online discussion, blogs, games and simulations, and interviews. When implemented appropriately, assessment strategies may provide prompt information on students’ learning progress, help students build better problem-solving and cognitive skills, and ultimately scaffold teaching and learning. However, it is not the format, but the consistency and fairness of the
assessment strategies that are most important. The best practices of assessments should be those that correctly align the assessment strategies and techniques with the instructional objectives, students’ characteristics, available technology resources, and other internal or external factors (Reeves, 2006).

There are many factors which can determine whether instructors will use cognitive development and constructivist-based strategies in their teaching and assessment, such as the environment or culture of the institution where the courses are delivered, faculty members’ teaching experiences, instructors’ beliefs about teaching, and other faculty demographic information. This study focuses on the link between faculty members’ use of technology, the faculty members’ epistemological beliefs and pedagogical orientation, and their online assessment practices. In addition, other factors, such as institution type, and involved disciplines were also examined as possible factors that could influence online assessment choices.

There are a variety of epistemological belief models to be applied to the study of teachers’ practices in classrooms (Hofer, 2001; Schraw, 2001), but the two epistemological belief models used in this study are the five-dimension epistemological belief model proposed by Schommer (1990) and the three epistemological worldview types summarized by Schraw and Olafson (2002). Schommer (1990) concluded that the epistemological beliefs of individuals are multi-faceted. Factors generated from previous empirical studies based on Schommer’s (1990) model include Certain Knowledge (e.g. knowledge is certain vs. knowledge is uncertain and developmental), Simple Knowledge (e.g. knowledge is simple and unambiguous vs. knowledge
is complex and interrelated), Quick Learning (e.g. learning is quick or not at all as opposed to learning is a progressive process), Omniscient Authority (e.g. knowledge is dispensed down by authority vs. knowledge is developed from reason), and Innate Ability (e.g. the ability of learning is fixed vs. the ability of learning is incremental). Schraw and Olafson (2002) described and compared three epistemological worldviews, which they thought influenced teachers’ thoughts and their instructional practices. The three epistemological worldviews are realist, contextualist, and relativist. These worldviews were regarded as indicators of global pedagogical orientations in this study.

In summary, many factors influence whether faculty members practice constructivist assessment in a course. These factors include the institution type, the nature of the discipline, the instructor’s use of computers and the Internet, course level, faculty members’ epistemological beliefs and pedagogical orientations, and faculty members’ beliefs about teaching and learning. Because the online learning environment is a different learning environment from the traditional face-to-face classroom environment, it is important to understand how and the degree to which the proposed factors influence assessment strategies practiced in an online environment.

**Definitions and Terms**

Online assessment: Online assessment refers to assessments that use computers and the Internet to deliver and administer assessments to students.

Epistemological beliefs: Beliefs about the nature of knowledge and knowledge acquisition.
Formative assessment: The assessment of student learning process that provides feedback used to monitor and modify students’ learning and teachers’ teaching (Black & Wiliam, 1998).


Summative assessment: Activities at the end of instruction for certifying mastery or assigning grades (Gronlund, 2003).

Traditional assessment techniques: Techniques used in traditional or standardized tests usually are: multiple-choice items, true-false, matching, completion, short answer, etc.

Alternative assessment techniques: Techniques used in alternative assessment in this study are authentic tasks and/or projects, portfolios, reflective journals, online discussion, simulation, online games, and behavior observation in Multi-User Virtual Environments (MUVE).

Significance of the Study

This study about faculty members’ perceptions toward and practices of online assessment is important for several reasons. First, assessment is vital for determining the effectiveness of teaching and learning activities. Online assessment may also occur if students meet face-to-face their teacher every day. Online assessment is even more important for monitoring students’ learning process because the lack of physical presence of instructors and peers during the instructional process and the distance and time differences. This study provides information about faculty members’ practices of online assessment and serves as a foundation for further studies of online learning and assessment in the future. Second, previous studies about online
assessments have been focused on small samples (e.g., a single course, a single institution, a single discipline). This study considered evidence across disciplines and from various institutions, thus yielding a better understanding of the current status and practices of online assessments in general. Third, instructors, administrators, course designers, and faculty support staff may benefit from an enhanced understanding of the relationship between faculty members’ beliefs about teaching and learning and their online assessment decisions. Finally, the implications and findings of this study may facilitate future studies of how assessment decisions are made by instructors teaching in traditional face-to-face classrooms.

Chapter Summary

As online education continues to proliferate, it is very important to examine factors that influence faculty members’ online assessment decisions to promote the effectiveness of online learning. Hence, the purpose of this study was to explore faculty members’ perceptions toward and practices of online assessments. The overarching research questions for this study are, “what are the faculty member’s experiences with online assessment?” and “how are faculty members’ practices of online assessment influenced by their beliefs toward teaching and learning?” To answer these two questions, epistemological beliefs and worldviews have been chosen as two main factors potentially influencing faculty members’ instructional practices. The next chapter presents a thorough review of the literature related to this study.
CHAPTER TWO: REVIEW OF THE LITERATURE

Overview

The purpose of this chapter is to present a review of the literature related to research on personal epistemological beliefs and worldviews, assessment practices, and online learning. The review first introduces conceptions of and approaches to teachers’ beliefs. Then two branches of personal epistemological beliefs, developmental approaches and system approaches, are introduced separately. In the introduction to system approaches, the most generally adopted epistemological belief questionnaires and studies using them are introduced and described. After this, the conception of epistemological worldviews and research related to epistemological beliefs and worldviews in teacher education are reviewed. The review then provides a summary of major assessment paradigms, stances, and concepts. Finally, studies in the literature concerning current implementation of online assessment are reviewed, including the principles of implementing assessments online, new assessment techniques in online learning environments, and the online assessment challenges that instructors face.

The GALIEO virtual library at the University of Georgia was the primary source of literature reviewed. The following search terms were used both individually and in various combinations to retrieve suitable literature: teachers’ beliefs, epistemological, epistemological
beliefs, epistemic, online assessment, online quiz, automated grading, blogs, wiki, authentic tasks, electronic portfolios, e-portfolios, online game, role-play, virtual world, and virtual learning. In the following sections, research found using the above search terms will be discussed in sections related to teachers’ beliefs, epistemological beliefs and worldviews, assessment, and online assessment.

**Teachers’ Beliefs**

Many researchers have argued that teachers’ beliefs influence their approaches to solving the problems faced in planning, conducting, and evaluating curricula, lesson plans, learning activities, assessment strategies, and other factors involved in education. Researchers have also argued that a better, richer understanding of the beliefs of teachers or pre-service teachers may be used to improve teacher education (Brookhart & Freeman, 1992; Mak, 2011; Smith, 2005; Waters-Adams, 2006; Wilson, 1990). Beliefs impact how individuals respond to particular circumstances as well as individuals’ utilization of existing knowledge. Beliefs influence how one manipulates knowledge to fit a particular purpose or circumstance (Abelson, 1979) and as a major determinant of behavior (Brown & Cooney, 1982).

It is important to distinguish between knowledge and belief. Knowledge and belief are usually intertwined, so it is difficult to clarify where knowledge ends and belief begins (Pajares, 1992). A teacher may know that her students are struggling with long division; the same teacher may believe that “The most important aspect of mathematics is to know the rules and to be able to follow them” (Drageset, 2010, p. 37). Teachers hold many types of beliefs that influence their
decisions and practices in teaching. These beliefs often relate to schooling, teaching, learning, subjects, curriculum, and learners. In the following sections, teachers’ significant beliefs are introduced. Although not all areas are directly related to epistemology in the formal sense, they all relate to either knowledge or the process of knowing, or both. Therefore, these beliefs are important research to truly understand teachers’ epistemological beliefs, worldviews, and practices in teaching.

**Beliefs about Learners and Learning.** Teachers’ conceptions and assumptions about their students and how learning occurs influence how they interact with their students and how they teach. In case studies of the conceptions of learners’ prior knowledge held by pre-service teachers, first-year teachers and expert teachers, Meyer (2004) found that expert teachers held a complex conception of learners’ prior knowledge and made use of their students’ prior knowledge in significant ways during instruction. On the other hand, pre-service and first-year teachers held a very limited view of how students’ prior knowledge influences learning. A study conducted by Rosenfeld and Rosenfeld (2008) indicated that when teachers had greater understanding of students’ learning differences, they were more likely to intervene in ways that assisted students with difficulties in learning.

**Beliefs about Teaching.** Teachers differ in important ways with respect to their beliefs about teaching (Calderhead, 1996). Some teachers view teaching as the process of delivering knowledge itself whereas others view teaching as a process of helping students to develop lifelong learning skills. Some view learning as the process through which individuals construct
knowledge and others view learning as the process through which learners construct their knowledge through interacting with other people.

Studies on pre-service teachers’ beliefs about teaching have noted that novice teachers are more likely to view teaching as merely delivering facts and students memorizing concepts and procedures (Patton, Fry, & Klages, 2008). Research suggested that pre-service teachers have established their beliefs about teaching based on their previous experiences in classrooms as students and the impressions they had about their teachers (Karavas and Drossou, 2009). If their beliefs about teaching are primarily derived from previous experiences with instructivist (i.e., teacher-centered as opposed to learner-centered) teachers, this may lead to a conflict with constructivist beliefs of learning and therefore result in a need to reconcile this conflict. Efforts to reconcile this conflict may lead to a process of professional growth for a novice teacher (Waters-Adams, 2006).

**Beliefs about Assessment.** Assessment is an important means of measuring student’s outcomes. Done well, assessment provides information about a student’s learning status and has a major role in the overall instructional process by giving teachers the information they need to both help students learn and teachers to improve their instruction. The information generated by assessing learning outcomes helps the teacher adjust various instructional factors such as the teaching strategies used and the pace at which the instructional material is delivered. A good assessment strategy provides students with detailed and constructive information that may help them understand their learning progress. This information may help students adjust their learning
strategies accordingly. Teachers’ beliefs about assessment, including the role of assessment, the purpose and function of assessment, and how to implement assessment in a classroom, impact their overall teaching.

Karp and Woods (2008) studied pre-service teachers’ beliefs on assessment and their assessment practices in a high school physical education program. Their study suggested that pre-service teachers’ beliefs about assessment were to some degree influenced by their past experiences with assessment. They also found that actually trying out alternative assessments in a classroom influenced pre-service teachers’ beliefs about assessment. On the other hand, the Karp and Woods study noted that pre-service teachers’ tended to be overly ambitious without appropriate consideration of contextual constraints like time setting and when to plan their assessments.

_Beliefs about the Role of the Teacher._ Teaching is a career that is largely constructed of personal interactions. How teachers position themselves within the classroom influences their choice of instructional activities, their relationships to their students, and the learning processes in which students engage. Teachers who regard themselves as the facilitators of learning usually place a strong emphasis on student participation and on linking content disciplines (Sturtevant & Linek, 2003). A study on the relationship between the personal beliefs of elementary school teachers about science instruction and their ability to implement science instruction also suggested that teachers with confidence in their ability to help others to learn actually taught more effectively (Haney, Lumpe, & Czerniak, 2002).
Teachers maintain a variety of beliefs, such as those relating to curriculum, pedagogy, the classroom, as well as to knowledge and judgment. Of course, all of these beliefs are intertwined and connected with each other, and they all influence teachers’ practices in their teaching. According to this review of the research on teachers’ beliefs, most studies have been done with pre-service teachers and K-12 teachers, not instructors in higher education. These studies indicate that teachers’ beliefs about learning, teaching, previous knowledge, assessment, and the role of teacher themselves during the process of instruction all influence the actual instructional process, including choices about how to plan and implement the assessment of student learning. The conclusions drawn from these studies hence guided the design of my research questions and the interview protocol in my dissertation study. Because few studies in the available literature have examined faculty members’ beliefs in the higher education environment, this study is necessary. Kane, Sandretto, and Heath (2002) present evidence that existing studies about the beliefs and practices of higher education instructors are weak. They recommended that more research be done to explicitly examine how the postsecondary instructors’ beliefs affect their teaching and assessment practices.

**Epistemological Beliefs and Worldviews**

**Epistemological beliefs**

Research on the relationship between epistemology and education has flourished in the past four decades (Hofer & Pintrich, 1997; Lang, 2011; Perry, 1970; Schommer, 1990; Slezak, 2010). According to literature, epistemology is a branch of philosophy concerned with the nature,
origin, structure, methods, and justification of knowledge (Hofer, 2002; Hofer & Pintrich, 1997; Schultz & Meleis, 1988). Personal epistemological beliefs, therefore, refer to personal beliefs about knowledge and knowing (Schraw & Olafson, 2002). Researchers have examined epistemological beliefs from different angles. One angle focuses on epistemological beliefs as developmental; the other views epistemological beliefs as an independent system, based on their conceptualizations of personal epistemology.

Developmental approaches regard personal epistemology as a sequence of developmental stages in individuals’ beliefs about knowledge and knowing. The five most frequently cited developmental approaches derived from empirical studies are: “the Perry scheme” (Perry, 1970), “women’s ways of knowing” (Belenky, Clinchy, Goldberger, & Tarule, 1986), the Epistemological Reflection Model (Baxter-Magolda, 1992), reflective judgment (Hofer, 2004), and “Argumentative Reasoning” (Kuhn, 1991). System approaches, on the other hand, regard personal epistemology more as an independent and systematic set of beliefs. Works related to system approaches have tried to identify dimensions of epistemological beliefs (Schommer, 1990) and these works have enabled researchers to further identify the relationships between epistemological beliefs, teaching, and learning (Hofer, 2000; Qian & Alvermann, 1995; Schraw, Bendixen, & Dunkle, 2002; Schraw & Olafson, 2002). Several measurement instruments were developed based on systems approaches, and those measures are discussed later in this chapter. Figure 1 illustrates the relationships between these approaches and various instruments.
**Figure 1.** Personal epistemological beliefs and their relationship to different measurement instruments.

**Developmental Approaches**

In this section, the Perry Scheme (Perry, 1970) is introduced along with a description of some empirical studies based on this scheme. Then other approaches “women’s ways of knowing” (Belenky et al., 1986), the Epistemological Reflection Model (Baxter-Magolda, 1992), reflective judgment (Hofer, 2004), and “Argumentative Reasoning” (Kuhn, 1991) are described.

Perry’s groundbreaking work on Harvard students’ intellectual and ethical development initiated educational research on personal epistemological beliefs and almost all epistemological models have some connection to his work. Perry interviewed students with the assumption that the variation in students’ responses to instruction was a result of personality differences. The
findings from the gathered data led Perry to detect a directional pattern or sequence. The Perry Scheme describes nine positions in four stages within a sequence of the development of personal epistemological beliefs. The first stage in this developmental sequence is *dualism*. A dualist views his or her world in bipolar terms: right versus wrong, good versus bad, and we versus others. The dualist person views answers as having a certainty that are only held by authorities. Knowledge is seen as absolute and discrete information. In the second developmental stage *multiplicity*, individuals start to realize that diverse opinions and states of uncertainty exist and are legitimate. At the end of the *multiplicity* developmental period, every view is equally valid, even the conflicting ones. In the stage of *realism*, knowledge is understood as relative, contingent, and contextual. The binary opposites are seen as rarely appropriate in the complex real world and are regarded as a subclass of relativism. The self is regarded as responsible for the acquisition of knowledge. At the end of this period of realism, individuals enter a commitment stage during which the person realizes he or she must make decisions between different values, relationships, careers, and identity. When individuals progress though the nine positions across the four stages, their beliefs about knowledge and knowing also have been developed from less sophisticated to more sophisticated.

The second developmental approach is *Women’s Way of Knowing* (Belenky et al., 1986). Different from Perry’s work, which used an all male sample from an elite institution, Belenky et al. (1986) investigated women’s epistemological beliefs. In Belenky et al. the sampling was gathered from nine different educational institutions and from women who were not involved in
formal education. These researchers described a progressive pattern of the development of women’s personal epistemological beliefs, focusing on the role of self as knower. This pattern includes five positions: silence, received knowing, subjective knowledge, procedural knowledge, and constructed knowledge. In the position of silence, women are voiceless, and they only listen to the authority figure. Received knowing is a position similar to Perry’s dualism. Women view this world as bipolar and questions as having certain answers, either right or wrong. Subjective knowledge is similar to the multiplicity in the Perry Scheme. It allows multiple opinions to be equally valid. Procedural knowledge represents the ability of reflection and analysis. However, Belenky et al. (1986) identified two subcategories under this position: connected knowledge (personal and empathic) and separated knowledge (detached and impersonal). Constructed knowledge is an integration of both connected knowledge and separated knowledge. In constructed knowledge, the knower is the active participant in making knowledge and all knowledge is regarded as contextual.

The third developmental approach is the Epistemological Reflection Model (Baxter-Magolda, 1992). Based on longitudinal interviews with equal number of male and female college students, Baxter-Magolda (1992) produced a sequence of four ways of knowing: absolute, transitional, independent, and contextual. Similar to the Women’s Way of Knowing approach, Baxter-Magolda’s approach is aligned with the Perry Scheme. The absolute knower believes authorities have all the answers to all questions. The transitional knower begins to understand the uncertainty of knowledge and eventually realizes that authorities do not have all of the answers
to all of the questions. The independent knower starts to question authorities and to view his or her own opinions as equally valid as the authorities’. The contextual knower constructs his or her knowledge according to the contextual evidence.

The fourth developmental approach is the *reflective judgment* model (King & Kitchener, 1994). Based on 20 years of longitudinal interviews involving participants from high school to adulthood, King and Kitchener (1994) depicted the process of knowing and reasoning in this model of reflective judgment. This model focuses on individuals’ perception and resolution of open-ended questions. When describing the seven stages of epistemological growth, King and Kitchener (1994) depicted three levels of *pre-reflective thinking*, *quasi-reflective thinking* and *reflective thinking*.

The last developmental approach addresses individuals’ response to ill-structured problems and is called the *Argumentative Reasoning* approach (Kuhn, 1991). Similar to the positions described in the Perry Scheme and stages in the reflective judgment model, epistemological beliefs were characterized as one of three stages: absolutist, multiplist, and evaluativist. Based on longitudinal interviews across sections and age groups from teens to the sixties, Kuhn (1991) focused on the identification of the epistemological standards and other social dilemmas, which underline argumentative reasoning.

All of the five developmental approaches to personal epistemological beliefs reviewed here are based on Piaget’s cognitive development theory, interactionism, and constructivism. Developmental approaches regard the trajectories of the epistemological belief development as a
process of change when individuals interact with their environment. Individuals’ epistemological beliefs start from a dualistic, objectivist position, followed by the recognition of equal validity of different opinions, and the developmental trajectories in which individuals are actively involved in the process of knowing and actively construct knowledge based on context. Developmental approaches may be good theoretical frameworks for studies related to younger student intellectual development and related teaching and learning process. However, these approaches may not be suitable for studies related to adult education and higher education because students who are already in post secondary education usually have already passed the first several developmental stages.

_System Approaches_

Another branch of understanding personal epistemological beliefs was pioneered by Schommer’s study of college students in 1990. Schommer (1990) first discussed the inconsistency in results of studies based on Perry’s (1970) work and suggested that this inconsistency may be a result of the unidimensional conception of epistemology in the Perry Scheme. She therefore proposed a five dimension system to describe an individual’s personal epistemological beliefs. These five dimensions are the structure of knowledge, the certainty of knowledge, the source of knowledge, and the control and speed of knowledge acquisition. Schommer acknowledged that the notions of structure, certainty, and source were derived from Perry’s (1970) work in finding that many college students believe that knowledge is simple,
certain and handed down by authority. The structure of knowledge, sometimes also called
“Simple Knowledge,” presents a continuum from viewing knowledge as highly interrelated
concepts to isolated, unrelated pieces of information. Certainty refers to a continuum of viewing
knowledge from tentative and evolving to solid and fixed. The source of knowledge is a
continuum ranging from believing knowledge is passed from authority, to believing knowledge
is self-developed. Schommer (1990) also acknowledged that the notion about the control of the
knowledge acquisition was derived from Dweck and Leggett’s (1988) research. Dweck and
Leggett’s research focused on beliefs about the nature of intelligence while the notion of the
speed of knowledge acquisition was from Schoenfeld’s (1983) study of high school students. The
control of knowledge acquisition reflects the nature of intelligence, which represents a
continuum from viewing intelligence as genetically determined to seeing intelligence as
incremental. The speed of knowledge acquisition is conceptualized as a continuum from a belief
that learning occurs quickly to a belief that learning does not occur at all.

In line with this five-dimension model, Schommer (1990) conducted two experimental
studies that assessed students’ epistemological beliefs with the Epistemological Belief
Questionnaire (EBQ) (see Appendix A). This questionnaire included 63 items. These items were
parceled into twelve subsets, categorized by the dimensions that they assessed, and each
dimension was measured by at least two subsets. The questionnaire employed a five-point Likert
scale ranging from 1 (strongly disagree) to 5 (strongly agree). The 12 parceled subsets were used
as variables during the factor analysis. Using orthogonal varimax rotation and an eigenvalue
greater than one as the cutoff, the principal factor extraction based on the data in the first experimental study generated four factors: "Ability to learn is innate" (Innate Ability); "Knowledge is discrete and unambiguous" (Simple Knowledge); "Learning is quick or not at all" (Quick Learning); and "Knowledge is certain" (Certain Knowledge). In the second experimental study, Schommer (1990) examined the relationship between epistemological beliefs and aspects of comprehension. Schommer’s study showed that Certain Knowledge predicted certain conclusions. As students tended to believe in certain knowledge, they were likely to write absolute conclusions about the reading passages. The study also found that Quick Learning predicted oversimplified conclusions. If students tended to believe that learning occurs quickly or not at all, the more likely they were to oversimplify conclusions. The study also concluded that Quick Learning predicted students' overestimation of their understanding of the information that they were given.

Schommer’s (1990) study of epistemological beliefs using five dimensions, especially the development of the epistemological belief questionnaire, has guided numerous studies that examined the relationship between epistemological beliefs and education. Some researchers tried to replicate Schommer’s factor structure; however, the results of their studies have been inconsistent (Kardash & Howell, 2000; Qian & Alvermann, 1995; Schommer, Crouse, & Rhodes, 1992). However, Schommer et al. (1992) replicated the factor structure in a study that examined the relationship between students’ beliefs in simple knowledge and aspects of mathematical comprehension. With 263 college students as the sample and .95559 as the cutoff eigenvalue,
the study generated the same four factors as those from Schommer’s work in 1990. However, the belief dimension of OmniscientAuthority; was not generated in either of Schommer’s studies.

In their study of epistemological beliefs’ effects on high school students’ helplessness, Qian and Alvermann (1995) adapted the 53-item questionnaire from Schommer and Dunnell’s (1992) study of high school students and tried to replicate the hypothetical five dimensions that underlined the Epistemological Belief Questionnaire. Previous studies consistently identified four factors, and this study also obtained four factors that used the principal axes procedure and varimax rotation. Items with factor loadings greater than .30 were retained; on that basis, 21 items were eliminated. Two- through five-factor solutions of exploratory factor analysis were then conducted with the revised 32-item epistemological questionnaire (see Appendix A for these items). The three-factor solution was chosen because of its stronger statistical evidence and its support for the theoretical hypothesis, with all eigenvalues greater than one. These three factors are Quick Learning, Simple-Certain Knowledge, and Innate Ability.

Kardash and Howell (2000) described the interrelationship between undergraduates’ epistemological beliefs, their beliefs about the HIV-AIDS relationship, and their cognitive process of comprehending a dual-positional text. Using 42 items from Schommer’s (1990) 63-item Epistemological Belief Questionnaire and the same factor analysis criteria, the study also generated four factors. However, these factors bore little resemblance to the factors generated from Schommer’s studies. The first factor was labeled as Nature of Learning, which represented beliefs that the learning is clear-cut or ambiguous, stable or tentative, handed down by authority
or self-conducted. The second factor was labeled as Speed of Learning, which reflected beliefs about quick learning, such as learn it the first time or not at all, and success is unrelated to hard work. The third factor was labeled as Certain Knowledge, and it represented beliefs of knowledge’s certainty. The last factor generated from Kardash and Howell’s (2000) study was Avoid Integration, viewing the information and knowing process as isolated and separated. Few studies have been able to replicate all factors underlined in the Epistemological Belief Questionnaire (EBQ). However, this challenge is not an uncommon situation, given the differences of the nature of sample groups, and the context of the study. Most of these studies did succeed in replicating part of the five factors, which supported the underpinned theoretical foundation of the five factors in EBQ.

In addition to Schommer’s Epistemological Belief Questionnaire, many other instruments have been developed to measure certain aspects of personal epistemological beliefs, such as the Measure of Intellectual Development (MID) (Moore, 1991), and the measure of Epistemological Reflection by Baxter-Magolda (1992), Assessment of reflective judgment by King and Kitchener (1994). Schommer’s (1990) EBQ, however, is the instrument most widely used by researchers, particularly for studies focusing on the relation between epistemological beliefs and education. Some researchers have done studies to revise her instrument or to develop similar questionnaires (Hofer, 2000; Schraw et al., 2002).

Hofer (2000) examined personal epistemological beliefs across disciplines. A 27-item Likert-scale Discipline-focused Epistemological Belief Questionnaire (DEBQ) was developed by
adapting from Perry’s Checklist of Educational Values, Schommer’s EBQ and creating new items based on the four dimensions proposed by Schommer (1990), Certainty of Knowledge, Simplicity of Knowledge, Source of Knowledge, and Justification for Knowing. To obtain the evidence for concurrent validity, based on the study results from Qian and Alvermann (1995), Hofer (2000) used an adapted version of the 32-item Schommer EBQ to measure the General Epistemological Beliefs. The DEBQ focused on domain-specific knowledge, and students were asked to keep in mind a certain discipline, either science or psychology, when responding to the items. Hofer first conducted an exploratory factor analysis based on the results of the DEBQ survey. Four factors were generated with eigenvalues greater than 1.00 for both psychology and science. They are: certain/simple knowledge, justification for knowing (personal), source of knowledge, and attainability of truth. Correlations between the general simple/certain knowledge domain and the disciplinary-focused dimensions were examined. Significant correlations were found between the general simple/certain knowledge domain and the three disciplinary-focused dimensions of certainty in both psychology and science ($r>.35$), source in psychology and science ($r>.18$), and attainability of truth in both disciplines ($r=.24$). Hofer’s study also concluded that students have different epistemological beliefs of the disciplines of science and psychology, although the structure of beliefs was similar across disciplines.

Schraw, Bendixen, and Dunkle (2002) believed in the importance of having an epistemological belief measure for all five dimensions that Schommer (1990) proposed, which are Certain Knowledge, Simple Knowledge, Quick Learning, Omniscient Authority, and Innate
Ability. They contended that the exclusion of the factor of Omniscient Authority in Schommer’s EBQ was important because many researchers have reported a relationship between the process of knowing and beliefs about authority (Curtis, Billingslea, & Wilson, 1988; Damon, 1988; Jehng, Johnson, & Anderson, 1993; Perry, 1970; Presley, 1985). They developed another scale, a 28-item Likert scale named Epistemic Belief Inventory (EBI) (see Appendix B for these items), to measure personal epistemic beliefs. Using 106 undergraduates as their sample, Schraw et al. (2002) conducted a study to validate their inventory by administering the EBI, Schommer’s EBQ, and a reading-comprehension test to the students. Identical exploratory factor analyses were conducted both on the EBQ and the EBI. The analysis on EBQ results generated 19 factors using eigenvalue greater than 1. The first five observed factors selected from this analysis were labeled as: Innate Ability, Certain Knowledge 1, incremental Learning, Certain Knowledge 2, and Integrative Thinking. Using the same factor-analytic procedures, the exploratory factor analysis on EBI yielded five factors with eigenvalues greater than 1, which exactly matched the five dimensions of Schommer’s (1990) model, which are “Omniscient Authority,” “Certain Knowledge,” “Quick Learning,” “Simple Knowledge” and “Innate Ability.” Each of the five factors has at least three items loading on it. Schraw et al. (2002) also found that the EQ factors were uncorrelated to students’ reading comprehension performance whereas the EBI factors showed modest though significant correlations with it.

Schommer’s study in 1990 inspired a number of new instruments to measure epistemological beliefs of either students or teachers by researchers, such as Qian and
Alvermann (1995), Kardash and Howell (2000), Hofer (2000), and Schraw et al. (2002). These instruments informed other studies related to epistemological beliefs of teachers and students (Kienhues, Bromme, & Stahl, 2008; Yılmaz- Tüzün, & Topcu, 2010). However, feedback from participants in a pilot-study (see Chapter 3 for more information) that I conducted for my dissertation indicated that many items in current EBQ instruments did not accurately measure their epistemological beliefs. Therefore, it was deemed necessary to investigate existing EBQ items and revise them, so they can more accurately measure epistemological beliefs of different sample groups.

Another concern drawn from the results of the pilot study is that epistemological beliefs are usually complex and are influenced by many other factors, such as the nature of disciplines and the institutional environment. The quantitative measurement of epistemological beliefs can be inaccurate. The use of qualitative research methods, such as interviews and observation may be necessary in order to better understand the target group’s epistemological beliefs and related practices.

**Epistemological Worldviews**

According to Schraw and Olafson (2002), it is important to distinguish between epistemological beliefs and epistemological worldviews. The authors believed that teachers’ epistemological beliefs were more holistic than those of students, and therefore the term of epistemological worldviews may suit the needs of studies related to teachers’ epistemological beliefs. Schraw and Olafson (2002) defined epistemological worldview as teachers' collective
beliefs about the nature and acquisition of knowledge. After reviewing terms used in research similar to epistemological worldview, such as epistemological stances (Cunningham & Fitzgerald, 1996), ways of knowing (Belenky et al., 1986; Hofer & Pintrich, 1997), Schraw and Olafson (2002) decided to use the term epistemological worldview. The reasons were twofold: first, Schraw and Olafson (2002) asserted that a worldview includes a broader intellectual perspective about the world than beliefs about knowledge per se; second, the authors suggested that the phrase, “a worldview,” is more practical when communicating with teachers and students than the term of “a stance or way of knowing.”

Based on Schraw and Olafson’s (2002) review of the literature and their assumptions, teachers’ epistemological worldviews were divided into three categories: realist, contextualist, and relativist. Each category included a set of epistemological beliefs and other beliefs such as teachers’ assumptions about knowledge, curriculum, pedagogy, assessment, reality and truth, the constructivist process, and the role of the teacher, student, and peers. According to Schraw and Olafson (2002), realists view knowledge as an objective body that is transmitted and reconstructed via experts. Realist teachers view students as passive recipients and ignore the role of peers. When assessing their students, realist teachers tend to use norm-referenced assessments such as standardized tests and they also tend to use externally developed assessments such as the end-of-unit tests provided by the textbooks that they use. Contextualist teachers view knowledge as changing over time and students need to not only acquire knowledge but also to learn skills related to acquiring knowledge. Contextualist teachers believe that students construct their
knowledge in collaborative contexts, and the teacher acts as a facilitator in students’ learning. Teachers with a contextualist worldview value the influence of peers and experts in scaffolding students’ learning. They therefore tend to implement authentic assessments in which cooperative learning is supported. Relativist teachers view knowledge as highly changeable and that every student constructs unique knowledge which is equally valid to that of other students. Teachers with relativist worldviews strongly believe that students should be the only center in the learning process and peers are only important when they can facilitate other students’ self-regulation. Relativist teachers place great emphasis on student self-assessments and self-generated feedback.

The three vignettes that summarize these three types of epistemological worldviews developed by Schraw and Olafson (2002) can be viewed in Appendix C. For this study, I have renamed “Epistemological Worldviews” as “Global Pedagogical Orientations” to more clearly distinguish this variable from Epistemic Beliefs.

**Research on Teachers’ Epistemological Beliefs, Worldviews and Their Practices in Teaching**

Researchers believe that teachers’ epistemological beliefs lead to different choices with respect to pedagogy, curriculum, and assessment (Schraw & Olafson, 2008; Thomas & Oldfather, 1997). Serious investigation of the relations between teachers’ epistemological beliefs and their educational practices, however, has only started within the last decade. Some studies of teachers have used the same construct of epistemological beliefs employed in research on students’ beliefs. Studies with students have tended to employ quantitative methods using self-report
instruments. Research on teachers’ epistemological beliefs has also relied on quantitative methods (Barnard, 2007; Barnard, Stevens, Siwatu, & Lan, 2007; Sweeney, 1996). However, some researchers view teachers’ epistemological beliefs as more holistic than students’ epistemological beliefs (Schraw & Olafson, 2008), and these researchers have tried to explore teachers’ epistemological beliefs and worldviews using qualitative methods such as interviews, document analysis, and observation (Levitt, 2002; Silvian, 2000; White, 2000; Wilcox-Herzog, 2002). At the same time, Schraw and Olafson (2008) asserted that measuring epistemological beliefs using a self-reported scale versus a holistic stance of epistemological worldview should not be mutually exclusive. In the following section, these three different approaches to exploring teachers’ epistemological beliefs and worldviews and their teaching practices are introduced and discussed.

An early attempt to explore postsecondary teachers’ epistemological beliefs and their teaching experiences was Sweeney’s (1996) dissertation study on college level nursing faculty’s epistemological beliefs regarding general knowledge and nursing knowledge as well as their cognitive positions and the epistemological beliefs that they used when teaching students in the classroom. A self-reported Nature of Knowledge Instrument (NKI) was developed by the researcher to measure the nursing faculty’s epistemological beliefs. This instrument included four paragraphs each of which described one of the four positions from two through five in the Perry Scheme (1970). The participants were asked to choose the position that best represented their view of knowledge, in terms of general epistemological beliefs, nursing knowledge, and the
epistemological beliefs that they used when teaching students. The results revealed that the faculty epistemological belief perspectives regarding general knowledge and nursing knowledge, used when teaching students, ranged from position 2 through position 5 with positions 4 and 5 being selected most often (88% of participants selected positions 4 and 5). The results, however, were inconsistent with findings described in the previous literature. For example, Brabeck (1983) and Benack and Baseeches (1987) found that epistemological beliefs were more developed when individuals have higher levels of education. Benack and Baseeches (1987) reported that nine out of ten faculty members were identified as relativists (position 5 in the Perry Scheme). Using the NKI measurement, only forty-nine percent of the participants in Sweeney’s study selected position 5 even though they were all highly educated (99% had at least a master’s degree and 52% had a doctorate and/or post doctoral training). One of the reasons for these inconsistencies could be the limitation of the instrument. The NKI condensed Perry’s epistemological belief positions into one position per paragraph, which might have reduced the concepts too much, making the discrimination between positions very difficult for the participants. Other methods could have been implemented to triangulate the measurement, such as classroom observation, interviews, and document analysis.

Barnard and her colleagues (2007) explored whether the epistemological beliefs of faculty members are a factor influencing their attitudes towards students with disabilities. They employed the Epistemological Belief Inventory developed by Schraw, Bendixen, and Dunkle in 2002 to measure faculty members’ epistemological beliefs and the Attitudes toward Persons with
Disabilities (ATPD) scale (Yuker & Block, 1986) to measure faculty attitudes toward students with disabilities. Other demographic information regarding faculty characteristics such as gender and discipline were also collected. For the variable of faculty discipline, different academic departments were categorized as either hard or soft disciplines according to Biglan’s (1973a & 1973b) classification system. Barnard et al. (2007) claimed that their findings suggested a moderately negative relationship between faculty characteristics and epistemological beliefs (p<.001) which means that male faculty members and faculty members in hard fields were more likely to have naïve and less sophisticated epistemological beliefs than female faculty members and those in soft disciplines. The results also showed a moderately positive relationship between faculty epistemological beliefs and their attitudes toward students with disabilities (p<.001), which means faculty members with more sophisticated epistemological beliefs would show more positive attitudes towards students with disabilities. The actual correlation values, however, were not reported in their article. In addition, because the EBI was initially developed to measure undergraduates’ epistemological beliefs, it would have been preferable to validate the instrument with academics before using it directly in a study exploring faculty’s epistemological beliefs.

Silvian (2000) explored faculty members’ experiences in a distance education environment (using interactive television) from three views: epistemology, constructivism, and creativity. In the two interpretive case studies of her dissertation, the author tried to understand how teachers’ epistemological beliefs and their levels of creativity influenced their teaching in a distance education context. Data collection methods used were interviews, observations, reviews
of document artifacts, and testing for creativity levels. The results of the case studies revealed that professors’ beliefs of knowledge were based on constructivism, i.e., the processes of the learners building their own knowledge. Professor took into account the social and cognitive processes of the constructivist approach. The results of the case studies also indicated that there was a need to better integrate technology and instructional content in a distance-learning environment. Silvian subsequently built a training model to prepare teachers teaching in a distance learning environment, which she named MAKE (Merging Acquired Knowledge with Epistemologies) TIME (Technology Integration Model for Education). In this model, three parties—trainers, teachers and students—each go through a varied integration process in which these processes interact with each other.

Schraw and Olafson (2008) reviewed both quantitative approaches to measuring epistemological beliefs using self-report instruments and qualitative approaches to measuring epistemological worldviews using interviews. They affirmed that research using self-report instruments contributes a great deal to the constructive discussion of the constructs that constitute the domain of epistemological beliefs. Studies using self-report instruments also help to understand the relationships among epistemological beliefs and factor variables such as age, gender, education level, academic achievement and moral reasoning skills. However, they contended that these instruments measure only narrowly defined epistemological beliefs whereas epistemological worldviews represent a holistic and integrated set of beliefs about knowledge, which better represent teachers’ beliefs of knowledge and knowing. The authors thus suggested
that combining the two strategies in research might help to cross-validate the measurement and help with the future research of teachers’ epistemological beliefs. As is explained in Chapter 3, this combined approach was applied in the current study.

**Assessment**

Assessment is the primary way to determine students’ learning achievement. It is also an important way to aid students’ learning, either directly or indirectly. In this section, first the term of *assessment* and its scope are clarified and distinguished from other similar terms of *evaluation*, *measurement* and *testing*, and then the major theories and categories of, and opinions about assessment are introduced. Finally current practices of online assessment are discussed.

**Evaluation, assessment, measurement and testing**

The terms *evaluation*, *assessment*, *measurement* and *testing* are commonly used interchangeably in educational research, especially the first two (e.g., Carey, 2001; Kubiszyn & Borich, 2003; Popham, 2000; Tanner, 2001). Many articles have tried to identify each term and distinguish each from the others; however, these interpretations are inconsistent and sometimes even contradictory (Bartley, 2006; Williams, 2006). It is necessary to define in this study the boundaries among these different terms in this study, before starting further discussion about assessment practices.

First, *evaluation* is the broadest and the most complex term referring to the process of making judgments about the quality, significance or value of a program, product, person, policy or plan (Fournier, 2005). Evaluation in education may justify program effects, helping
administrators and instructors to find out if their programs have achieved their purposes, such as improving learning or increasing motivation, and it may be used to determine which aspects of programs might be improved. Evaluation is also used to monitor a course’s implementation and a teacher’s teaching within a course.

Assessment, specifically in this study, refers to the evaluative determination of the levels of students’ achievement. The results from the assessment of students’ achievement levels can indicate the efficiency, quality, significance or value of the program, product, and procedures (Mabry, 2005). Assessment findings are used to provide students with formative information about their learning so that they may take remedial actions if the findings warrant them. However, assessment is just one of the various ways to collect data used in an evaluation. Many other approaches are used to evaluate a program, product and procedure, such as document analysis, observation, expert review checklists, focus group interviews, hermeneutic survey, and analysis of ROI (Return on Investment) (Reeves & Hedberg, 2003).

Measurement is one way to implement data collection for evaluation and/or assessment. Measurement refers to the process of transforming behaviors and cognitive processes into categories and numbers according to certain rules so that they can be meaningfully calculated and interpreted (Petrosko, 2005). Measurement usually depends on methods such as testing and surveys to obtain quantitative data so that these data can be further analyzed to yield meaningful assessment. When social phenomena and some higher order thinking levels cannot be measured
in a traditional psychometric sense, they still can be assessed using more qualitative strategies such as interviews and observations.

Testing is a set of rules or instruments for measurement (McDonald, 2002), which usually contains a set of items, directions for how examinees should respond to the items, and the scoring procedure (Martuza, 1977). Standardized testing has been considered the most reliable method of testing and has been used broadly in U.S schools since the 1900s because of the ease of use and perceived lower costs.

**Major Assessment Paradigms, Stances, and Concepts**

As indicated in the introduction to epistemological worldviews, teachers with different epistemological worldviews perceive learning processes differently and thus have different beliefs about assessment. For example, realist teachers believe that knowledge is “passed down” from experts and students are the passive receivers of knowledge. Realist teachers primarily employ norm-referenced and standardized tests to assess students’ learning and they are more likely use externally created tests such as those tests created at the end of each chapter of the textbooks. Contextualist teachers emphasize the social interaction and the scaffolding of the context during the process of learning. Contextualized teachers stress expert supported and peer scaffolded assessment. Relativist teachers, on the other hand, strongly believe that learners are the primary agent of learning, so they provide more chances for students to self-assess and self-reflect. In order to understand how these different assessment terms and the epistemological stances behind these terms inform the implementation of assessment in higher education, it is
necessary to examine several concepts and theories. These concepts and theories have historically been identified as the underpinning of both traditional and alternative assessment paradigms, such as norm-referenced and criterion-referenced assessments, formative and summative assessments, self-assessment and peer assessments, and constructivist and objectivist assessment.

*Traditional and Alternative Assessments*

Beginning with the prevalence of the ‘reconstructing movements’ and the advent of assessment reform in the 1970s (Broadfoot, 1986), traditional assessment paradigms, formats and theories have been criticized substantively for decades, but their use persists throughout education (Freeman & Miller, 2001). On the other hand, alternative assessment concepts, theories and techniques have been broadly applied in the last two decades of assessment practice, albeit with many controversies and uncertainties.

The term traditional assessment has been used primarily as the opposite of alternative assessments. Generally, traditional assessments refer to standardized, norm-referenced, multiple-choice testing (Linn & Baker, 1996; Linn, Baker, & Dunbar, 1991; Wiggins, 1989b). Techniques used in traditional or standardized tests usually are: multiple-choice items, true-false, matching, completion, short answer, etc.

As noted earlier, attacks and criticisms about traditional assessment were raised around the 1970s. These critiques include:
• Traditional assessments assess only lower level skills and knowledge and have high costs of time, energy and resources (Conrad & Donaldson, 2004; Drummond, 2003; Lynch, 2001).

• The results of traditional assessments may give insufficient or even wrong information about student learning status.

• Traditional standardized tests are biased against particular social and cultural groups (e.g., minority students, female students, students with English as second language, and students from lower classes) (Broadfoot, 1986; Haney & Madaus, 1992).

Interest in alternative assessments has grown among the professional educators and government figures (Broadfoot, 1986). Various ways have been employed to classify alternative assessments. For example, Maurer (1996) contended that alternative assessments include performance assessment, product assessment and portfolios. Some authorities categorized alternative assessment approaches as cognitive assessment, performance assessment and portfolio assessment (Reeves, 2000; Reeves & Okey, 1996; Wiggins, 1993). Others maintain that the phrases performance assessments, alternative assessments and authentic assessments represent the same concept just with different focuses (Navarrete & Gustke, 1996). However, many other concepts have also been categorized as alternative assessment, such as constructivist or constructive assessments, educative assessments, authentic assessment, and embedded assessment (Shepard, 2000; Wiggins, 1998; Wiggins, 1989a; Wilson & Sloane, 2000).
To reconcile these controversies, the characteristics of alternative assessment should be clarified. Maclellan’s (2004) work identified the main characteristics of alternative assessments:

- student involvement in setting goals and criteria for assessment;
- performing a task, creating an artifact/product;
- use of higher level thinking and/or problem solving skills;
- measuring metacognitive, collaborative, and intrapersonal skills as well as intellectual products;
- measuring meaningful instructional activities;
- contextualization in real world applications;
- use of specified criteria, known in advance, which define standards for good performance. (p. 312)

Techniques used in alternative assessment usually are authentic tasks, portfolios, interviews, and reflective journals. Some researchers also identified peer evaluations, self-assessments, reference checks, and expert judgment as alternative assessment instruments (Reilly & Chao, 1982). Additionally, practical and ethical challenges relating to the validity of results and legitimacy of online learning have brought unique forms of alternative assessments, (Bartley, 2006), such as electronic portfolios, discussion boards, and blogs.

Although proponents of alternative assessment asserted that it has distinct advantages such as measuring higher order skills, enhancing assessment validity, motivating students, and directly informing instruction and learning, merely using alternative assessment without
profound understanding of the underlying principles and paradigms does not assure a good result. As Reeves (2002) noted, it is not the format, but consistency and fairness of the actual design and implementation of the assessment, which determine if the purposes of the assessment are met. A poorly designed performance assessment may fail to measure student mastery of skills in a certain area, whereas a well-designed multiple-choice test may measure higher order thinking and motivate learning (Durmus & Karakirkik, 2005; Smith, 1996).

**Norm-referenced and criterion-referenced assessments**

The terms *norm-referenced* and *criterion-referenced* refer to the ways of interpreting the assessment results (Gronlund, 2003). According to Haney & Madaus (1992), norm-referenced tests, sometimes called *normative-referenced* tests, were developed at the turn of the 20th century. These tests were subsequently explored more widely by the U.S. Army Alpha and Army Beta intelligence testing during World War I. Since then, the norm-referenced test has been extensively used in schools and classrooms.

Norm-referenced tests measure the relative status of student achievement by comparing the student to a given group (Behnke & Sawyer, 1998; Gronlund, 2003; Klecker, 2005). The covered content is broad and items are selected to discriminate individuals. Therefore, the primary use of a norm-referenced test is for *survey testing* (Gronlund, 2003). Norm-referenced testing has been considered a reliable and valid way for measuring student achievement and has been implemented as a routine part of American schools’ assessment practice (Taylor & Walton,
Norm-referenced testing has been also implemented widely in psychometric measurement. However, since the beginning of 1990s, norm-referenced tests have been criticized for their negative impact on student motivation and the lack of useful information they provide (Ornstein & Gilman, 1991; Taylor & Walton, 1997).

In contrast, criterion-referenced tests have received attention from proponents of assessment reform and performance-based assessment. Criterion-referenced testing, surprisingly, is older than norm-referenced testing. It had dominated assessment practices in U.S. schools before the development of norm-referenced tests in the 1900s (Haney & Madaus, 1992). The primary use of a criterion-referenced test is to test “mastery” (Gronlund, p. 28, 2003). A criterion-referenced test measures student performance by comparing him or her to specified criteria and the level of student performance is determined by absolute performance standards. The covered content of a criterion-referenced test is usually limited to a narrow domain, and the level of difficulty of a criterion-referenced test does not need to be adjusted to get a wide range of grades. Based on these attributes, Hambleton and Rogers (1991) suggested that this type of testing is most productive when standards for acceptable performance are easy to set. Therefore, criterion-referenced tests are the most preferred in performance assessments because performance assessments should have a clear set of performance standards (Priestley, 1982). With norm-referenced scoring, only a few students reach the top score, but criterion-referenced scoring permits all to exhibit mastery. Criterion-referenced scoring encourages cooperative learning and the sharing of ideas (Klecker, 2003, Linn & Miller, 2005).
Yet, the design of a criterion-referenced test presents challenges. For example, the determination of an ideal difficulty level sometimes is difficult for criterion creators. An inappropriate difficulty level of the criterion may result in either grade “inflation” or grade “deflation,” which means all the students passed or failed the cut score. Under this condition, it would be hard to distinguish students who did not meet the standards and to evaluate whether instructors taught well (Berk, 1995). In addition, criterion-referenced tests may require investments in more time and more resources to attain general agreement among faculty members on the grading components.

Formative and Summative Assessments

Formative assessment and summative assessment are referenced most when discussing and describing the purposes, functions and processes of the assessment. The distinction between ‘formative assessment’ and ‘summative assessment’ is usually considered to originate from Scriven’s (1967) works (Gardner, 2006; Roos & Hamilton, 2005; Taras, 2005). To determine if learners have met the learning goals (Stiggins & Chappuis, 2006; Taras, 2005), most researchers distinguish formative assessment and summative assessment as “assessment for learning” and “assessment of learning.”

Formative assessment, as Black (1986) interpreted, comprises “…forms of student evaluation carried out to monitor progress with a view, where appropriate, to altering the final outcomes, holds a position somewhere behind the closed and private door of the classroom” (pp.
Formative assessment is diagnostic and ongoing. Generally, formative assessment has been linked to educational functions, that is, assessment for learning (Black, 1986; Stiggins & Chappuis, 2006). These functions include monitoring the learning process; motivating students’ learning, and aiding retention and transfer of learning.

Summative assessment, as Gronlund (2003) defined, is “Achievement assessment at the end of instruction for the purpose of certifying mastery or assigning grades…” (p. 8). As its literal meaning indicates, summative assessment usually takes place at the end of the instruction and learning. Therefore, summative assessment has been referred to as the assessment of learning (Black, 1986; Stiggins & Chappuis, 2006). The main purposes of summative assessment are to assign students grades and to decide if the student has achieved the targeted learning objectives and should proceed to the next learning unit. Data from summative assessment has also been used for social functions, such as certification and selection, decision-making, and research.

Roos and Hamilton (2005) attempted to interpret the difference between formative and summative assessment by analyzing the paradigms underpinning them. The authors asserted that the difference between formative assessment and summative assessment “represents the uneasy conflation of two distinct models of evaluation and assessment” (p. 9). Substantial initial works of formative and summative assessment and foundational learning theories (Cronbach, 1957; Cronbach, 1975; Gage, 1963; Gagné, 1967; Scriven, 1967; Shepard, 2000, Shepard, 2001; Skinner, 1954) contended that the root of summative assessment was behaviorist theories, but that the concept of formative assessment was derived from a constructivist framework.
Driven by increasingly diverse educational demands, formative assessment has garnered more attention in higher education, although summative assessment remains dominant. Such formative assessment is intended to help students identify their learning strengths and weaknesses, target areas for remedial action, plan their own learning, and develop meta-cognitive and other professional transferable skills (Boud, 1990; Brown & Knight, 1994; Topping, 1998).

*Self-Assessment and Peer Assessment*

Given the increased emphasis on formative assessment in the higher education context, interest has grown in involving students in the assessment process, which may include self-assessment (Boud & Holmes, 1981; Boud, Churches, & Smith, 1986) and peer assessment (Van den Berg, Admiraal, & Pilot, 2006), which share common features.

Among definitions of self-assessment in the literature, Boud’s work (1995a) has been more widely accepted. According to Boud, self-assessment includes involving students in the identification of criteria or standards of the assessment as well as making judgments on the extent to which they met the standards and criteria. Priestley (1982) distinguished self-assessment from other types of assessment through its purpose and the way in which it is administered. That is, self-assessment is usually implemented without formal administration procedures, and its primary purpose is almost always for supporting student learning.
Peer assessment sometimes has been referred to as peer evaluation (Baker, 2008). Topping (1998) defined peer assessment as “an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status” (p. 250). The design and implementation of peer assessment in higher education varies widely. First the product format used in peer assessment varies. A peer assessment can involve a standardized test, writing assignments (Van den Berg, Venables & Summit, 2003), oral presentation (Langan, et al., 2005), group work projects (Brooks & Ammons, 2003; Bushell, 2006); portfolios (Liu, Zhuo, & Yuan, 2004), or other performance products. The directionality of peer assessment also varies. A peer assessment can be non-directional, reciprocal, or mutual (Topping, 1998). Van den Berg and his colleagues (2006) contended that reciprocal two-way feedback is easier to organize in the practice.

While both self-assessment and peer assessment put students at the center of the assessment process, they share common merits and meet similar problems in practice. First both self-assessment and peer assessment facilitate student understanding of the criteria, standards, and goals of acceptable performance on the subject and content by engaging them in the assessment procedure. Second, both self-assessment and peer assessment help students develop employability skills (Cassidy, 2006, 2007). Cassidy (2006) argued that it is the responsibility of higher education to enhance students’ employability skills. As Cassidy (2006) quoted, these skills include:
oral communication, reading, writing and arithmetic, higher order skills such as learning skills and strategies, problem solving, decision making, and affective skills and such as dependability and responsibility, a positive attitude, interpersonal skills (co-operation, team work), self-discipline and self-management and ability to work without supervision (Cotton, 2001). (pp. 508-509)

In addition, each assessment type has its own merits. For self-assessment, by assessing themselves, students understand their own weaknesses and strengths. Also, as Priestly (1982) mentioned, self-assessment helps to relieve the anxiety of being assessed by instructors, supervisors and peers. For peer assessment, the explanation of the assessment results between students usually helps build a better-structured interaction on the subject (Van den Berg, Admiraal, & Pilot, 2006)

The primary disadvantages of both self-assessment and peer assessment stem from the students’ lack of experience and discomfort with assessment procedures and criteria when their roles are changed to being the evaluators (Cassidy, 2007; Langan et al., 2005). Cassidy’s (2007) recent work examined the correlation between self-assessment skills, learning styles, student perceptions of academic locus and academic self-efficacy. His research indicates that deep learning positively correlates to self-assessment skills. In addition, Priestly (1982) noted that student self-assessment and peer assessment involve self-interests and emotional factors during the assessment process, which might cause assessment bias.
**Constructivist Assessment and Objectivist Assessment**

Compared to other assessment terms and phrases above, constructivist and objectivist assessments are less frequently mentioned. However, the encompassment of constructivist assessment is fairly broad and actually has been extensively practiced in the higher educational context for many years. As discussed above, in comparison with traditional assessments, summative assessment, and teacher-centered assessments, many researchers believe that alternative assessments, formative assessments, self assessments and peer assessment have their roots in constructivist orientations to learning (Cronbach, 1957; Cronbach, 1975, Gage, 1963; Gagné, 1967; Scriven, 1967; Skinner, 1954; Shepard, 2000, Shepard, 2001). It appears that the whole assessment reform movement has been under the influence of constructivism.

Rust, O’Donovan and Price (2005) illustrated the rationale of constructivist assessment. They first contended that one of the key issues within current assessment practices is to truly understand the requirements and the criteria and standards being applied in the assessment process. They argued that both the lack of reliability in the marking process and the lack of student understanding of the assessment expectation were caused by the lack of understanding of the assessment process. Hence, they appealed for a social constructivist approach in the assessment process for acquiring knowledge and understanding assessment processes, criteria and standards. Plus, assessment and learning intertwine with each other. Influenced by Vygotsky (1998, 2004a, 2004b), current researchers and educators believe that learning is essentially a
dialogic process and knowledge is a co-construction process that involves live discourse situated in social interactions (Wells, 1999), therefore, assessment for learning in higher education should also be designed and applied with some variant of constructivist pedagogy.

However, previous studies observed the opposite phenomena in practice. Graue (1993) stated "assessment and instruction are often conceived as curiously separate in both time and purpose" (p. 291). Shepard (2000) identified that the current classroom practice has been dominated by objective and standardized tests despite the enthusiasm for alternative assessment from both researchers and teachers. Shepard (2000) hence urged a “social-constructivist” conceptual framework to lead the assessment reconstruction toward effective learning. Based on his review of existing cognitive, constructivist and socialcultural theories, Shepard first suggested that the content of assessment should be designed to assess more open-ended, realistic tasks. Second, Shepard argued that constructivist assessment should avoid the negative effects of high-stakes accountability testing. She proposed that constructivist assessment should be dynamic and ongoing. More specifically, Rust, O’Donovan and Price (2005) proposed a social constructivist model with three important strategies. The first strategy in the model is to allow both tutors and students to engage in applying the criteria of the assessment. According to them, students can participate in a marking exercise or peer marking. Studies have showed that students’ engagement with the assessment process would statistically significantly improve their subsequent work (Cohen, Boud, & Sampson, 2001; Forbes & Spence, 1991; Hughes, 1995; Rust, 2002; Rust, Price, & O’Donovan, 2003). The next important strategy is to involve students and
tutors in the process of criteria selection and creation. Actually, this strategy is a component of
the preparation work for both self-assessment and peer assessment. The third strategy of the
model is to involve students and tutors in the process of giving feedback. To involve students in
the process of giving feedback, the authors suggested two approaches. The first approach is to
have students first discuss the assignments with their peers, and then to have students to write
down suggestions for future actions. The second approach is to give students only comments but
no grade when the assignment was initially returned. The students would grade themselves based
on the comments, and only after they have done so, their actual grades would be provided.

**Online Assessment**

**Overview of the Current Research**

Online learning began to proliferate in all levels of education following the initial
widespread use of the Internet in 1995. Although the goals of assessments online are the same as
goals of assessments in the traditional face-to-face learning environment, a significant
transformation on practices of assessments can occur along with the transformation in many
aspects of online learning itself. This transformation includes the physical distances between the
teacher and learners, the forms of communication, the ways instructional time is allocated, the
media to deliver the course contents, the pedagogies, the curriculum, and the roles of students
and teachers in learning. Assessment of online learning should not to be conducted as it has been
in a traditional face-to-face classroom without careful consideration (Reeves, 2000). Reeves
suggested, "Traditional assessment measures are unlikely to reveal the complexities of student-
centered online learning environments that are radically different from the dominant teacher-centered instructional paradigm” (p. 109). We should keep in mind that no matter how the technology changes, the purpose of assessment has been always to monitor students’ achievements in terms of instructional goals and objectives (Kim, Smith, & Maeng, 2008). The implementation of online assessment also takes greater efforts in terms of time and student management (Beebe, Vonderwell, & Boboc, 2010). Clearly, the implementation of new technology in online assessments raises both opportunities and challenges.

Using the search term of online assessment, assessing students online and restricting the results to peer reviewed journals and publications dated between the year of 1991 and 2011, 305 articles were found in the GALIEO virtual library at the University of Georgia. One hundred and seventy three of these articles were selected to be included in the review, and all the reviewed articles had to be first hand studies, published by peer-reviewed journals, or presented at scholarly peer-reviewed conferences. By only looking at the keywords used in the titles and abstracts of these articles, certain trends were apparent: the earlier the articles were published, the more general the discussion topics were, and the more they discussed topics such as “computer-based,” “internet-based,” “online testing,” “online test,” or “transferring from traditional face-to-face to online.” By contrast, articles published in recent years focus more on detailed online assessment strategies such as online discussion, simulation, and use of multiple-choice in online quizzes, etc. It was interesting that many of the articles from the beginning of the last decade discussed and questioned the accountability and feasibility of online assessment.
For example, the title of an article published in the *British Journal of Educational Technology* in 2002 by Northcote was “Online assessment: friend, foe or fix?” There were also many studies at that time that compared the learning outcomes and students’ performance between online learning and face-to-face learning. In the last couple of years, studies related to online assessment began to focus on the unique strengths of online learning and online assessment such as providing prompt formative feedback (Miller, Doering, & Scharber, 2010), promoting collaboration (Chu & Borsting, 2009), and interactive media support (Spitzberg, 2011).

Among the studies reported by these 173 articles selected for this part of literature review, some focus on different discipline areas (e.g. teacher education, medical and nurse education, law, mathematics, engineering, computer science, language education, and early childhood); some discussed a specific online assessment strategy (e.g. online discussion, online quiz, essays, journal/blog, electronic portfolios, and simulation); some discussed the role of the evaluators (self-assessment, peer-assessment, or instructor assessment); some investigated students’ perception of online assessment; some discussed transitions from face-to-face to online; and some investigated faculty’s practices on transferring assessment from face-to-face to online in small scale. However, no studies were found that discussed faculty members’ perceptions toward and decisions about online assessment practices across disciplines and institution types. This section of the literature review discusses several studies on the principles of implementing assessment online, and then introduces featured assessment methods and techniques in an online learning environment.
Principles of Implementing Assessment Online

As mentioned above, the new technologies have brought opportunities and challenges. Even though technology has brought new possibilities for the implementation of online assessments, it is important to remember that for good practices surrounding assessment, “it is not the format, but consistency and fairness that is the appropriate test of objectivity” (Reeves, 2002, p.170). A new question therefore has been proposed to educators, instructional designers and researchers: How can these new technologies best be used for the purpose of assessing students’ learning in an online learning environment? This section first introduces some principles of implementing assessment online that have been developed in the last two decades, and then the possible implementations based on these principles are explored as well.

Ragan (1999) and his colleagues developed a set of guiding principles for the design and development of distance education, as one outcome of the Innovations in Distance Education (IDE) project, launched in 1995 and sponsored by the AT&T Foundation. Among these principles, they reinforced that assessment strategies should be integral parts of instruction. They asserted that assessment and measurement should serve the instructor and the learner in the distance education environment as follows:

1. Assessment instruments and activities should be congruent with the learning goals and should be consistent with the skills required of the learner throughout the distance education program.
2. Assessment and measurement strategies should be employed as integral parts of the learning experience—enabling learners to assess their progress, to identify areas for review, and to reestablish immediate learning or lesson goals.

3. Assessment and measurement strategies should accommodate the special needs, characteristics, and situations of the distance learner.

4. Distance learners should be provided ample opportunities and accessible methods for providing feedback on the instructional design of the distance education program.

Robles and Braathen (2002) also suggested that online assessment requires a more ongoing, systematic approach than assessment typical in traditional instruction. They argued that online assessment should not only be able to modify and transfer those traditional assessment techniques but also be able to expand the menu of the traditional assessment techniques so that both students’ learning outcomes and the application of knowledge can be measured. In addition, Robles and Braathen (2002) also identified the assessment of interaction between the instructors and students as a crucial component of online assessment. They asserted that with the lack of face-to-face interaction in an online learning environment, students’ online interaction should be measured to understand what students are doing online. Roblyer and Ekhaml (2000) designed a “Rubric for Assessing Interactive Qualities of Distance Learning Courses." In their rubric, the levels of course interactivity were measured in four dimensions of social goals, instructional goals, types and uses of technology, and impact of interactivity—changes in learner behaviors.
Kerka, Wonacott, Grossman, and Wagner (2000) suggested that online assessment should be continuous and interactive. The authors noted out that continuous assessment in distance education means that formative assessment should play a critical role in process of assessing students online. Three key issues should be addressed when planning continuous assessment online: (1) continuous assessment should help learners pace and schedule their learning; (2) instructors should provide feedback on learners’ understanding; and (3) the assigned activities should direct learners to specific content areas and skills to ensure the learning quality. Kerka et al. (2000) also suggested that the following approaches be implemented as continuous assessment: ungraded feedback built into study materials; self-assessment quizzes and tests; formal feedback on assignments from instructors, peers, and workplace mentors or colleagues; informal dialogue with instructors, peers, or others; and ungraded tests. The role of instructors in online assessment should be: acting as a coach, mentor, and facilitator; communicating information; providing timely feedback; and being a team member. Instructors can make the assessment interactive by comparing learner answers with correct answers and giving feedback; recommending remediation; and showing web pages with supplemental information.

A study by Gaytan and McEwen (2007) noted that immediate feedback is critical during the process of online assessment. This immediacy suggests that faculty members need to fully understand a variety of teaching strategies and the students’ learning style preferences before they start teaching online. Their study recommended implementing a wide variety of assessment strategies and providing meaningful and immediate feedback. They also recommended using
peer assessment as an effective approach for students to get immediate feedback from their classmates. Online discussion, e-mail messages, and chat room conversations help instructors to be more aware of their students’ learning progress.

Beebe et al. (2010) examined seven faculty members practices of transferring assessment from face-to-face classes to online and suggested that an understanding of both assessment of learning and assessment for learning is important for faculty to implement effective online assessment. Their study also suggested that timely feedback and frequent communication between the instructor and students was important for the success of online assessment for learning. Assessing students’ learning in an online environment requires students to have more initiative and be more responsible provide the instructor information about what they have learned and what they need to learn. Findings by Beebe et al. (2010) also suggested that the less complex or applied the course content was, the easier it was for the assessment to be transferred from traditional to online.

As these principles indicated, assessment of students’ learning in an online environment should be integrated to the instruction, be continuous and maximize feedback (Beebe et al, 2010; Gaytan & McEwen, 2007). Instructors, who are using online assessment, have to use alternative formats more often than traditional classroom to overcome challenges created by online assessment (such as the lack of face-to-face observation and interaction, academic dishonesty, etc.). In addition, a virtual peer supporting and expert scaffolding environment is important to compensate the physical absence of class participants. The following sections introduce current
research on a number of online assessment strategies and their related opportunities and
challenges.

**Online Quiz**

The advent of computers enabled computer based testing to be implemented widely in
education. In comparison to traditional face-to-face quizzes, online quizzes add more benefits,
such as administration control, interactivity and multi-media support (Fox, Pham, & Dollar,
2007), automated scoring and adaptive testing, and immediate and formative feedback (Butler,
Pyzdrowski, Goodykoontz, & Walker, 2008). The presence and development of various web-
based programs and applications have added more possibilities and flexibilities of online
computer based testing.

Automated grading and scoring programs have released faculty from some of the
workload associated with test analysis and grading (Engelbrecht & Harding, 2004; Okolo,
Englert, & Bouck, 2006). Automated scoring programs also cost less to mark tests with
standardized answers, such as automatic graded multiple-choice tests and automated essay
scorers (Landauer, Laham, & Foltz, 2003; Lonsdale & Strong-Krause, 2003). Another advantage
of auto-grading is to provide students with instant feedback of their learning progress and
therefore sustain their persistent learning effort (Hung, Lin, & Hwang, 2010). With the advent of
ever more sophisticated Internet technology, numerous programs have been developed to support
online automated scoring. Some programs support the auto-scoring of selected-response tests,
which are tests that use multiple-choice, true-false, ranking, and matching items. A number of
Course Management Systems (e.g., Blackboard, Sakai, Moodle) provide this type of automated scoring in their quiz management section. Assessment that employs selected-response tests usually involves a less subjective process of judgment, and therefore the implementation of automated scoring for selected-response tests, is easier, and has received less criticism from opponents of automated grading. However, researchers and practitioners alike are suspicious about the effects of programs in the effort to assess higher level thinking skills with supply-response tests such as essays and journals), or even authentic tasks, such as computer programming practices (Cheang, Kurnia, Lim, & Oon, 2003). Some studies found that human raters were more consistent with one another (a higher inter-rater rating) than computers were with them (Sireci & Rizavi, 2000). However, Nakayama et al. (2010) claimed that utilizing both the computer generated scores and the average faculty scores were more accurate at placing students than were models which incorporated only the average faculty score or the computer generated scores.

**Online Discussion**

Another frequently employed online assessment technique is online discussion assessment. Online discussion can be synchronous online chat using chat-rooms, Instant messengers and/or web-based video conferencing, or asynchronous using web discussion (e.g., bulletin boards) and other tools. Instructors who teach online are increasingly adopting asynchronous online discussion tools as an effective approach to monitor and assess students’ learning (Vonderwell, Liang, & Alderman, 2007). The assessment of online discussion not only
encourages students’ participation in online courses (Chu & Borsting, 2009), but also encourages student inquiry, collaboration and metacognitive feedback (Yang, Richardson, French, & Lehman, 2011; Vonderwell et al., 2007). Assessment of online discussion can be implemented by simply counting things like the number, frequency, and length of posting. But the problem with this method is that if students know the policy of grading, they may just simply post random texts without original and thoughtful cognitive process (Swan, Shen & Hiltz, 2006). Solutions that have been proposed to address this problem include: using online discussion rubrics (Bali & Ramadan, 2007), judging the other students’ responses to posts (Swan et al., 2006), and utilizing content analysis models to analyze the quality of posts. Several content analysis models have been developed to assess critical thinking revealed in online discussions (Yang et al., 2011). Although researchers claimed that online asynchronous discussion can be employed for both formative and summative assessment (Rovai, 2000; Vonderwell et al., 2007), the best practice of implementing online discussion as an assessment technique may be one that serves as an assessment for learning and supports an interactive and collaborative learning environment.

**Essays as Online Assessment Strategy**

As discussed previously, essays are an important assessment strategy for instructors to understand students’ critical thinking and problems solving skills. Therefore, many instructors continue to use essays as one of their course assessment strategies in online teaching. A unique feature of assessing students’ essays online is to auto-grade students’ essays via an essay grading software. However, results from studies of whether machine grading is consistent with human
grading have been controversial. For example, a study by McCurry in 2010 discussed whether machine scoring of writing tests has similar reliability as human scoring and claimed that during the trial of this study, auto-grading did not grade the writing tasks as reliably as human markers. However, another study by Nakayama et al. that was also published in 2010 determined that automated essay grading tools can be as efficient as human grading in a hybrid or fully online course.

**Journal/Blogs**

Journals have been traditionally used as an effective assessment tool in traditional face-to-face courses (Moon, 1999). When transferring from a traditional face-to-face to an online assessment, instructors not only continue using the format of traditional journals as one of their online assessment strategies, but also utilize the various features of online Blogging to maximize the assessment benefits. Online journals or Blogs are unique tools that instructors can use to assess students’ critical thinking and problem solving. They are also effective tools for the purpose of formative assessment (Olofsson, Lindberg, & Stödberg, 2011) and learner autonomy (Bhattacharya & Chauhan, 2010). These tools can provide the opportunity for students to reflect on their own learning and to communicate with their learner peers (Joshi & Chugh, 2009). When implemented correctly, blogs can help students improve their reading and writing skills (De Souza-Hart, 2010). The sharing feature of blogging also provides students with immediate feedback from their peers (Granberg, 2010) and collaborative opportunities with their class project team members (Philip & Nicholls, 2009).
**Electronic Portfolios**

With the growth of the Internet and web technologies, electronic portfolios have become popular since the middle of 1990s, and have begun to replace traditional portfolios. An e-portfolio is a web-based digital repository of artifacts that demonstrates the author’s knowledge and performance (Greenberg, 2004). Researchers claim that electronic portfolios have distinct advantages over other forms of assessment, such as the traditional portfolios, writing assignments (Baturay & Daloğlu, 2010), and comprehensive exams (Clark, Topp, & Goeman, 2002). When digital video, audio, and other multimedia artifacts are added to the traditional portfolio, it presents a much richer picture of the student’s abilities (Briceland & Hamilton, 2010). Benefits of electronic portfolio assessment have been demonstrated in terms of promoting self-reflection (Buzzetto-More, 2010), peer assessment (Ruiz et al., 2009), and self assessment (Hung, 2009) as well as in students’ professional growth (Lumsden, Pinataro, Baltuch, & Reardon, 2009).

**Online Game/Simulation**

Several other innovative technologies and techniques have been implemented to assess students learning online. Most of them can be categorized as authentic assessment approaches, such as role-playing and simulations (Hayes, 1999; Morse, 2010), online games (Yip & Kwan, 2006), and using Virtual Worlds for sophisticated assessment (Dede, 2008).

Computer-based simulation software has been used to assess students’ performance since 1970s, when the U.S. Army first used computer-based simulated battles to teach the trainees
military skills at the National Training Centers (Ong, 2007). Online role-play and simulation assess multiple aspects of students’ knowledge, skills, and metacognitive strategies that arise in different situations by developing realistic scenarios with various types of multimedia online (Kerka et al., 2000). Online courses in various content areas, such as teacher education (Fischler, 2007), electrical engineering (Spanias & Atti, 2005), and business training (Clarke, 2009), have been implementing simulations and role-play as part of their assessment strategies and effective approaches to improve students’ learning and performance. Another frequently used online simulation tool is a virtual laboratory (Chen, Wu, & Su, 2008; Spanias & Atti, 2005). Although the differences between games and simulations are not always clear (Gredler, 1996), they are usually treated as the same in educational research. Gibson, Aldrich, and Prensky (2007) recommended that educators and researchers must carefully consider the in-game data to be collected so that the information can later be used as evidence for assessment.

Teaching in virtual worlds is still a new trend for most university and college instructors. However, more and more postsecondary educators have started their exploration of teaching in a virtual world. Courses from dozens of disciplines, from Ethnography to Biology, from Architecture to Music, have been delivered in virtual worlds such as Second Life. For example, as early as 2004, Aaron Delwiche, an assistant professor at Trinity University in San Antonio, began having students attend his class within a virtual classroom located in Second Life (Terdiman, 2004). New opportunities and potential of assessment strategies are emerging in this kind of learning environment. Dede (2008) described how the detailed record of student actions
and utterances automatically collected in MUVEs (Multi-User Virtual Environments) offers great potential for assessment; both from a research perspective and in terms of formative, diagnostic information that could help tailor instruction to individual needs.

**Using Web 2.0 Tools as Online Assessment Strategies**

As discussed in the Journal/Blogs section, Blogs are one of the Web 2.0 tools that have frequently been used in online courses for assessment purposes. In addition to Blogs, several other types of Web 2.0 tools, such as Wiki, Podcasting, and YouTube videos, have also been incorporated by instructors in their online course for the purpose of assessing and assisting students’ learning. Several published articles were found during this literature review which provided suggestions and possible strategies of using Web 2.0 tools in instruction and assessment (Duffy, 2008; Gray, Thompson, Sheard, Clerehan, & Hamilton, 2010; Hatzipanagos & Warburton, 2009; Kingsley & Brinkerhoff, 2011). However, no introduction to first-hand practice has been found in peer-reviewed journals in this literature review search.

**Challenges**

The previous sections of this literature review chapter introduced how traditional formats of assessment are being adapted in online learning environments (e.g., quizzes, journals, portfolios, essays) and also how innovative approaches are being deployed for online assessment (e.g., Blogs, wiki, Youtube videos, online gaming, online simulations, virtual worlds). Still, problems and dilemmas related to goals, formats and strategies of online assessment challenge instructors and researchers during this exploration stage of implementing assessment online. The
transformation from face-to-face to online assessment is significant, in terms of space, time, media, methods, pedagogies, paradigms, and the roles of students and teachers. Therefore a number of challenges and dilemmas have emerged during the implementation of online assessment due to the lack of direct observation and other consequential issues. This section discusses several challenges and dilemmas that have been frequently mentioned by instructors, instructional designers, and educational researchers.

The foremost challenge that instructors face is the lack of direct face-to-face observation (Rovai, 2000). For example, formative assessment aims to monitor student learning and instructional teaching, therefore the instructor must observe student learning as much as possible during the instruction. However, it is much more difficult to observe student reactions online because of the physical distance and asynchronous nature of most online higher education. Although many technologies enable possible virtual interaction, such as video/audio conferencing, and chatting, it is still difficult for instructors to observe students’ learning progress frequently and conveniently. In addition, the lack of face-to-face observation complicates the situation of academic dishonesty in online assessment (Hollister, & Berenson, 2009). Dishonesty is not a new concern in practices of assessment (Peterson, 1986); however, this issue gets twisted in another direction in online assessment. Because they are physically distant and unobserved during the test, students are able to use e-mails, instant messengers and other Internet based communication tools to answer questions. Sometimes the test taker may even not be the person who should be taking the test. Plus, instructors are no longer able to
depend on different handwriting, a change of ink color, and eraser marks to tell if students
complete the assignment independently or if they have not changed the answers after completing
the assessment. Plagiarism is another old issue that has flourished in the online environment. The
convenience of information access afforded by the Internet allow students to type keywords in
search engines and then copy the found text and paste it directly into their own work without or
with slight changes.

Because of the high risk of academic dishonesty, anyone conducting high stakes
assessments can choose various security alternatives such as employing synchronous video or
television conferences for testing, or having the test proctored with a human proctor in a public
computer lab. However, instructors who do not have the access to these security techniques and
environments usually reserve online assessment delivery for lower stakes purposes, such as
measuring on-going learning progress (Hunt, 2006).

Although most researchers and instructional designers believe that online assessments
should integrate more formative assessments, authentic tasks, self-assessments and peer
assessments, all of these assessment methods can bring problems as Mathur and Murray (2006)
stated: labor intensiveness, relatively high cost on resources and time, and questions of public
faith in the objectivity and reliability of judgment-based scores. Although challenges are inherent
in all types of assessment, no matter whether the delivery medium of the assessment is paper-
and-pencil or online, college or university instructors clearly face more challenges in an online
assessment than they do in a traditional assessment because of the special requirements of assessing students remotely.

**Chapter Summary**

This literature review provided an overview of how teachers’ epistemological beliefs can influence and shape their decisions of assessment practices and how online assessment has been practiced in the past two decades. Empirical studies about online learning and online assessment have advanced tremendously and new technologies have encouraged teachers to achieve the best assessment effects to not only measure students’ learning outcomes, but also support students learning of both subject content knowledge and problem solving skills. Assessment practices influence the type of learning occurring and are influenced by the instructor’s epistemological beliefs. Instructors’ epistemological beliefs and pedagogical orientations influence how instructors view the process of acquiring knowledge, how they plan and conduct teaching, the roles of instructors and learners in the learning and assessment process, and the implementation of course curriculum.

This literature review has established that there is clearly a need for further exploration in these areas. Researchers have not specifically examined at the relationship between instructors’ epistemological beliefs and their practices of assessing students online. An exploration of online assessment, with its opportunities and possibilities to support students’ cognitive developmental process and constructivist learning and its connection to instructor’s epistemological beliefs and
global pedagogical orientations, should provide a better understanding of how faculty members may be helped as they strive to implement the best online assessments in their teaching.
CHAPTER THREE: METHODOLOGY

Overview

Chapters 1 and 2 established the need for and importance of the current study regarding the factors that influence the decisions that higher education instructors teaching online make about how to assess student learning. The specific purpose of my study has been to examine the relationships among a number of variables, including the various disciplines involved; faculty members’ teaching experiences; their use of and attitudes toward technology; their beliefs regarding knowledge and instruction, and their practices regarding the choice and implementation of online student assessment.

The specific research questions for the study were:

1. What statistically significant relationships exist between certain factors and the online assessment practices of faculty members?
   a. What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the nature of the discipline, the course level, and the types of online assessment methods and techniques that they implement?
   b. What statistically significant relationships are found among faculty members’
experience and expertise with computers and the Internet, and the types of online assessment methods and techniques that they implement?

c. What statistically significant relationships are found among faculty members’ epistemological worldviews and pedagogical orientations and the types of online assessment methods and techniques that they implement?

2. How do faculty members make decisions about how to assess students in an online learning environment?

d. What are faculty members’ perceptions of the role of assessment within their courses?

e. How do epistemological worldviews and pedagogical orientations affect decisions faculty members make regarding online assessment?

f. What areas of improvement do faculty members perceive for online assessment tools?

g. According to faculty members’ perceptions, what improvements should be made to the assessment functions in current course management systems (CMSs)?

h. What new functions and/or applications should be added to the current online assessment technique menu?

**Research Design**

Based on the overall purposes of this study and the specific nature of these research questions, the design of the study used a mixed-method approach recommended by Creswell in
2003, specifically the sequential exploratory strategy. Many researchers have embraced mixed-methods since Campbell and Fiske depicted the multitrait-multimethod matrix in 1959 (Creswell, 2003; Kumar, 2007). Generally, proponents of mixed-methods claim the approach provides triangulated information, expands understanding from one method to another, and provides researchers with a rigorous approach to answering research questions (Creswell, 2003; Creswell, & Plano Clark, 2007; Kumar, 2007). Tashakkori and Teddlie (1998) even argued that the emergence of mixed-methods marks the end of the paradigm war among positivists/empiricists, constructivists, and phenomenologists.

However, the definition of mixed-methods varies across the literature in the social sciences including education. Creswell (2003) described mixed-methods as the combination of qualitative and quantitative methods, concurrently or sequentially; however, Axinn and Pearce (2006) claimed that it is not necessary to distinguish between qualitative and quantitative methods, suggesting instead that mixed-methods should be merely a mixture of various data collection strategies, such as observations, structured interviews, surveys, etc. Based on their work and other researchers’ previous work, Creswell and Clark (2007) defined mixed methods research as:

[. . . ]a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analyzing,
and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone. (p. 5)

The mixed methods design used in my study consisted of two phases. Phase I included both quantitative and qualitative data collection and analysis, and phase II included qualitative data collection and analysis. In phase I, relationships among previously mentioned variables were examined using appropriate statistical analysis approaches. Certain patterns and connections were found. These patterns and connections then guided further in-depth investigation into faculty members’ practices of assessing students online. Based on these findings, further qualitative data was collected using document analysis and interviews in phase II, which focused on the patterns and connections found in phase I. Finally, after the qualitative data were collected, I analyzed the interview transcriptions and the faculty members’ discursive responses to the open-ended survey questions. I also determined similarities to and inconsistencies with my findings in phase I. From these determinations, meaningful implications have been drawn that will help further the field’s understanding and implementation of online assessment in the future. An overall picture of research design is shown in Figure 2.

**Research Context**

Online courses and online educational programs can be offered by many different types of higher education institutions, such as traditional public research universities, private liberal arts colleges, and commercial online institutions. This study focused on the online courses and
online programs at two distinctly different types of institutions within the United States: 1) traditional research institutions and 2) commercial online institutions. An example of the former is The University of Georgia and an example of the latter is the University of Phoenix.

Figure 2. The flow of the study.

Online courses that are offered by traditional research universities and online institutions were identified using the following strategy: first I identified the traditional research universities using the classifications of U.S. Universities maintained by the Carnegie Foundation (http://www.carnegiefoundation.org/classifications/). Specifically, I used the classification listed as “RU/VH: Research Universities (very high research activity).” In the year phase I on my study began (2009), 96 institutions in the USA had the RU/VH classification. Next I searched for
online programs and/or online courses offered by each individual RU/VH university at their websites. Online courses offered by commercial online institutions was identified using with following resources: education center online (http://www.educationcenteronline.org/online-degrees/index.html), college-scholarships (http://www.college-scholarships.com/ssac.htm), the education portal (http://education-portal.com/online_degree.html), and the United States Distance Learning Association (USDLA) (http://www.usdla.org/). Although many websites had a collection of links to online universities and online colleges, many of the links pointed to the online division of traditional universities. Therefore, only nineteen institutions during this study were identified as online institutions at that time. The Online Adjunct Yahoo Group and the Second Life Research listserv were also included as additional resources for online institution faculty recruitment. After identifying the online programs, online courses, and online institutions, I either contacted the leader of the program or directly contacted the course instructors to invite these faculty members to participate in the study.

Participants

The majority of the participants in phase I were recruited through email invitations to the leaders of the identified online programs or directly to the online course instructors. These participants were faculty members who were teaching or had taught at least one online course for at least one semester. The faculty members were affiliated with one of the two different types of institutions, research universities or online commercial institutions. The courses that these faculty members were teaching or had taught were undergraduate, graduate level, or both. Sixty
faculty members from the 96 RU/VH Universities listed by the Carnegie Foundation (http://www.carnegiefoundation.org/classifications/) began the survey and 53 faculty members (88.3%) completed it. Ninety-five faculty members from online institutions began the survey and 93 faculty members (96.9%) completed it. However, the number of the online institutions whose faculty members participated in this survey could not be identified because some participants may have received the information via the online adjunct faculty Yahoo group or the Second Life Research Listserv.

The participants in phase II were recruited by first asking phase I participants to voluntarily leave contact information for further study. Information-rich participants (Patton, 2001) for phase II were identified from those participants who left their contact information, according to their responses to the online survey. Selection criterion to identify phase II participants included the use of online assessment strategies, online teaching and assessment experience, the nature of the disciplines involved, course level, and the institution type. Professors with abundant experience in online teaching and online assessment were selected first. At the same time, I sought to find participants who were representative across a range of factors such as disciplines, course level, and institution type. Thirteen faculty members participated in phase II of the study, whereas only two were from online commercial institutions.

**Pilot Studies**

Two pilot studies were conducted before the formal dissertation study. The purpose of the first pilot study was primarily to refine and validate the online questionnaire. Only phase I was
conducted during this round of the pilot study. A Likert-scale questionnaire was created and pilot-tested in September 2007. The online survey was refined according to the results of the first pilot study. The purpose of the second pilot study was to test the design and validity of the survey and to refine the design of the whole study. Therefore, both phase I and phase II of the originally designed study were conducted to fulfill this purpose. According to the results of the second pilot study, the whole Epistemic Belief Instrument was abandoned because no statistically significant relationship was found between the measured epistemological beliefs and faculty’s practice of online assessment. However, because of their descriptive nature, the three vignettes developed by Schraw and Olafson (2003) were preserved to measure faculty’s epistemological worldviews. Based on the results of the second pilot study, the interview protocol was also modified. The interview protocol that guided the interviews in the second pilot study can be viewed in Appendix D.

Instrumentation

The instruments in this study included the online survey that was distributed in phase I, and the interview protocols that guided the interviews in phase II. This section introduces the sub-scales and items in the online survey in detail. The interview protocol that guided the interviews in phase II of the study appears in Appendix G. The online survey included 26 items divided into five sections. These five sections are demographics, Internet Literacy, epistemological worldviews (called global pedagogical perspectives in the survey), the use of online assessment strategies, and open-ended questions (please see Appendix E for the online
Demographic Information

The purpose of phase I of the study was to discover whether statistically significant relationships existed between the independent variables of the type of the institution, the disciplines involved, the course level, the use of the Internet, faculty’s epistemological worldviews, and the dependent variables of online assessment practices (the variety of online assessment strategies, the purposes of using online assessment strategies, and the tendency of using online assessment strategies). Therefore, the first section of the survey is designed to collect demographic information about the participants and the courses, including the categories of the institutions (Traditional Research High Universities or Online Institutions), the disciplines involved, the percentages of online delivered content of the courses, and the course level (graduate or undergraduate). Based on the collected information from the pilot study, and the Biglan’s (1973a, 1973b) discipline categories, there were 102 disciplines (please see Appendix F for the disciplines and categories) for participants to choose from. If the discipline of the respondent was not listed among the 102 disciplines, then the participant was asked to identify the name of the discipline in a textbox.
Internet Literacy

In view of the lack of questionnaires available for the Internet Literacy of postsecondary instructors, I created a context-specific Internet Literacy questionnaire to measure the general use of the Internet by study participants. The participants’ Internet literacy as exemplified by their use and their comfort levels with the Internet were measured with an 11-item 7-point Likert subscale. This subscale includes two parts to measure the degree to which the participant engages in certain Internet applications with their general virtual social network and within their professional career in research and teaching. The first part included six items that measure participants’ use of the Internet for their virtual social network. A sample statement is “I communicate with people via social network tools (e.g., Facebook, My Space, twitter, etc.).” The second part included five items that measure participants’ use of the Internet for their professional life of teaching and researching. A sample statement was “I use asynchronous tools (e.g., blogs, wikis, discussion boards, listservs) to communicate with my students in a delayed manner in my teaching.” Both parts are scored from 1 (“Never”) to 7 (“Often”).

Global Pedagogical Perspectives

Faculty members’ beliefs about teaching and learning were examined using the approach that Schraw and Olafson (2003) used to study teachers’ epistemological worldviews. In their study of teachers’ epistemological worldviews and their educational practices, Schraw and Olafson (2003) suggested that teachers’ epistemological worldviews could be categorized as realist, contextualist, and relativist. The authors created three vignettes which each described one
of the three types of teachers’ epistemological worldviews and teaching practices that may
guided by this certain type of worldview. The contents of the three vignettes are available in
Appendix C.

In their study, Schraw and Olafson (2003) asked the teacher participants to choose one of
the three vignettes that best represented their epistemological worldviews. However, for
participants to easier understand the content, in my study, the section of epistemological
worldviews in the survey was named "Global Pedagogical Perspective," and the participants
assigned a total of ten points to the three vignettes. They were asked to assign the most points to
the vignette that they most agreed with, and the least amount of points to the one that they least
agreed with. The points assigned across the three vignettes added up to 10.

**Use of Online Assessment Strategies**

The fourth section was designed to measure the general use of online assessment
strategies. Online assessment strategies that were investigated in this section included online
quizzes, authentic tasks, general assignments (e. g., exercises on certain types of problems,
questions or problems that a student responds to with a written summary, analysis, or explanation
such as essays or short papers), online discussion assessment, journals, electronic portfolios, and
online games and/or online simulations.

In this section, participants were first asked to identify a specific course that they taught
totally or partially online. Then participants were asked to identify the course level
(undergraduate or graduate), the degree to which that the course was delivered online, and the
type of Course Management Systems (CMSs) used in the course. After this, participants were asked to check each of the statements for seven different online assessment strategies and if these statements were true. These seven strategies were online quizzes/tests, authentic tasks and/or projects, writing essays or completing written exercises, threaded online discussions, online journals, electronic portfolios, and online games or simulations. A sample statement was “My course included online quizzes/tests for students to self-test their knowledge.” Participants were also asked to identify the percent of the final grade that is based on a specific type of online assessment that they employed in the course. A sample questions is “If your course included online games or simulations that count toward the final grade, what percent of the final grade is based on these online games or simulations? The last item in this section asked participants to identify and describe assessment strategies that they employed in the course other than the ones specified above.

**Open-ended Questions**

The last four items are open-ended questions. The first three open-ended questions asked faculty members’ perceptions of online assessment tools and their suggestions for possible improvement for the online assessment functions in the current Course Management Systems (CMSs) they used. The last question asked these faculty members to leave their contact information if they would be willing to participate in the next phase of the study in the format of interviews. Table 1 displays the summary and sample questions of the survey instruments that were used in this study.
### Table 1

**Summary of Survey Instruments for the Study**

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Construct Measured</th>
<th># of Items</th>
<th>Sample Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Information</td>
<td>Demographic information of participating faculty members</td>
<td>2</td>
<td>2. What is the total number of courses that include some types of online assessment which you have taught in each of these levels during the last 12 months?</td>
</tr>
<tr>
<td>Internet Literacy</td>
<td>Faculty members’ general use of the Internet</td>
<td>11</td>
<td>I regularly communicate with people using social networking tools (e.g., Facebook, My Space, twitter, etc.).</td>
</tr>
<tr>
<td>Epistemological worldviews</td>
<td>Revised faculty’s global pedagogical orientations</td>
<td>3</td>
<td>Please see Appendix C for vignettes.</td>
</tr>
<tr>
<td>Basic information of a specific course</td>
<td>Basic information of a specific course that the online assessment strategies were used within</td>
<td>4</td>
<td>This course is primarily for:</td>
</tr>
</tbody>
</table>
Both undergraduate and graduate students

Other (please specify)

Please check each of the following statements if they are true of the course you have in mind (check all that apply):

My course includes:

- online quizzes/tests for students to self-test their knowledge.
Data Collection Procedures

As mentioned earlier, this study used a two-phase mixed-methods design. In phase I, both quantitative and qualitative data were collected using an online survey. The survey has 26 items including 22 items collecting quantitative data such as demographic information, epistemological worldviews, Internet literacy, and the use of online assessment. Three of four open-ended questions collected qualitative data including participants’ attitudes towards and their suggestions about online assessment. The last item asked participants to leave their contact information if they were willing to participate in phase II of the study. Phase II involved interviews with the selected participants who volunteered. More details about the two phases are provided below.

Phase I

During phase I, the survey was published to two different web links. By sending two different survey web links, the data collected from the traditional research universities was able to be compared to the data collected from the online institutions and certain patterns were discovered through the comparison. Then the invitation emails including one of the survey links were sent to the leaders of the identified online programs or directly to the online course instructors in the selected traditional Research High institutions. The invitation emails including the other survey link were sent to the leaders of the identified online institutions as well as to individual online institution faculty members whose email addresses were available on the Internet, which were not many. Due to the business nature of online institutions, it was very difficult to obtain the contact information of individual faculty members who taught in online institutions. Emails sent to contacts of identified online institutions were rarely responded to. Among the nineteen online institutions that I searched, I was only able to find one online
institution who listed the email addresses for all its faculty members. Therefore, in the later stage of my data collection from online institutions, I also broaden my participant recruitment by sending emails to the Online Adjunct Yahoo Group and the Second Life Research listserv.

The email briefly introduced me and the study and it also included a web link to the online consent form for the study and a PDF version of the consent form. If the instructors were willing to participate in the survey, then they could click through the web link, read the consent form, click the “Begin Survey” button and fill out the survey online. The online surveys were hosted using the professional survey hosting site of Survey Monkey (http://www.surveymonkey.com). As mentioned before, the survey contains five parts: demographic information; an 11-item Internet literacy scale for faculty members; a revised three-item global pedagogical orientation scale (Schraw & Olafson, 2002); a 16-item check-list about the use of online assessment strategy and a fill-in-the-blank item; and four open-ended questions.

Phase II

As soon as feasible, I began to select and contact information-rich participants for phase II of the study from participants who left their contact information at the end of the survey. Information-rich participants were identified according to the following criteria: (1) use of online assessment strategies; (2) experiences regarding online teaching and online assessment; (3) discipline; and (4) course levels taught. I first identified possible participants for phase II who have relatively extensive experiences of online teaching and online assessment. Second, I considered the diversity in terms of the disciplines involved, course level, and institution type. After the information-rich participants were selected, I sent them emails to invite them to participate in phase II of the study via interviews. At the beginning, about twenty faculty members responded and showed interest in participating in phase II. However, due to faculty
members’ tight schedules and business concerns (specifically among online institution faculty members), only thirteen faculty members participated in phase II of the study. Among these thirteen participants, only two of them were from online institutions. All the interviews were conducted at a distance (via online virtual conferences using instant messenger program such as Skype, MSN messenger, or via telephone call) except for one professor who preferred to use email to respond to my interview questions. The interviews were semi-structured, and were guided by an interview protocol (Appendix G). Each audio-based interview lasted from 30 minutes to one hour and was audio-recorded. The audio records of the interviews were then transcribed verbatim for further analysis.

**Data Analysis Procedures**

The two data analysis phases followed the two data collection phases, respectively. The quantitative part of the data gathered from phase I were used to examine the statistically significant relationships among the seven mentioned variables, and to obtain an initial understanding of the online assessment experiences and attitudes of faculty members. The qualitative part of the data from phase I was used to help interpret the findings from the quantitative data from phase I. The phase I data also helped me to identify the participants for phase II of the study. Patterns and relationships discovered in phase I guided the modification of the interview protocol questions. For example, during the analysis of phase I, statistically significant relationship was discovered between the category of discipline and the variety of online assessment strategies. Therefore, during the interview, I added a question about the reason of choosing specific online assessment strategies according to the nature of the subject areas that the professors taught. The phase II data was analyzed for in-depth understanding of faculty members’ practices of and perceptions about online assessment.
Phase I Analysis

As detailed above, Phase I collected demographic information about the faculty members, their Internet Literacy, epistemological worldviews, and use of online assessment. Different types of statistical analyses (using SPSS 16.0) were conducted to investigate the relationships among the eight independent variables and the dependent variables mentioned previously, depending on the data types of the independent and dependent variables. Data types and statistical analysis techniques are shown in Table 2.

Before the statistical analysis, several variables were calculated and/or transformed. First, the survey data collected from two separated online links for both online and traditional institutions were aggregated. Then the collected discipline information was categorized into eight categories, according to the Biglan Categories (1973a). These eight categories are: pure-life-hard, pure-life-soft, pure-non-life-hard, pure-non-life-soft, applied-life-hard, applied-life-soft, applied-non-life-hard, and applied-non-life-soft (please see Appendix F). After that, the total numbers of types of online assessment strategies were calculated. A descriptive analysis (using SPSS 16.0) was conducted to obtain the big picture of the sample group, including the distribution of two institution types, disciplines, and course level.

After all data was aggregated and computed, statistical analyses were conducted between the independent variables and dependent variables, using SPSS 16.0, as shown in Table 2, to answer the research questions of phase I:

- Question 1a: What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the nature of the discipline, the course level, and the types of online assessment methods and strategies that they implement?
### Table 2

*Summary of the Data Types of Variables and Statistics Techniques*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Statistical Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution Type</td>
<td>Teaching Load</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>Discipline Category</td>
<td>Percentage of Undergraduate/Graduate</td>
<td>Correlation</td>
</tr>
<tr>
<td>Course Level</td>
<td>Courses Taught</td>
<td>T-test</td>
</tr>
<tr>
<td>Online Delivery</td>
<td>Pedagogical Orientation</td>
<td>regression</td>
</tr>
<tr>
<td>Percentage</td>
<td>Internet Literacy</td>
<td>ANOVA</td>
</tr>
<tr>
<td>Internet Literacy</td>
<td>Variety of Online Assessment</td>
<td></td>
</tr>
<tr>
<td>Teaching Load</td>
<td>Strategies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purposes of Each Online Assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategy</td>
<td></td>
</tr>
</tbody>
</table>

- **Question 1b:** What statistically significant relationships are found among faculty members’ experiences and expertise with computers and the Internet, and the types of online assessment methods and strategies that they implement?

- **Question 1c:** What statistically significant relationships are found among faculty members’ epistemological beliefs and pedagogical orientations and the types of online assessment methods and strategies that they implement?
After estimating the existence and strength of variable relationships, certain patterns and interpretations were generated, and these were used to guide the data collection of phase II.

**Phase II Analysis**

During the data analysis of phase II data, faculty members’ answers to the open-ended questions in the online survey were first examined. The document analysis results were combined with the analysis results from the interview transcriptions to answer the following research questions:

How do faculty members make decisions about how to assess students in an online learning environment?

a. What are faculty members’ perceptions of the role of assessment within their courses?
b. How do epistemological beliefs and pedagogical orientations affect decisions faculty members make regarding online assessment?
c. What areas of improvement do faculty members perceive for online assessment tools?
d. According to faculty members’ perceptions, what improvements should be made to the assessment functions in the current Course Management Systems (CMSs)?
e. What new functions and/or applications should be added to the current online assessment technique menu?

An inductive analysis approach was first applied to identify themes and patterns (Patton, 2001). The three open-ended questions in the online survey are: (1) How can the current available online assessment tools (both commercial and open source systems) be improved to facilitate your teaching and students’ learning? (2) What do you think is the biggest difference between traditional assessment and online assessment? and (3) Please write any comments you would like to share about online assessment. I began the analysis by extracting all the answers.
from the survey and then pasting them into a table. Then I started open coding, as suggested by Glaser (1978) and Ezzy (2002). After open coding, I compared them using the method Strauss and Corbin (1990) described as “constant comparison.” In this process, I compared each meaningful sentence against others for similarities and differences. After determining codes for each meaningful sentence, I started sorting these answers into units or items according to the frequencies that the codes appeared (LeCompte, 2000). These initial units were then categorized into stable set of items by comparing them back and forth to look for things exactly alike and slightly different (LeCompte, 2000). Spradley’s (1979) semantic relationship table was used to help to make these comparisons.

For the data analysis of phase II data, the recorded interviews were first verbatim-transcribed. Before I started the analysis, I first listened to the interview recordings to elicit the units of general meaning and to check whether I would be able to bracket my presuppositions (Hycner, 1985). As suggested by Hyncner (1985), I first “horizontalized” the data of the interview transcriptions, and then listed meaning units from each individual interviewee. Next, I clustered these meaning units into categories or themes. The clustered categories and themes developed from each individual participant’s experience were then compared and aggregated to develop “the textural descriptions of the experience” (Moustakas, 1994a, p. 118). Finally, I wrote a structural description about how the participants experience the experience they recounted, which was a composite structural description (Moustakas, 1994b, p. 142). During both analysis processes of the answers to open-ended questions and the interview transcriptions, the qualitative analysis software ATLAS.ti 6.2 was used to help with coding and writing memos.
Subjectivity Statement

When I entered the Instructional Technology program, I would not have predicted that I would have conducted a study that involved as much qualitative research as this one has. With my engineering background in my previous studies at undergraduate and Master’s level, I believed more in numbers and experiments, and I fully expected to conduct some sort of quantitative quasi-experimental study. But as I was introduced to qualitative courses in my first years in the program and as my confidence in my English language skills grew, I began to learn the meaning and importance of implementing qualitative methodologies in the process of studying human behaviors and cognition mechanisms. I started to realize that talking and communicating with the study “subjects” is as important as collecting statistical numbers and “hard data” if I wish to more completely understand what is going on during the process of human learning. I then detected the feasibility of doing a mixed-methods study as I have done. I believe that mixed-methods provide the fully triangulated data from as many angles as a researcher might need. This approach was also certainly an appropriate one given the nature of my research interests and questions. My advisor and my committee greatly influenced my thinking with regard to my research questions and methods.

As a doctoral student, I worked on various types of graduate assistantships. These jobs offered me different roles, which might have influenced my data collection and data analysis. For example, before and during this study, I had been teaching and/or assisting both graduate and undergraduate courses at my department. Some of these courses were face-to-face, whereas some of them were partially face-to-face and partially online. In the later stage of this study, I worked as an instructional designer for the Garden Earth Naturalist (GEN) program at the State Botanical Garden of Georgia. During my doctoral study, I also worked at faculty support organizations,
such as the Center for Teaching and Learning at UGA, and the Teaching with Technologies at the College of Education. Although my working experiences might have brought subjectivity into my study to some degree, the variety of the jobs that I have been involved with provided me a holistic view of my study as an instructor, an instructional designer, and a faculty supporter.

**Chapter Summary**

This chapter described the research design of this study. It first introduced the overall picture of the research design, which includes two phases of data collection. Then the research context and the participants for each phase of data collection were described. After this, the five sections in the online survey were introduced. These five sections are demographic information, Internet Literacy, Global Pedagogical Perspectives (epistemological worldviews), use of online assessment strategies, and open-ended questions. Then the data collection procedures for both phases were introduced, including how the online survey was distributed, the recruitment of the interviewees, etc. Finally, the data analysis processes for both phases were described with reference to the research questions for each phase. At the end of this Chapter, I reflected on the path of my academic growth and my research subjectivity. The following Chapter four describes and discusses the results of the data analyses for both phases.
CHAPTER FOUR: RESULTS

Overview

Among the purported benefits of mixed-method research in the area of social science study is that the triangulated data analysis using a variety of data resources can produce cross support for findings. Therefore, in this chapter, the results of data analysis from both Phase I and Phase II of the study are presented together, in order to answer the research questions addressed in both phases.

Phase I of this study addressed the following research questions:

1. What statistically significant relationships exist between certain factors and the online assessment practices of faculty members?
   a. What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the discipline, the course level, and the types of online assessment methods and techniques that they implement?
   b. What statistically significant relationships are found among faculty members’ experience and expertise with computers and the Internet, and the types of online assessment methods and techniques that they implement?
   c. What statistically significant relationships are found among faculty members’ epistemological beliefs and pedagogical orientations and the types of online assessment methods and techniques that they implement?

97
Phase II of this study addressed the following research questions:

2. How do faculty members make decisions about how to assess students in an online learning environment?
   a. What are faculty members’ perceptions of the role of assessment within their courses?
   b. How do epistemological beliefs and pedagogical orientations affect decisions faculty members make regarding online assessment?
   c. What areas of improvement do faculty members perceive for online assessment tools?
   d. According to faculty members’ perceptions, what improvements should be made to the assessment functions in current course management systems (CMSs)?
   e. What new functions and/or applications should be added to the current online assessment technique menu?

Phase I data came from 60 faculty members from the Research High Universities listed by the Carnegie Foundation who participated in the survey and 53 faculty members who completed it, and 95 faculty members from online institutions who participated in the survey and 93 faculty members who completed it. The raw data from the survey were first downloaded using two sets of Excel spreadsheets (one for traditional universities and one for online institutions). Then the data was processed for further statistical analysis within each set of the spreadsheets. The following data were calculated and processed:
- categories of the disciplines,
- scores from the scale of Internet Literacy,
- total types of online assessment strategies used by each participant, and
- percentage of scores that each assessment strategy has been assigned.

Next, the two sets of data were aggregated and each was labeled with the corresponding institution type (traditional or online). Statistical analyses were conducted to answer the research questions amenable to this approach. Although 146 out of 152 participants completed the survey, some items had more respondents than others. Therefore, in order to obtain the biggest sample size, each statistical analysis was conducted independently using the number of data entries that had responses to the variables involved. After this, data from the open-ended questions in the survey as well as the interview transcription data were imported to the qualitative analysis software called ATLAS.ti 6.2 to assist me in answering the questions about faculty members’ perceptions toward and decisions about implementing online assessment strategies. In the qualitative data analysis results and the excerpts of the interview transcriptions, pseudonyms have been used, in order to protect the identities of the participants.

**An Overview of the Data and a Comparison**

In order to get the big picture of the sample group, a descriptive analysis was conducted to determine distribution of disciplines, and course levels (please see Appendix F for the discipline listed in each category of the nature of disciplines). Figure 3 shows the number of faculty in each of eight discipline categories who participated in the survey from both types of institutions \(N=147\). As illustrated in Figure 3, the number of faculty from the discipline category of applied-life-soft was the highest, and the number of faculty who were from the applied-nonlife-soft discipline was the second highest.
This frequency of responses raised a question related to these discipline categories. Are the categories of online courses taught in traditional universities different from those taught in online institutions? To answer this question, a cross-tab analysis was performed, using the type of institution as the columns, whereas the categories of disciplines as the rows. The statistical analysis result shows a great relationship between the variable of institution type and the variable of discipline categories (Chi-square $\chi^2(1, N=147)=16.912, p=.018$). As shown in Table 3, applied-life-soft courses are the most taught online courses for both online institutions (31.8%) and traditional universities (33.9%). However, for traditional universities, pure-life-hard courses and applied-nonlife-soft courses are equally the second most taught online courses in traditional universities (both were 15.3%); however, for online institutions, applied-nonlife-soft courses (22.7%) are the second most taught online courses and pure-life-soft courses (17%) are the third most taught.
Table 3

*Discipline and Institution Type Crosstabulation*

<table>
<thead>
<tr>
<th>Discipline Category</th>
<th>Institution Type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Online</td>
<td>Traditional</td>
</tr>
<tr>
<td>Pure-life-hard</td>
<td>Count</td>
<td>% within institution Type</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>8.0%</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>15.3%</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>10.9%</td>
</tr>
<tr>
<td>Pure-life-soft</td>
<td>Count</td>
<td>% within institution Type</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>17.0%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>13.6%</td>
</tr>
<tr>
<td>Pure-non-life-hard</td>
<td>Count</td>
<td>% within institution Type</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6.8%</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>8.2%</td>
</tr>
<tr>
<td>Pure-non-life-soft</td>
<td>Count</td>
<td>% within institution Type</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3.4%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>6.8%</td>
</tr>
<tr>
<td>Applied-life-hard</td>
<td>Count</td>
<td>% within institution Type</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.3%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>4.8%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>1.4%</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Applied-life-soft</td>
<td>% within institution Type</td>
<td>31.8%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>19.0%</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Applied-non-life-hard</td>
<td>% within institution Type</td>
<td>.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>.0%</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Applied-non-life-soft</td>
<td>% within institution Type</td>
<td>22.7%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>13.6%</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>Total</td>
<td>% within institution Type</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>59.9%</td>
</tr>
</tbody>
</table>

$\chi^2=16.912$.

*p<.05.

**Teaching Load**

One result observed in both phase I and phase II is that faculty from online institutions usually teach more courses in the same time period (12 months in this study) than faculty from traditional univerisities. Figure 4 shows that according to the data collected in phase I, the average course loads during the last 12 months for faculty of online institutions ($n=95$) were much higher than those of faculty at traditional research universities ($n=60$). In this chart, the average course
load for faculty who teach undergraduate courses in online institutions was almost 6 courses per 12 months; the load for faculty who teach undergraduate courses at traditional institutions was about 1 course per 12 months. Similarly, the average number of graduate level courses faculty members from online institutions taught in 12 months was about 4.3; on the other hand, the average number of graduate level courses a faculty member from traditional universities taught was about 1.4 per 12 months. In phase II, a professor from an online institution stated, “(I teach) two courses every five weeks. I teach about 20 courses a year. (I: How many students are there usually for one course that you are teaching?) I’d say average about 20 to 25.”

![Figure 4. Average course loads for faculty members per year.](image)

To look closer at how the course loads and the composition of the course levels vary in traditional universities and online institutions, independent-samples t-test analyses were conducted to compare the concentration of faculty course loads in terms of course levels between the two groups of faculty members. According to Table 4, there were significant differences between the online institutions and traditional universities in terms of the percentages of
undergraduate level (t(151)=2.61, p=.010) and graduate level courses (t(150)=2.45, p=.015) taught per faculty member at the p<.05 level. Online institution faculty reported teaching 53% undergraduate courses, 37% graduate courses, and 10% mixed graduate and undergraduate courses whereas traditional university faculty reported teaching 34% undergraduate courses, 55% graduate courses, and 11% mixed graduate and undergraduate courses. No statistically significance was discovered between the means scores of mixed-level course taught by both types of institutions. Taken together, these results suggest that the type of institutions and the percentages of graduate level and undergraduate level courses offered by them are related. Specifically, the results suggest that faculty members from online institutions taught more undergraduate level courses than they taught graduate level courses online. On the contrary, faculty members from traditional universities taught more graduate courses than they taught undergraduate courses online.

Table 4

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>94</td>
<td>.53</td>
<td>2.61</td>
<td>151</td>
<td>.010</td>
</tr>
<tr>
<td>Traditional</td>
<td>59</td>
<td>.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grad%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>94</td>
<td>.37</td>
<td>6.014</td>
<td>150</td>
<td>.015</td>
</tr>
<tr>
<td>Traditional</td>
<td>58</td>
<td>.55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Internet Literacy**

An independent-samples t-test was conducted to compare faculty members’ experience and expertise with computers and the Internet between faculty members from online institutions and faculty members from traditional universities. The maximum score any faculty member
could report for Internet Literacy was 77 and the minimum score was 11. There was a significant difference in the scores for faculty members from online institutions (M=50.20, SD=9.87) and faculty members from traditional universities (M=45.79, SD=9.73); t (145) =2.605, p =.010. These results suggest that institution type has a relationship with self-reported faculty members’ experience and expertise with computers and the Internet. Specifically, the results suggest that faculty members from online institutions reported more experience and expertise with computers and the Internet than their counterparts at traditional universities.

**Pedagogical Orientation**

To obtain an overall image about how faculty respondents to this survey perceive teaching, learning and their roles during teaching and learning, a descriptive analysis was first conducted about faculty members’ responses to the three vignettes of the Global Pedagogical Orientation (the epistemological worldviews of Realist, Contextualist, and Relativist). As shown in Table 5, faculty members on average scored higher on Contextualist versus Realist and Relativist within and across the groups of online institutions and traditional universities.

In order to understand whether faculty members from each of the institution types held different pedagogical beliefs, three independent-samples t-tests were conducted to compare scores on Realist, Contextualist, and Relativist by faculty members from two different types of institutions. Kurtosis and skewness of the data were checked before performing the analysis to make sure the data met the assumption of normal distribution. The analysis results (Table 6) showed that the relationship between institution type and faculty members’ Realist and Contextualist global pedagogical orientations was not statistically significant. However, the results revealed that faculty members from online institutions tended to hold a Relativist
orientation more than faculty members from traditional universities, and these differences were statistically significant.

Table 5

*Faculty Members’ Average Scoring on the Global Pedagogical Orientations*

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Realist</th>
<th>Contextualist</th>
<th>Relativist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>90</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Traditional</td>
<td>53</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>143</td>
<td>146</td>
<td>146</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>2.50</td>
<td>4.13</td>
<td>3.53</td>
</tr>
<tr>
<td>Traditional</td>
<td>2.81</td>
<td>4.61</td>
<td>2.81</td>
</tr>
<tr>
<td>Total</td>
<td>2.62</td>
<td>4.31</td>
<td>3.27</td>
</tr>
<tr>
<td><strong>S.D.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>1.94</td>
<td>1.94</td>
<td>2.09</td>
</tr>
<tr>
<td>Traditional</td>
<td>1.91</td>
<td>1.91</td>
<td>2.04</td>
</tr>
<tr>
<td>Total</td>
<td>1.93</td>
<td>1.94</td>
<td>2.10</td>
</tr>
</tbody>
</table>

**Descriptive Information about the Specific Course Identified by Respondents**

In order to closely examine how faculty members implemented different online assessment strategies, in section 4 of the online survey, the participants were asked to think of a specific course and to provide the name of the course and the online delivery percentages. Figure 5 shows the frequencies and percentages of four different online delivery types (e.g., 100% online, small part online, small part face-to-face, and half-to-half) for the specific courses identified by the faculty respondents in section 4 of the survey. It is clear that when asked to
identify a specific course for which they would describe their assessment decisions, most respondents identified a course that they taught totally online.

Table 6

*Independent-Samples T-tests for the Global Pedagogical Beliefs*

<table>
<thead>
<tr>
<th>Belief</th>
<th>Institution Type</th>
<th>Mean</th>
<th>S.D.</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realist</td>
<td>Online</td>
<td>2.50</td>
<td>1.94</td>
<td>141</td>
<td>-.93</td>
<td>.35</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>2.81</td>
<td>1.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contextualist</td>
<td>Online</td>
<td>4.13</td>
<td>1.94</td>
<td>144</td>
<td>-1.45</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>4.61</td>
<td>1.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relativist</td>
<td>Online</td>
<td>3.53</td>
<td>2.09</td>
<td>144</td>
<td>2.02</td>
<td>.045</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>2.81</td>
<td>2.04</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05.

*Figure 5. The frequencies and percentages of four different online delivery types.*

**Selection of Course Management Systems (CMSs)**

According to the data, most faculty members implemented CMSs in their online teaching and assessment. These CMSs can be classified into the categories of commercial CMSs, open-source CMSs and school-developed CMSs. Commercial CMSs are those CMSs developed by
companies and sold for profit, such as Blackboard. Open-source CMSs are CMSs that were developed by volunteers across the Internet, such as Moodle, Sakai, and ATutor. School-developed CMSs are those that were developed by the schools themselves. Some online institutions and traditional universities are developing their own unique CMS. Faculty members responding this survey expressed a range of positive and negative opinions about the CMSs used at their institution. For example, a professor from Ohio State University said:

Ohio State has its own …course management system called Carmen. And Carmen is a very low technical level course management software application. It has just the basics. You can have a discussion board. But it’s very bare bones. It doesn’t have very many thrills but on the other hand it served our needs quite well. So we were using a system to Ohio State course management system that Ohio State uses.

A professor from an online institution said:

We have a proprietary system that’s about a hundred times better than Blackboard. (I: Wow!) Oh yeah it’s I’ve used Blackboard (and) it is so much better than Blackboard, WebCT, (and) the others out there. It’s proprietary. They spent a lot of money to build it. so nobody else has access to it…which means they can customize it very easily. (I: I see. How do we customize the course management system)? Oh it just takes software engineers writing the code to customize it. (I: Do they get ideas or suggestions from some faculty)? Yes we actually have a faculty committee that provides their input. (I: oh I see). Yeah it’s very, very, very user friendly for both the students and the faculty.

Figure 6 shows the total numbers of faculty members who use different types of Course Management Systems (CMS) from online institutions and traditional universities. (Although Blackboard and WebCT had already merged when I collected this data, there was the possibility
that some institutions were still using WebCT when the data was collected, and therefore I kept the option of WebCT in the checklist). The CMSs listed in the survey of Phase I included Blackboard, WebCT, ANGEL, Sakai, Moodle, ATutor, CLAROINE, and Design2Learn. Nevertheless, other CMSs, such as Web Assign, SCHOLAR, and Carmen, were mentioned by participants in the survey.

Figure 6. Number of faculty members using different types of CMSs.

From this chart, statistically, it is clear that Blackboard and WebCT were the most adopted CMSs. However, data collected from the open-ended questions in Phase I and interviews with participants in Phase II suggests that both traditional universities and online institutions may be tending to move from commercial CMSs to open-source CMSs. In the interview, Professor White stated:

[... ] in fact, let me go there quick. It's a, this is Blackboard Vista, which uh we are not gonna to use in couple of years. We are just discontinuing it and switching to Moodle. Moodle of course does the same thing.
Compared to commercial CMSs, respondents in this study showed considerable preference for open-source CMSs and school-developed CMSs, such as Moodle and Sakai. In some cases, the people developing and refining the open-source software may be the same people who are actually using the software in practice. Therefore, these developers can revise and improve the usability of the system based on their own and other users’ real-life needs. For example, Professor Rice commented:

I think another problem is the, you know, Blackboard because it’s a closed source environment. They don’t have, you know, they don’t have a group of volunteer users who are creating new interface methods, you know …who would like write an interface method for say a new desktop test creation software package, as you would see happen with an open source package like Moodle for instance.

Dr. Morris commented, “[. . . ] we are lucky at Hopkins we have an entire group dedicated to online education. And they’ve developed their own platform.” Costs associated with software licenses and upgrades for commercial products appear to be another consideration when switching from commercial CMSs to open-source CMS. Professor Park explained, “…we moved from Blackboard to Scholar because it’s less expensive.”

**Use of Various Assessment Strategies in the Selected Course**

Question 11 on the survey asked respondents to “Please check each of the following statements if they are true of the course you have in mind.” Table 7 shows the number of the 152 respondents who responded to this item who indicated that they used each of the various assessment strategies listed in the item for various purposes (e.g., self-testing or to measure student learning).
Answers to Research Questions in Phase I

**Question 1a:** What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the discipline, the course level, and the types of online assessment methods and techniques that they implement?

Table 7

*The Number of Respondents for Each of the Online Assessment Strategies with a Certain Purpose*

<table>
<thead>
<tr>
<th>Use of Online Assessment Strategies</th>
<th>Purposes</th>
<th>Online Institutions</th>
<th>Traditional Universities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online quizzes/tests</td>
<td>For students to self-test their knowledge.</td>
<td>32</td>
<td>24</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>I can see how effective my instruction is.</td>
<td>17</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Because it is the best way to determine if students have learned.</td>
<td>13</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Authentic tasks</td>
<td>To assess students' performance.</td>
<td>76</td>
<td>40</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>To provide service learning opportunities.</td>
<td>26</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Because it is the best way for students to learn in this course.</td>
<td>49</td>
<td>28</td>
<td>77</td>
</tr>
<tr>
<td>assignments such as writing an essay</td>
<td>To assess students' knowledge and understanding or completing exercises in written form</td>
<td>64</td>
<td>26</td>
<td>90</td>
</tr>
<tr>
<td>Threaded discussion</td>
<td>In which student contributions are assessed based on the number and quality of responses per week or per topic.</td>
<td>74</td>
<td>23</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>So that students can express their ideas and receive feedback from peers.</td>
<td>70</td>
<td>35</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>So that students can express their ideas and receive feedback from me as the instructor.</td>
<td>57</td>
<td>30</td>
<td>87</td>
</tr>
<tr>
<td>The assignment of students writing Online journals</td>
<td>To foster their self-reflection</td>
<td>14</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>To assess their intellectual development in the course</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>To assess their emotional engagement in the course</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Electronic portfolios</td>
<td>Was not specified in the survey because the length limit.</td>
<td>19</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>online games or simulations</td>
<td>To assess student learning.</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Other online assessment strategies</td>
<td></td>
<td>13</td>
<td>10</td>
<td>23</td>
</tr>
</tbody>
</table>
In order to answer this first Phase I research question, relationships were analyzed between the independent variables of institution type, the nature of the discipline, the course level, and the dependent variables of the variety of online assessment methods and the weight of each online assessment method in the final score of a certain course. To begin, SPSS was used to examine the statistical relationships between the factors of Institution Type, Nature of Discipline, Course Level, online percentage of the delivery of a specific course, and the dependent variables of the variety of online assessment and percentage of use each type of online assessment strategy of the total number of types of online assessment methods. ANOVA method was used to examine these relationships. Before starting the analysis, the skewness and Kurtosis of the dependent variables of total number of types of online assessment strategies were checked to verify that the data were normally distributed so that the analysis could be implemented with the data (please see Table 8 and Figure 7). Missing values were dealt with the listwise deletion strategy on the advice from the statistician consulted for this study.

Table 8

*Descriptive Statistics of Total Number of Types of Online Assessment Strategies*

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Mean</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid N (listwise)</td>
<td>154</td>
<td>3.29</td>
<td>-.25</td>
</tr>
</tbody>
</table>
According to the results of these ANOVA analyses, statistically significant relationships existed between the following pairs of variables as shown in Table 9. From this table, we can see that the factor of institution type had statistically significant effects on the percentage of using online quizzes and authentic tasks in the specified course that the participants chose in the survey. Similarly, discipline category, online delivery percentage, and course level each had their effects on either the variety of online assessment strategies or use of a certain online assessment strategy in a specific course.

Before commencing data analysis, I would have assumed that as the “online” nature of a course increases, more online assessment strategies would be used in that course. However, as illustrated in Figure 8, courses that were delivered half-online and half-in-the classroom implemented the greatest variety of online assessment strategies. Courses delivered 100% online used almost the same amount of online assessment strategies as those courses delivered almost
purely online but with some face-to-face components. The courses delivered primarily face-to-face with small online components used the least number of online assessment strategies. The study found the relationship between percentage of online delivery and variety of online assessment to be non-linear; this irregular relationship contradicts the expected relationship of an increase in variety of assessment as percentage of online delivery increases.

Table 9

*Statistically Significant Relationships Discovered by Using ANOVA Analyses*

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>df</th>
<th>N</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution Type</td>
<td>Percentage in the final score of a specific course</td>
<td>1</td>
<td>77</td>
<td>4.803</td>
<td>.031</td>
</tr>
<tr>
<td></td>
<td>Online Quiz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Authentic Tasks</td>
<td>1</td>
<td>107</td>
<td>5.075</td>
<td>.026</td>
</tr>
<tr>
<td>Discipline Category</td>
<td>Variety of Online Assessment</td>
<td>7</td>
<td>145</td>
<td>3.193</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Percentage of E-portfolio in the final score of a specific course</td>
<td>7</td>
<td>27</td>
<td>3.869</td>
<td>.008</td>
</tr>
<tr>
<td>Course Level</td>
<td>Percentage of writing assignments in the final score of a specific course</td>
<td>2</td>
<td>87</td>
<td>4.182</td>
<td>.019</td>
</tr>
<tr>
<td>Online Delivery</td>
<td>Percentage of online discussion in the final score of a specific course</td>
<td>4</td>
<td>106</td>
<td>3.930</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>Variety of online assessment</td>
<td>4</td>
<td>147</td>
<td>8.422</td>
<td>.000</td>
</tr>
</tbody>
</table>

*p<.05*
One of the most interesting relationships examined in this study is the one between the variable of institution type and the variable of variety of online assessment methods for a specific course. Although the average number of assessment methods used by respondents teaching at online institutions was higher (3.45) than the average number used by survey respondents teaching at traditional institutions (3.01), statistical analysis (see Table 9) showed that this difference was not statistically significant at the recommended $p=<.05$ level.

After this analysis, in order to justify further statistical analyses, the distribution of the dependent variables for the percentages of each online assessment strategy in the final score of a specific course were examined by considering their skewnesses and kurtosises (please see Table
Table 10

Independent-Samples T-test for the Effects of Institution Type on the Variety of Online Assessment Strategies

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>95</td>
<td>3.45</td>
<td>1.29</td>
<td>1.88</td>
<td>152</td>
<td>.06</td>
</tr>
<tr>
<td>Traditional</td>
<td>59</td>
<td>3.01</td>
<td>1.55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10 for the findings). According to the frequency analysis of each data set for the percentages of each online assessment strategies, the distributions of the percentages for all eight online assessment strategies did not satisfy the normal distribution assumption for the linear regression analysis and analysis of covariance. Linear regression analysis and analysis of covariance could not be used to analyze the relationships between the independent variables mentioned at the beginning of this section (institution type, the nature of the discipline, Internet Literacy, and the course level), and dependent variables of percentages of online assessment strategies.

Following the recommendation of my statistical consultant, the relationships between the independent variables of institution type, course level, the nature of the discipline, and the dependent variables of the purposes of using different online assessment strategies and methods, the analytic procedure of crosstabs with Chi-Square were performed among these variables. According to the analysis, statistically significant relationships existed between the variables of institution type and use of authentic tasks for students learning, institution type and use of essays as an assessment method, institution type and use of online discussion as an assessment method and class collaboration tool.
Table 11

*Descriptive Statistics of Online Percentages of Each Online Assessment Strategy*

<table>
<thead>
<tr>
<th>Percentage</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Quiz</td>
<td>78</td>
<td>90</td>
<td>23.82</td>
<td>1.26</td>
<td>1.35</td>
</tr>
<tr>
<td>Authentic Tasks</td>
<td>108</td>
<td>100</td>
<td>38.66</td>
<td>0.55</td>
<td>-0.14</td>
</tr>
<tr>
<td>Essays</td>
<td>89</td>
<td>80</td>
<td>33.61</td>
<td>0.59</td>
<td>-0.6</td>
</tr>
<tr>
<td>Online Discussion</td>
<td>107</td>
<td>57</td>
<td>22.29</td>
<td>0.67</td>
<td>0.77</td>
</tr>
<tr>
<td>Online Journal</td>
<td>22</td>
<td>60</td>
<td>14.36</td>
<td>1.66</td>
<td>2.81</td>
</tr>
<tr>
<td>E-portfolio</td>
<td>28</td>
<td>100</td>
<td>19.29</td>
<td>2.08</td>
<td>6.13</td>
</tr>
<tr>
<td>Online Game Simulation</td>
<td>16</td>
<td>20</td>
<td>4.38</td>
<td>1.49</td>
<td>2.32</td>
</tr>
<tr>
<td>Other Assessment Strategies</td>
<td>38</td>
<td>100</td>
<td>25.74</td>
<td>1.65</td>
<td>2.64</td>
</tr>
</tbody>
</table>

Figure 9 and Table 12 show that the percentage of faculty from online institutions who used authentic tasks to provide service learning opportunities was statistically greater than that of the percentage faculty from traditional institutions. Among 95 faculty members from online institutions, 27.4% of them used authentic tasks to provide service learning opportunities.
However, only 11.7% of the 60 faculty members from traditional institutions used authentic tasks to provide service learning opportunities.

Table 12

*Crosstab Analytic Results between Institution Type and Using Authentic Tasks to Provide Service Learning Opportunities*

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Used Authentic Tasks as Service Learning</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Total</td>
</tr>
<tr>
<td>Online</td>
<td>69</td>
<td>26</td>
<td>95</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>72.6%</td>
<td>27.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Count</td>
<td>53</td>
<td>7</td>
<td>60</td>
</tr>
<tr>
<td>Traditional</td>
<td>53</td>
<td>7</td>
<td>60</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>88.3%</td>
<td>11.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Count</td>
<td>122</td>
<td>33</td>
<td>155</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>33</td>
<td>155</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>78.7%</td>
<td>21.3%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 5.410. \]

*p=.020<.05.

Interestingly, the result illustrated in Figure 9 seems to align with the earlier analysis result of statistically significant difference in terms of pedagogical beliefs toward Relativist Perspective from both types of institutions. Faculty from online institutions valued the belief of the Relativist Perspective more than faculty from traditional universities. Faculty members from online institutions believed more in vignette 3 which states:
They have to figure it out on their own, taking into account the events that shape their lives, even if the uncertainty of living in a world with conflicting views of truth bothers them. What I know and believe shouldn't really influence my students. My job is to create an environment where students can learn to think independently and take nothing for granted.

![Bar chart showing percentages of faculty members that used authentic tasks as service learning opportunities in each type of institution.](image)

**Figure 9.** Percentages of faculty members that used authentic tasks as service learning opportunities in each type of institution.

Use of authentic tasks to provide learning opportunities reflects the Relativist Perspective as explained in vignette 3. It appears that a faculty member who believes strongly in the Relativist Perspective is more likely to use the assessment strategy of authentic tasks to provide service learning opportunities to his/her students.

According to Table 13 and Figure 10, the percentage of faculty from online institutions who used essays to assess students was statistically greater than that of the percentage of faculty from traditional institutions. Among 95 faculty members from online institutions, 67.4% used
essays to assess students’ learned knowledge. Meanwhile only 43.3% of the 60 faculty members from traditional institutions used essays to assess students’ knowledge.

Table 13

*Crosstab Analytic Results between Institution Type and Use of Essays to Assess Students’ Knowledge and Understanding*

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Used Essays to Assess Students</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>Count</td>
<td>31</td>
<td>64</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>% within institution Type</td>
<td>32.6%</td>
<td>67.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Traditional</td>
<td>Count</td>
<td>34</td>
<td>26</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>% within institution Type</td>
<td>56.7%</td>
<td>43.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>65</td>
<td>90</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>% within institution Type</td>
<td>41.9%</td>
<td>58.1%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 8.725. \]

*p=.003<.05.*

*Figure 10. Percentages of faculty members that used essays to assess students’ learning.*
Table 14 and Figure 11 illustrate that the percentage of faculty from online institutions who used online discussion to assess students based on number and quality of posts was statistically greater than that of faculty from traditional institutions. Of 95 faculty members from online institutions, 77.9% used online discussion to assess students’ learned knowledge, whereas only 38.3% of the 60 faculty members from traditional institutions used online discussion as an assessment tool. Similarly, faculty members ‘beliefs toward the Relativist perspective could explain the differences between faculty members’ use of online discussion to assess students’ learned knowledge. Online discussion provides students with opportunities to express their own opinions as well as to learn opinions from others. Such interaction also provides opportunities for students to compare and identify relevant opinions based on their own knowledge and judgments. Based on this study, a faculty member who believes in the Relativist position may find online discussion to be a useful way to assess students’ learned knowledge.

![Bar Chart](chart.jpg)

**Figure 11.** Percentages of faculty members who used online discussion to assess students based on the number and quality of responses.
Table 14

*Crosstab Analytic Result between Institution Type and Use of Online Discussion to Assess Students Based on the Number and Quality of Responses

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Count</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td></td>
<td>21</td>
<td>74</td>
<td>95</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>22.1%</td>
<td>77.9%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td></td>
<td>37</td>
<td>23</td>
<td>60</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>61.7%</td>
<td>38.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>58</td>
<td>97</td>
<td>155</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>37.4%</td>
<td>62.6%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

$\chi^2=24.578$.

*p=.000<.05.

Table 15 and Figure 12 illustrate that the percentage of faculty from online institutions who used online discussion for student expression and peer review was statistically greater than that of the percentage of faculty from traditional institutions. Among 95 faculty members from online institutions, 73.7% used online discussion to provide students with opportunities for peer interaction, whereas only 58.3% of the 60 faculty members from traditional institutions used online discussion for peer interaction.
Figure 12. Percentages of faculty members who used online discussion for students’ expression and peer review.

Table 15

Crosstab Analytic Result between Institution Type and Use of Online Discussion for Students to Express their Ideas and Receive Feedback from Peers

<table>
<thead>
<tr>
<th></th>
<th>Used Online Discussion for Expression and Peer Review</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Total</td>
</tr>
<tr>
<td>Institution Type</td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online</td>
<td>25</td>
<td>70</td>
<td>95</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>26.3%</td>
<td>73.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Traditional</td>
<td>25</td>
<td>35</td>
<td>60</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>41.7%</td>
<td>58.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>105</td>
<td>155</td>
</tr>
<tr>
<td>% within institution Type</td>
<td>32.3%</td>
<td>67.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

$\chi^2 = 3.966.$

*p = .046 < .05.*
Perspective may explain this difference between faculty members from the two types of institutions. However, it is worthy of note that more faculty members in traditional universities used online discussion as a tool for students to express themselves and to receive feedback from their peers’ (58.3%) than those who used online discussion to assess student progress according to the number and quality of responses (38.3%). The differences in scores of faculty members from traditional universities toward the beliefs of Realist and Contextualist may explain this variation. The average score of faculty from traditional universities on belief of Realist was 2.507, whereas the average score of those faculty members on belief of Contextualist was 4.61. According to the vignette of Contextualist belief, faculty members believe in this perspective will think that:

I can teach them some of these skills, but some they will have to learn by working with other students, or on their own. I believe that each student will bring a unique and valuable perspective with them. I try to structure my class so that students will pool their resources and come to the best understanding possible.

Use of online discussion as a tool for expression and peer review may reflect a contextualist epistemological orientation and it can explain why there were more faculty members used online discussion as a tool for peer review and self-expression than as a tool to assess students’ learning progress.

Crosstab analysis was also performed between course level and the types of online assessment implemented by faculty members. Statistically significant relationships were found between the variable of course level and the variables of using authentic tasks to assess students’ performance, using authentic task to provide service learning opportunities and using online discussion for students to communicate with the instructor. As illustrated in Figure 13-15
presented below (to view detailed statistical results, please see Tables II-I3 in Appendix I), it can be concluded that courses at the graduate level tended to be more student-centered (using authentic task to assess students’ performance), formative (online discussion for the students to communicate with the instructor), and outcome-based (using authentic tasks to provide service learning opportunities).

![Figure 13](image13.png)

**Figure 13.** Percentages of courses that used authentic tasks to assess students’ performance.

![Figure 14](image14.png)

**Figure 14.** Percentages of courses using authentic tasks to provide service learning opportunities.
Figure 15. Percentages of courses that used online discussion for students to express ideas and receive feedback from the instructor.

As illustrated in Figure 16 presented below (to view the detailed statistical results, please see Table I.4 in Appendix I), graduate courses tended to use more online game simulation to assess student learning.

Figure 16. Percentages of courses that used online game simulation to assess student learning.
The relationships between the percentage of the course that was delivered online and the type of online assessment strategies were also analyzed using Cross Tab and Chi-Square. Statistically significant relationships were found between the percentage of online delivery and use of online quizzes; percentage of online delivery and use of authentic tasks to assess student performance; percentage of online delivery and use of online discussion to assess students learning; percentage of online delivery and use of online discussion for students to post comments and to receive feedback from peers; percentage of online delivery and use of online discussion for students to receive feedback from the instructor; percentage of online delivery and students’ use of an online course journal to assess their intellectual development. An interesting observation is that, as illustrated in Figure 17-23 (please see Appendix I for detailed statistical results in Tables 15-I11), the relationships between the situation of using a certain online assessment strategy and the percentage of online delivery are not always linear, and are not always consistent across different situations. For example, for the situation of using online quizzes for instructional effectiveness, faculty members who taught courses half-online-half-in-classroom were the highest percentage (63.6%), whereas faculty members who taught courses mostly online were the second lowest (28.6%) (Please see Table 15 and Figure 17). On the other hand, for the situation of using authentic tasks for the purpose of student performance assessment, faculty members who taught courses 100% online were the most (81.7%), whereas faculty members who taught courses mostly online were the second (78.6%) (Please see Table 16 and Figure 18).
Figure 17. Percentage of courses that used online quizzes for instructional effectiveness with different online delivery percentages.

Figure 18. Percentage of courses that used authentic tasks to assess students’ performance with different online delivery percentages.
Figure 19. Percentages of courses that used online discussion to assess students based on quality and number of responses with different online delivery percentages.

Figure 20. Percentages of courses that used online discussion for posting comments and receiving feedback from peers with different online delivery percentages.
Figure 21. Percentages of courses that used online discussion for feedback from the instructor with different online delivery percentages.

Figure 22. Percentages of courses that used online course journal to assess students’ intellectual development with different online delivery percentages.
Figure 23. Percentages of courses that used an online course journal to assess emotional engagement of the course with different online delivery percentages.

Question 1b: What statistically significant relationships are found among faculty members’ experience and expertise with computers and the Internet, and the types of online assessment methods and techniques that they implement?

In order to answer the second question in Phase I, regression analysis was conducted to examine the correlation between the factor of Internet Literacy, and the factor of variety of online assessment methods that had been used in a specific course. Internet Literacy significantly predicted the variety of online assessment methods $\beta = .044$, $t(144) = 4.129$, $p < .001$. Internet Literacy also explained a significant proportion of variance in variety of online assessment methods, $R^2 = .106$, $F(1, 144) = 17.046$, $p < .001$.

To look at the relationships between faculty members’ Internet Literacy and the weights of the online assessment strategies in the final score of a specific course, linear regressions were conducted between the Internet Literacy and the eight dependent variables of the weights of eight types of online assessment strategies. However, statistically significant correlation was only
found between Internet Literacy and Percentage of Authentic Tasks (F (1, 67)=4.631, p=.035).
No statistically significant correlations were found between Internet Literacy and the other seven types of online assessment strategies (essays, online discussions, online quizzes, online journals, online games, writing assignments, e-portfolio).

Research Question 1c: What statistically significant relationships are found among faculty members’ epistemological beliefs and pedagogical orientations and the types of online assessment methods and techniques that they implement?

To answer the third question in Phase I, Pearson correlations were calculated between the independent variables of the scores of the three global pedagogical beliefs (Realist, Contextualist, and Relativist) and the dependent variable of total number of online assessment strategies. The correlations showed that none of these three independent variables were correlated with the total number of types of online assessment strategies (r=.0.232, r=0.178, and r=0.085). Therefore, the regression analysis between the variables of pedagogical beliefs and the variable of total number of online assessment strategies would be of little use to the study.

Beliefs about Online Teaching and Online Assessment

This section addresses research question 2a: What are faculty members’ perceptions of the role of assessment within their courses?; and 2b: How do epistemological worldviews and pedagogical orientations affect decisions faculty members make regarding online assessment? When asked about their beliefs about online teaching and online assessment, the faculty members as a whole pointed their comments toward several sub-categories of belief. These sub-categories included: their choice of pedagogical orientations; their beliefs toward the roles of faculty members in online teaching and online assessment; their beliefs about test dishonesty in
an online learning environment; their beliefs toward the role of technology in online learning and online assessment; and their beliefs about instructional design.

**Faculty Members’ Pedagogical Orientations**

As discussed earlier in the beginning of this chapter, there is no statistically significant difference between Realist beliefs held by faculty from online and traditional institutions or between Contextualist beliefs held by faculty from online and traditional institutions. However, a statistically significant difference was found between the mean number of Relativist beliefs held by faculty from online institutions and by faculty from traditional universities. A theoretical assumption of this study was that a certain type of faculty members may possess fixed pedagogical beliefs and these pedagogical beliefs should hence shape their way of teaching and assessing. However, the qualitative data analysis of both Phase I and Phase II suggests that their beliefs were not fixed, but instead varied by contextual variables such as the content of the course and nature of the students in the course.

Data analysis of faculty members’ comments in the online survey of Phase I and interview transcriptions in Phase II provided some interesting insight into their preferences toward pedagogical orientations in online teaching. The faculty members selected their preference for each of three pedagogical beliefs in teaching and assessment depending on the nature of the course subjects and the demographic characteristics of the group of students. For example, a professor from a traditional university commented at the end of the three vignettes of pedagogical orientations of the survey:

> Since I teach four different types of courses (intro survey, methods, lab, field work, theoretical versus applied), it was difficult to agree completely with any one approach,
since it would vary by type of course how much students could learn on their own and how much I as instructor have to "teach" or guide them.

Similarly, a faculty member from an online institution left the following comment in the online survey after finishing the pedagogical orientation section:

I teach in various doctoral levels, including entry, transition, clinical and Ph.D. so there is some variation in how much self directed learning is incorporated into the class—generally, the emphasis is on having students gain an understanding of 'how' to think, rather than 'what' to think.

Data analysis of the interview transcriptions also provided similar information. For example, Professor Morris, who taught at a traditional university, explained the reason why he assigned four points each to realist and contextualist pedagogical orientation but only two points to relativist pedagogical orientation based on the nature of the course that he was teaching:

Well, uh, I do in statistics there are some hardcore facts. That everyone agrees on. The method the mathematics at the same token that is the realist part…at the same token it’s not pure mathematics we apply mathematics but then have to make interpret the results…and the interpretation is not mechanical like the mathematics so it will involve context, substantive understanding, etc and there’s where the contextualist part. And then the relativist well you know there a variety of ways to understand these including statistics and now it does come and go. However you know again the underpinning of what I’m teaching is founded in rules that are not wavering so I thought, you know, as opposed to if you were doing a political science course or something that was fully informed by, you know, temporal things.,
Dr. Morris, who as noted above taught in a traditional university, chose realist and contextualist as his primary pedagogical beliefs based on his understanding of the nature of the subject that he taught, statistics. Another instructor, Dr. Louis, who also taught in a traditional university, chose contextualist beliefs. She stated why she chose contextualist over the other two pedagogical beliefs, based on the characteristics of her students and the nature of the knowledge and skills that were taught in this class:

[...] because we had some of the students were professionals and some were teachers and some were in different stages in their life, I wanted to make sure that what they were learning would be directly relevant to what they were doing and to where and to their needs. And so I think I guess I see myself more in vignette number two (contextualist). (Me: I see. And why didn’t you choose number one or number three can you please tell me about that)? I don’t see it necessary for me—perhaps maybe in an undergraduate class or at the high school level or something it’s more important for me to be an authority — but in all likelihood especially with a graduate level class, by providing various selection of materials that I’ve provided to them, I was making a statement about what I felt was most important for them to gain.

Beliefs on Roles of Faculty Members in Online Teaching and Online Assessment

Most faculty members appeared to believe that their roles in online teaching and online assessment were to support students’ learning whether they were from traditional universities or from online institutions. For example, Dr. Prechet from a traditional university said in the interview, “my role in the instructional process is to facilitate. So I think that my role is to help them to learn at the speed that they find most comfortable.” Faculty members also seemed to believe that students in online classes should assume a different role than they do in face-to-face
classes. Dr. Rice argued in the interview, “In the online classes its more self directed, more self paced than my in-person classes have been because students are responsible for motivating themselves to absorb a lot of material.” Several professors mentioned their “intervening” and “monitoring” behaviors during the online discussion of the class: Dr. Franklin said, “I’ll watch the small groups, but I won’t intervene unless they are not getting anywhere. But in Psych. and Soc. I participate in my forum prompts on each week’s discussion board.” Dr. Smith explained, “And so I’m evaluating their discussions and prompting them with questions and prompting them with discussion. So my main role during the class will be monitoring the discussion boards and then developing the midterm and the final.”

Respondents also expressed the belief that the main purpose of their teaching was to teach students higher level thinking and problem solving skills, instead of merely facts and knowledge. A professor from an online institution commented in the survey, “I feel my biggest job is to teach students to build from basic facts and create syntheses that will help them in dealing with the problem solving that they will face every day.”

It is interesting that, similar to the findings about faculty members’ pedagogical beliefs, faculty members adjusted their roles in different courses according to the nature of the students in the classes and the nature of the courses themselves.

**Perceptions and solutions toward test dishonesty**

For as long as tests have existed, academic cheating and plagiarism have been problems. Students may cheat on a test or assignment due to fear of failure, stress, desire to obtain the certificate for which the test is taken, etc. Instructors and/or institution administrators, on the contrary, have tried to find solutions to prevent students from cheating on tests. Cheating, and counter-cheating measures sometimes constitute a battle between test makers and students.
However, for those who have a traditional view towards assessment and academic cheating, in the online environment, cheating and plagiarism may seem even easier for those who intend to do so, due to the lack of physical presence of authority figures and the convenience of the Internet as a communication tool and source of enormous amount of information. Professor Louis commented:

And some students you know it’s easy to deceive I shouldn’t say it’s easy but it’s easier to deceive if the student is that kind of person it’s easier deceive someone online than it is in person. So I think one of the challenges that we have is gauging the genuine ability and or interest of the student when we can’t see and talk with them.

It has been suggested that the main reason for people to suspect the credential of online education comes from the assumption of higher rate of academic cheating and lower reliability of online assessment (Hart & Morgan, 2010). Shall we really assume that online education is less trustworthy just because the assessment process is not face-to-face and students are not watched when they are taking the tests and finishing the homework? Analysis of the qualitative data from Phase I and Phase II provides mixed perspective on this question. First, opinions from participating professors suggest that there are multi-levels of standards toward defining test-dishonesty and plagiarism in environment of online learning. According the professors in this study, some held very strict standards toward test dishonesty and cheating, and they definitely agreed that tests and exams in an online program should be monitored—which includes the use of human proctors, video cameras, and specialized software. For example, Dr. White described the proctor strategy she used for her online courses:

[... ] and for people that are taking exams on the computer you know where it’s much more likely that they can go somewhere and look at Wikipedia or something and get an
answer—you know. The proctor sits at a desk where he can see what’s on everybody’s screen. So he can see immediately if they’re doing something they shouldn’t on the computer you know other than doing their tests. So and the students taking the exams know that all these safeguards are in place. So the kind of good thing is that they don’t really know when they are being viewed on a camera or when their computer’s being viewed. But they don’t want to take the risk. If they do they get a zero.

Some professors abandoned use of quizzes and tests in the online environment because they were worried that students could use textbooks while they were taking an online test. Dr. Smith explained why she did not grade the online quizzes and tests in her online course:

I’ve taken online classes before and they I know it’s feasible to grade a student fairly with online quizzes and tests, but I also know that the students can also look at their books or look at their notes while taking an online quiz or test. And so I haven’t gone into having students do online quizzes and tests for a grade yet. I just have them do it for practice.

Some professors, while still implementing online quizzes, choose to limit the time length that a quiz can be taken and believe this strategy can prevent students from looking up in textbooks. Dr. Park described how the big number of the test items in her online quizzes help to prevent test dishonesty:

[. . . ] so that they have to know the material there’s no time to look it up in the books. Even though they can have their book and they can have whatever pages open on the website they can have their textbooks with them but there’s no time to look things up. There’s time to check a date of a theorist or there’s you know to check that there were four tenors not five tenors you know in a theory.
However, other professors view looking up in textbooks and notes as a way of learning.

For example, Professor Park commented:

I don’t think looking in the book and reading your notes is cheating. Because I want them to be able to find the material and be confident so then on the final they know that they’ve already been tested on this and they feel more confident and they….a better….is better on the final.[. . . ] And I mean they still have their text and notes and everything there, but they are feeling pretty confident because nothing’s really going to be a surprise. I know that sounds bad, but I’m not too worried about the cheating because yeah… but I’m happy for them to know where to look for it because it means when they need to use it later in the field, they can look it up. They know where to find it. Even if they don’t have it memorized. I’m not worried it’s not memorized it’s just something they forget it. If they know where to find it or they have an example well then they can explain it in a better way that’s ok.

A few professors took an even bigger step and allowed their students to work together during online tests or when finishing their course assignments. For these professors, the main purpose of online tests and assignments was to help students to learn course content and to learn how to collaborate with each other. Collaborating with their classmates during tests and finishing their assignments represents a new interpretation of academic honesty in which the students learn the course content and skills. For example, a professor answered to one of the open-ended questions in the online survey:

I would like to see a better collaborative feature that allows students to collaborate better on quizzes/tests and projects. I feel it’s important that students be able to work in a team-based environment which will better prepare them for the "real world."
Suggested Improvements

In this section, research questions of 2a, 2b, and 2c will be answered together because faculty members usually suggested improvements for online assessment tools with the context of CMSs. Faculty members also suggested new functions and/applications to be added to the current online assessment technique menu when they answered questions about improvements on current CMSs. These three research questions are:

2a) What areas of improvement do faculty members perceive for online assessment tools?
2b) According to faculty members’ perceptions, what improvements should be made to the assessment functions in current course management systems (CMSs)?
2c) What new functions and/or applications should be added to the current online assessment technique menu?

Course Management Systems (CMSs) and Online Assessment within and without CMSs

Online Assessment Practices within/without CMSs

Currently, most CMSs provide a variety of tools to facilitate the delivery of courses, communication and collaboration among course participants, and assessment of students’ learning. Faculty members in this study suggested numerous ways to assess students using the functions provided by CMSs. These functions include quiz-makers, auto-grading, blogs, discussion boards, electronic portfolios, assignment drop-box, etc. The following sections discuss the faculty’s use of these tools. Although sometimes faculty implemented these online assessments without using a CMS, most were implemented using the available features of the
CMSs. Therefore these online assessment practices are discussed here with the discussion of CMSs.

From the surveys, we see that faculty members use these tools in the following order of frequency: Online Discussion (80%), Authentic Task (79.35%), Essay (58.71%), Online Quiz (47.10%), Electronic Portfolios (20%), Online Journal (18.71%), Other Assessment Strategies (14.19%), and Online Game (9.68%). This order of frequency is shown in both total numbers and percentage of use in Figure 24:

![Figure 24. Frequencies of use for each type of online assessment strategy.](image)

**Use of Online Discussion**

According to the interviews, online discussion was the most favored online assessment strategy. Faculty used it to monitor students’ learning progress and engage students in learning and receive feedback about the instruction. For example, Dr. Franklin described how she felt seeing an improvement in the mean scores of the students engaged in online discussion assessment during the semester as providing valuable feedback about her own teaching:
… (the calculation from the rubric) can give me an aggregated number that I can use in figuring out for that week what was the mean point value of the responses or posts that I got that week. So if I want to see if the group mean has gone up since the beginning of the year and actually they did -- from about the mean response being 3.5 to the mean response being 9 -- or higher than that…that’s a personal evaluation of myself and my learning and my own teaching.

However, the actual implementation of online discussion as an assessment strategy still varied greatly among faculty. First of all, some professors counted students’ performance in online discussion toward the course’s final grade; however, some others chose not to do so.

Even among those professors who included online discussion in their students’ final grades, their methods of grading differed. Some professors only graded on the basis of quantity of the posts. Some evaluated both the content and the quantity of students’ posts. Furthermore, some used a rubric, but others did not. For example, Dr. Franklin used a rubric based on Bloom’s Taxonomy to grade her students’ posts in the online discussion board.

A common emphasis of grading online discussions was the presence of interaction and collaboration during online discussions. Some professors required students to both post initial statements and respond to their peers’ posts. For example, Dr. Louis asked her students to respond to two of their peers:

Each response was graded for its content or depth of understanding and for its timeliness… and then there was a requirement of course of responding to two of their peers, so essentially the nature of their initial response was graded as well as the timeliness. And then their two responses to their peers so there was both. They were
graded on both the participation— the timeliness with which they responded to the other— and their own initial post.

However, Dr. Smith did not specify a requirement for the number of responses to peers’ posts. He said he expects to see that students make useful responses that connect their opinions about the course with their peers’ posts; he does not want to see that students simply comment to be given credit for completion of the activity.

**Use of Authentic Tasks**

Although Authentic Tasks were listed as the second most frequently used online assessment strategy according to the results of the online survey, the interviews showed that this type of assessment was usually mixed with other types of assessment. After assigning authentic tasks to their students, the faculty tended to use a number of different formats to assess the results of student performance on these tasks, such as essays, journals, etc. For example, Dr. Smith, who was teaching a course titled Community General Health, asked her students to create a lesson plan and then present it to the community. However, she graded the essays that students wrote about the presentation of the lesson plan, “I am not grading their presentation I’m grading their paper. And so their paper outlines everything that they would do for their presentation.” Another professor commented in one of open ended questions of the online survey, “…For the question below, my students place some of their authentic tasks in their e-portfolios for assessment, so it's unclear how to divide the percentages.” Dr. Black used virtual labs and online simulation to assess her Biology students’ performance on authentic tasks.

Qualitative data shows that faculty members who participated in this study were very fond of authentic tasks as an online assessment strategy. Still, the formats of their approaches to
the evaluation of students’ performance on authentic tasks were limited. Faculty members’ definition of authentic tasks might vary from the definition used by this study; however, the interviews in Phase II did not invite faculty members to talk about their understanding of the meaning of authentic tasks as an online assessment tool. Most of the faculty members in the interview mentioned that they used essays as the primary strategy to assess students’ performance on authentic tasks. Only one professor mentioned use of online simulation to assess the performance of authentic tasks. This limitation could be the result of the technical barriers of Internet connection speed; difficulties in creating online interactive activities, etc. Based on the analysis results of this study, authentic tasks appears to be unique separate tasks from other online assessment strategies because they maintain unique and independent roles outside of other online assessment strategies.

*Use of Online Quiz and Auto-grading*

Most CMSs provide auto-grading with online quizzes. When faculty members discussed online quizzes during the interview, the most frequently referred to question type was multiple-choice items. According to the interviews, there are several reasons for faculty to choose multiple-choice questions as the major type of questions for online quizzes. First, multiple-choice questions can easily be auto-graded by CMSs, which can reduce a faculty member’s workload. For example, Dr. Rice stated, “I grade the online quizzes. Well, I should say that Blackboard grades them for me because they are multiple-choice. And those grades go automatically into the grade book.”

Second, faculty stated that the use of multiple-choice questions can be easily administered online, and that application provided immediate feedback to students. For example,
Dr. Morris explained the reasons why all his online exams were multiple-choice exams: “First of all given the sheer volume of students, this is the most efficient way to provide reasonably-timed feedback. Secondly, in the online framework, these things can easily be administered online.”

Third, faculty appeared to believe that if used appropriately, multiple-choice items can assess student learning as efficiently as other question types. Some professors stated that multiple-choice questions were an efficient way to assess conceptual knowledge. Statistics professor, Dr. Morris said, “Because my interests are more conceptual, do they understand the underlying ideas…so I think I can, I think I can get a reasonable sense of that through multiple-choice.”

Other professors maintained that if written carefully, multiple-choice questions can evaluate middle level or even higher level thinking. Dr. Park, who was teaching a behavioral course related to music, argued that his use of multiple-choice questions that covered a broad range of difficulty levels led to students’ use of higher-order thinking.

Instead of testing what they know, I write multiple-choice questions on a variety of levels, so I would say what would be the best application of the theory… and they need to have to know the best replication and that’s the higher order of thinking.

When using multiple-choice items in their online quizzes, in order to reduce the possibility of test dishonesty, faculty usually chose to use the random test-generating function in CMS, to set up quizzes. Some professors expressed the belief that these randomly-generated question sets could reduce the risk of cheating, but others used this strategy to require students to see and practice a variety of test items and therefore help them to learn the content. Dr. Rice explained how he allowed his students to attempt each quiz three times, so his students could learn better:
The primary reason is because I have been trying to get my instruction gradually over time into what I understand to be a mastery model of learning where you keep getting questions and you keep practicing until you get an A.

Although ready-to-use question banks are usually available with the textbooks on the market, many professors chose to write their own questions instead of using those created by textbook authors. As Dr. White explained:

I don't believe in using questions that come up with the textbook. I hate those ‘cause I never think they are as good as I could write. (laugh). And of course they don't always come exactly that the things I want you know in the same way.

Use of Electronic Portfolios and other Online Assessment Strategies

The electronic portfolio is another popular tool that faculty use to assess students’ learning in online courses. Faculty also use electronic portfolios as a program accreditation tool. In addition, students can use electronic portfolios as a job search tool. Grading of these e-portfolios was based more on the completion of each required element in the portfolios, and faculty tended to take a holistic view of the entire e-portfolio instead of looking into details of each individual element. For example, Dr. Park explained how she evaluated the e-portfolios of the class, “…when the course is graded it’s graded on pass fail basis. So students complete the portfolio they pass, and if they don’t, they fail…”

Other online assessment strategies used by faculty included Blogs, Wikis, online games, and other emerging Internet applications. Some faculty let their students use Blogs to reflect on their learning and connect their learned knowledge to their daily lives. A few faculty members used Blogs for students to practice their writing skills. No matter what faculty members’
motivations for using Blogs were, Blogs typically accounted for a small portion of students’ final grades. Some respondents used Wikis to assess students’ group work. The grading of students’ Wiki works was very similar to those of Blogs except for the grading of the collaboration portion related to Wikis.

**Suggested Improvements of CMSs from Faculty Members**

According to the interviews and the answers to the open-ended questions in the online survey, current CMSs, especially their functions related to online assessment, do not satisfy faculty members. A respondent in the survey complained:

> The assessment tools I have used in the past are not streamlined enough to make course and evaluation design easy enough for instructors that are just a little computer phobic. Too many times, a slight mistake can negate a body of work. Creating quizzes and tests is slow and tedious.

Some faculty members claimed that the software designers of the CMSs were not considering the actual needs of the users:

> At times I wonder if the designers have real world experience. For example, when entering in grades into Bb's new grading center, the program now needs to save each student's score, which takes a few seconds. Before it was easy to tab through the grade sheet and get the scores entered. I think an understanding of how to make this easier for a teacher with lots and lots of students is important to keep in mind...

Based on participants’ responses in the online survey and the interviews, faculty members suggested improvements on the following aspects of current CMSs:

1. **Usability/interface.** Faculty members generally felt that the current CMSs were too complex to use. They wished that the process necessary to access a needed page
could be more streamlined. They also wished that the visual alignment of the CMS interface could be simplified as well.

2. Test Dishonesty Prevention. Some faculty members desired that the CMSs could provide better ways to prevent test dishonesty. For example, one faculty member wished there was a way to prevent students to print the test feedback and keys to the test items.

3. Support for Multimedia and Interactivity. Faculty wanted to use more multimedia features, such as camera recorded video files, audio, and flash animations in online delivery and assessment. Faculty members also wished to have more “virtual face-to-face” capabilities. Some faculty members who taught lab-related courses also suggested interactive simulations so students could practice the lab process in simulated uses.

4. Better support to Quantitative/Math Functions. Some faculty members who taught math or other subject areas which related to math equations wished that current CMSs could have better support with embedding math or statistics equations into their test items. They also wished that there would be more flexibility with the format of the answers when they create multiple-choice items in the online quizzes.

5. Enhancement of Collaboration Features. From the qualitative data, faculty members valued collaboration in the online assessment process greatly. As mentioned in the discussion of faculty members’ attitudes toward test dishonesty, many professors actually wished to encourage students to work together during online tests because collaboration is a necessary skill for students to succeed in their future career.
6. Flexible Feedback Features. Faculty members wished to have more variety in terms of giving students feedback. For example, one faculty member mentioned, “In the context of written work, I would like to have the ability to virtually write on a student's paper.”

7. Enhancement of data gathering about students’ activities. Faculty members wished that CMSs could offer more sufficient ways to collect data about students’ activities within the online course, such as the log in/off time, the numbers of posts, the time length for a single log in. Faculty members suggested that these data could provide better way to monitor students’ learning progresses and these data could be another way to assess students’ learning.

8. Job Aids/tech support. Faculty members generally suggested that the current job aids and training for the use of CMSs were not sufficient. Some faculty members suggested having more multimedia and interactive features within the training materials. Others suggested that schools should have in-person coaching process for new faculty members to learn online teaching and assessment tools faster and easier.

9. Adding Additional Options, such as Games, Voice Command and Social Networking. Faculty members also mentioned adding some other innovative features to the current CMSs, such as voice commands and social networking applications.

Chapter Summary

In this chapter, the data analysis results from both Phase I and Phase II of my study were presented and discussed. The overall statistical findings of faculty members from traditional universities and online institutions were examined, such as teaching loads, their choice of Course Management Systems, and the disciplines that they taught. The results of the statistical analyses
showed that faculty members from online institutions taught more courses in the same period of time. Applied-life-soft courses (e.g., Business education, Elementary/middle school education, Music or art education, Physical education or recreation) were the most taught online courses for both traditional universities and online institutions. In general, faculty members from online institutions had more experiences and expertise of computers and the Internet. The results also indicated that faculty from disciplines of pure-life-soft (e.g., Anthropology, Ethnic Studies, Political Science, Psychology, and Sociology) and applied-nonlife-soft (e.g., Journalism, Accounting, and Business administration) used the greatest variety of online assessment strategies. The results revealed several statistically significant relationships among institution type, the percentage of online delivery of the courses, and the purpose of implementing different types of online assessment strategies. Table 16 summarizes the statistically significant relationships discovered among variables in this study in addition to the relationships listed in Table 9. Finally, the qualitative analysis results further explained how faculty members made decisions on their implementations of certain types of online assessment strategies, and also provided recommendations on possible ways of improving the online assessment tools within current CMSs.
Table 16

*Statistically Significant Relationships Revealed in this Study*

<table>
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<th>Institution Type</th>
<th>Percentage of Undergraduate/Graduate Courses Taught</th>
<th>Pedagogical Orientation</th>
<th>Internet Literacy</th>
<th>Variety of Online Assessment Strategies</th>
<th>Q1</th>
<th>A1</th>
<th>A2</th>
<th>E1</th>
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*Note.* In order to save table space, the following combinations of letters and numbers are used to replace the actual variable:

- Q1: Using online quiz for instructional effectiveness.
- A1: Using authentic tasks to provide service learning.
- E1: Using essay to assess students’ knowledge and understanding.
- D1: Using online discussion to assess students based on quantity and quality of response.
- D2: Using online discussion for students to express idea and receive feedback from peers.
D3: Using online discussion for students to receive feedback from the instructor.

J1: Using online course journal to assess students’ intellectual development.

J2: Using online course journal to assess students’ emotional engagement.

G1: Using online game simulation to assess student learning.
CHAPTER FIVE: IMPLICATIONS OF RESULTS, RECOMMENDATIONS, AND FUTURE RESEARCH

Overview

This mixed-method study explored faculty members’ perceptions toward and decisions about online assessment using both quantitative and qualitative methods. Chapter Four presented and discussed the findings from the quantitative and qualitative phases of the study. This chapter first discusses the limitations of the findings of each phase. The results from both phases have illuminated the problems in this study, and provided guidance for improving further research and practice. After delineating the problems that occurred during the design and implementation of the study, appropriate solutions are proposed to address these problems in hopes of strengthening the integrity and validity of a subsequent study. After discussing the limitations, the implications of the findings are discussed. Although these implications and the accompanying recommendations are tentative at best, given the limitations of the study, they do merit attention.

Limitations of Phase I

Phase I involved the development and distribution of an online survey and addressed the following research questions:

(1a) What statistically significant relationships are found among faculty members’ demographic information, such as the institution type, the nature of the discipline, the course level, and the types of online assessment methods and techniques that they implement?
(1b) What statistically significant relationships are found among faculty members’ experience and expertise with computers and the Internet, and the types of online assessment methods and techniques that they implement?

(1c) What statistically significant relationships are found among faculty members’ epistemological worldviews and their pedagogical orientations and the types of online assessment methods and techniques that they implement?

During the analysis and discussion of the data from Phase I, limitations were revealed in both the development and the distribution of the online survey. This section will first discuss the limitations and problems that emerged in the design and development of the survey instrumentation and possible approaches to fix these problems, and then discuss the issues revealed during the survey distribution and the approaches to solve these issues.

**Interpretation of Survey Sections**

The first version of the online survey used in the phase I (see Appendix H) in the formal study was modified based on the testing results of the two pilot studies. Numerous modifications had been made based on the feedback and comments left by survey respondents and experts (including some faculty attendees at international conferences in our field) in the two pilot studies. Before it was formally distributed, the revised survey was distributed to and reviewed again by various experts and other doctoral students in our program resulting in one more revision. However, the results showed that there were still many places that needed to be improved before it could be used in subsequent research. The entire survey included five sections, including General Information, General Use of Computer and Internet (Internet Literacy), Global Pedagogical Perspective (Epistemological Worldviews), Use of Different Online Assessment Strategies, and the open-ended questions. In the following section, problems and issues in each
section of the survey (except for the open-ended question section) will be discussed and possible solutions will be suggested.

General Information

The General Information section collected information about categories of the discipline that faculty members were involved, and the working load of faculty members. Although 103 majors were included in the options of question 1 (What is the major discipline associated with your academic department?), 18 majors were still added by participants in textbox under the option of “other (please specify).” Future surveys designed to collect similar information should extend the options of the majors by adding these 18 majors and other new emerging majors.

The second question of this section tried to collect data about faculty members’ work load by asking the total number of courses that the faculty member taught in the last 12 months. It was assumed that the bigger the number was, the heavier the working load of this specific faculty member had. The results of the data collection were basically consistent with this assumption. However, it must be acknowledged that the interpretation of workload is complex because the duration of each individual course varied across institutions. Most traditional universities either had two long semesters (spring and fall) and one short semester (summer) or had four academic quarters. Courses taught in the traditional universities usually last two to four months. On the other hand, courses taught in online institutions were usually finished in a much shorter period of time, such as one month or five weeks. Work load can also be influenced by other factors such as the class size, number of students, and the frequency of class meetings (virtually or face-to-face). In future studies, more detailed information about the length and
frequency of courses should to be collected in order to measure faculty members’ work load more accurately.

*General Use of Computer and Internet (Internet Literacy)*

The second section of the survey is General Use of Computer and Internet (Internet Literacy). The major problem discovered with this section is the questionable internal consistency reliability of this subscale. The reliability of a measuring instrument is its consistency (Meeker & Escobar, 1998). This kind of consistency includes inter-rater reliability, test-retest reliability, inter-method reliability, and internal consistency reliability (Brennan, 2006). Based on the nature of this study, the primary reliability that needs to be considered here is the internal consistency reliability in this subscale of Internet Literacy. This subscale was used to measure faculty members’ experiences and expertise with computers and the Internet. The subscale included 11 items to measure the expertise and experience of faculty members with Internet applications in two dimensions of general online social life and online teaching. The faculty respondents’ scores on this subscale were then used as an independent variable to analyze the statistical relationships between faculty members’ Internet Literacy and the variety of online assessment strategies. The subscale of the Internet Literacy was first conducted, tested, and revised in a survey instrument creation class (Construction of Educational Measuring Instruments- ERSH 7600) at my university. This subscale was then reviewed and tested by a group of faculty members and graduate students in our field in two rounds of pilot tests.

However, an analysis of the consistency of the responses in this section showed that the Cronbach’s Alpha for this subscale was as low as .67 with a sample size of 147. This low internal reliability indicated the weakness in this subscale. One strategy would be to adopt an
instrument used by other researchers to estimate faculty members Internet literacy. Another strategy would be to expand the item creation process to a larger group to obtain a comprehensive representation of behaviors related to use of the Internet. A panel of experts could be recruited to generate an initial list of items collaboratively. The panel of experts would need to be knowledgeable and diverse in terms of their experiences and expertise with the use of Internet. The use of focus groups could be an effective approach to create an initial list of survey items (Czaja & Blair, 1996).

Global Pedagogical Perspective (Epistemological Worldviews)

The third section of the survey is Global Pedagogical Perspective (Epistemological Worldviews). This section was a modified version of the three vignettes by Schraw & Olafson (2002). The purpose for using these vignettes was to identify faculty members’ epistemological world views and their pedagogical orientation. However, the statistical results and the comments left at the end of this instrumentation indicated that faculty members sometimes can agree to all three vignettes equally, or only agree to certain portions of each vignette. Some comments also show that faculty respondents felt that these three vignettes could not represent their pedagogical beliefs. The possible reason for the insufficiency of measurement using this instrument is that the participants in the original study by Schraw and Olafson (2002) were primarily k-12 teachers and the nature of the pedagogical strategies are very different from those of faculty in higher education institutions. For future studies which measure faculty members’ epistemological world views and their pedagogical orientation at higher education institutions, new measurement methods need to be developed and validated to better describe this specific group.
Use of Different Online Assessment Strategies

The fourth section of the survey focused on Use of Different Online Assessment Strategies. A major problem within this section is the possible violation of the construct validity. Many different aspects can influence the construct validity of the survey. One aspect among them that negatively compounded the validity of the instrument is content validity. According to Carmines and Zeller (1991), content validity is the degree to which the instrument matches the operational definitions of concepts in the specific intended domain of content. In the data analysis process of this study, it is obvious that the definition and description of various assessment strategies in this section should be clarified in order to avoid confusion.

For example, as mentioned in Chapter four, many faculty members selected both “Essays” and “Authentic Tasks” as the online assessment strategies that they used in their courses. However, in the comment area and later during the interviews, I found that many faculty members believed that they were implementing authentic tasks as an online assessment strategy by asking students to write essays. In this situation, the numbers of online assessment strategies is somewhat muddled. In future studies, a more accurate and specific definition about each type of online assessment strategy should be provided in order to avoid the confusion which emerged in this study. It might also be a better idea to obtain information about assessment from other sources. For example, an analysis of course syllabi might be a more reliable and valid source of information about the types of assessment strategies instructors use in their courses.

Participant Recruitment

Phase I of this study collected survey data from both traditional research high universities and online commercial institutions. Although there were two pilot studies before the final data collection, certain issues emerged during the participant recruitment and data collection process.
The first issue was the low response rate. In order to get a large enough sample size, thousands of emails were sent during phase I of the data collection. The invitation emails were sent to the leaders of the identified online programs or directly to the online course instructors whose email addresses were available on their program website. I also tried to send invitation emails to certain listservs such as Online Faculty, Second Life, etc. But the 2% response rate was very low. A low response rate indicates the possibility of response bias and has always been a significant matter in survey research of this kind. Research shows that response rates to online delivered surveys are typically lower than traditional surveys (Menachemi, 2011). Although such a low response rate was expected given the limitations of the online distribution format and the well-known heavy work load for faculty members, a higher response rate should be sought in subsequent studies in order to increase the internal reliability and the external validity of the instrument. Certain strategies such as incentives and contact follow up need to be implemented in future studies in order to increase the response rates (Dommeyer, Baum, Hanna, & Chapman, 2004). In addition, instead of targeting so many different institutions, it might be better to identify a few well-known examples of institutions of various types with large online enrollments, and then find respondents within those particular institutions.

Secondly, the external validity of this study may have been violated because the study did not account for the situation whereby some faculty members had double roles by teaching both at online institutions and traditional universities. External validity is the degree to which the result of the survey can be generalized to people in other places and at other times (Barry, 2005). In order to distinguish the two groups of faculty members, the online survey web links provided to faculty members at online institutions and faculty members at traditional universities were different, even though the content of each survey was identical. Consequently, all related
statistical analyses which compared the differences of perceptions and practices of online assessment strategies by faculty members from each of the two types of institutions was based on the assumption that people who took the survey represented the opinions and experiences of faculty members matching the survey URL's corresponding type of institution. Yet, in the process of data analysis, my advisor, Dr. Reeves, mentioned that some faculty members teach both at Research High universities and online institutions. Therefore, their perceptions toward and practices of online assessment may differ from those who only teach at either online institutions or traditional universities. To clarify the situation in future studies which involve the identification of faculty members' institution types, specific questions need to be added to identify whether the faculty members only teach at one or both types of institutions.

**Limitations of Phase II**

The main goal during phase II of this study was to identify underlying themes related to the following research questions:

How do faculty members make decisions about how to assess students in an online learning environment?

a. What are faculty members’ perceptions of the role of assessment within their courses?

b. How do epistemological worldviews and pedagogical orientations affect decisions faculty members make regarding online assessment?

c. What areas of improvement do faculty members perceive for online assessment tools?

d. According to faculty members’ perceptions, what improvements should be made to the assessment functions in current course management systems (CMSs)?

e. What new functions and/or applications should be added to the current online assessment technique menu?
This section describes issues that emerged during the process of the participant recruitment for interviews, the interview protocol, and the analysis of the qualitative data. After discussing each issue, possible solutions are provided.

**Participant Recruitment**

My original plan for phase II was to recruit an equal or similar number of faculty members from each type of institution. Participants were asked at the end of the online survey if they were willing to leave their contact information to be used for a 30 minute to one hour interview via phone or Skype. However, only two online institution faculty members participated in this phase whereas eleven faculty members from traditional universities participated. Several online institution faculty members who provided their contact information in phase I later decided not to participate in Phase II. The reasons given for their withdrawing varied, such as concern of how their institution would be represented. Others simply did not answer their phone when I called at the time scheduled for the interview.

The small number of faculty participants from online institutions in the interview phase of this study yielded a lack of qualitative information on how online institution faculty members perceived and implemented online assessment. The high dropout rate of online institution faculty members during the qualitative phase may reflect the influence of business concerns about these online institutions. At the time of this study, television news programs such as PBS Frontline were highly critical of most for-profit online institutions and there were even congressional investigations into perceived problems with them such as recruiting students who were not academically prepared for college and the misuse of federally backed college loans. These respondents may have been reluctant to discuss the nature of their online courses and the
assessment strategies they employed. I also could have been more persistent in continuing to try and contact the interviewees if they missed their scheduled interview time.

**Modification of Interview Protocol**

Although the results of initial statistical analysis of data from phase I indicated that statistically significant relationships existed between the institution type, respondents’ levels of Internet Literacy, and certain implementation types of online assessment strategies, the interview questions asked in phase II did not explicitly ask participants about how the institution types that they taught at had influenced their perceptions toward and decisions regarding online assessment. Although there was one faculty member from an online institution who shared his opinion about how the business nature of online institution influenced the “quality” of his students as well as the flexibility of choosing certain types of online assessment strategies, more specific questions should have been asked in order to obtain better-structured information. Questions about the influence of institution type on the implementation of online assessment should be added to the interview protocol in order to explain the statistical relationships found in Phase I of this study. Some sample questions could be: How do you think that teaching at an online institution or traditional university influences the way that you assess your students’ learning? What would you do differently in terms of assessing your students if you were teaching at a different type of institution?

The interview questions asked in phase II also failed to explicitly ask participants about how their expertise and experiences about technologies had influenced their perceptions toward and decisions regarding online assessment. In future studies, questions related to faculty members’ expertise and experiences about computers and the Internet and questions related to institution types need to be carefully phrased in order to gain more constructive responses. Some
sample questions could be: To what level do you think that you have been comfortable with the current online social network applications? To what degree do you think it is necessary to keep up with the current constantly emerging new technologies and Internet applications in order to teach students online?

In addition, during the interviews, I asked questions about faculty members’ beliefs about their and their students’ roles during teaching and their beliefs about the purposes of online assessment. I also asked how their students learned in a specific course that they taught online. By asking these questions, I wished to identify whether there were certain patterns in the implementation of online assessment in relation to the pedagogical beliefs of faculty members from either online institutions or traditional universities. However, most of answers to these questions were generic. For future studies, more specific questions need to be asked in order to reveal the detailed patterns of the implementation of online assessment and the pedagogical beliefs in an online learning environment. It will be helpful to let faculty members talk about their previous experiences with online and/or in-classroom assessment with their teachers and peers. Questions need to be asked in an inductive manner so that the interviewees can share in a more detailed level their beliefs toward learning, teaching, and assessing in an online environment. Some sample questions could be: How did you decide what assignments and/or class projects that students need to finish for the course? If required, how did you choose the textbook(s) for the course? Why (or why not) do you include peer review (or other assessment strategies) in the assessment process in your course?
Triangulation of Sources

In this study, a number of different types of data sources were analyzed in order to triangulate the results of the analysis. Statistical data and answers to open-ended questions in Phase I and transcribed interviews in Phase II were analyzed and compared. In order to better understand the online assessment implementation processes by the interviewed professors, some of them were also asked to provide course rubrics. However, not every interviewed professor actually provided their course rubrics after the interview. Therefore, the few acquired rubrics were not officially used in the document analysis process. In future research, course rubrics should be collected more completely. In addition, another possible resource of document analysis could be “visiting” the actual online courses that interviewees talked about during their interviews. Although there may sometimes be difficulties with accessibility, screen captures of the online courses and of sample student works which were submitted for the purpose of assessment can help in the admittedly complex challenge of understanding the actual online assessment process.

Implications and Recommendations

The primary goal of this study was to understand the perceptions toward and use of online assessment by faculty members in both traditional universities and online institutions. In this section, my interpretation of the implications of this study and recommendations for the improvement of faculty members’ implementation of online assessment in both traditional and online institutions are offered.

Keeping in mind the aforementioned limitations of this study, several interesting findings stand out in my mind. The respondents in this study used a wider range of different assessment strategies than might have been expected. They also tended to emphasize using assessment to
improve student learning rather than just as a basis for assigning grades. They view students’
collaboration during online open-book tests as a process of learning, rather than the behavior of
cheating and test dishonesty. They use course management system tools for assessment, but
would like to see these tools improved. They keep improving their course design and assessment
strategies over the years. They keep an open mind and keep experimenting with new Internet
applications with regard to teaching and assessing. They believe that teaching, learning, and
assessing is an integrated system and the best practice of assessment is the assessment that can
both assess students’ learning and assist students’ learning. They believe that there is no single
fixed epistemological belief or pedagogical orientation that can solve all the challenges of
teaching in higher education.

The differences in teaching load and pedagogical orientation between instructors teaching
online at online institutions and those at traditional universities are also interesting. Although the
online institution instructors appear to have a teaching load that would dismay faculty at
traditional institutions, the former appear to be modestly more likely to employ a wider range of
assessment strategies. A possible reason for this difference can be the degree to which each type
of institution emphasizes teaching. For online commercial institutions, students are the customers
and the source of the financial revenue. Therefore, teaching is the primary job responsibility for
faculty members, and they may have more time and may be more motivated to explore differ
rent ways of teaching and assessing. On the contrary, faculty members at traditional research
universities have diverse types of responsibilities besides teaching, such as researching,
publishing, and services. Therefore, faculty members in traditional research universities may
have less time and motivation to experiment and explore new ways of teaching and assessing in
an online learning environment. Grade inflation is a widely acknowledged problem in traditional
institutions, and it would be interesting to examine whether this problem extends to online institutions. Although the quantitative part of the study did not investigate the difference of student composition on each type of institutions, the qualitative data showed that faculty from online institution felt there were differences between students of online institutions and students at traditional universities, in terms of preparation for the school, motivation to learn, and efforts made to meet the school standards. It will be interesting to examine if the way that faculty teach and assess are influenced by these different types of students.

Based on my analysis of the quantitative and qualitative data from this study, the first major recommendation I wish to make is that the current reward system for faculty members at traditional universities should be adjusted to encourage them to implement more innovative ways to assess students’ online learning. According to the data from Phase I, online institution faculty respondents, who have much heavier teaching loads and who teach more undergraduate courses than graduate, tend to utilize a wider variety of online assessment methods than the traditional university faculty respondents. There is a widely recognized but largely unspoken understanding that traditional university faculty members are rewarded primarily for their research and the amount of external funding they attract rather than for their teaching. Online institution faculty members, on the other hand, largely teach in institutions where students are treated as customers and therefore there is greater emphasis on teaching in ways that keep the customers satisfied. These factors may encourage online institution instructors to be more innovative in how they teach and how they assess learning than traditional university faculty members who do not have teaching as a major priority. Clearly, if teaching is to become more of a priority for traditional university faculty, their reward system will need to be adjusted.
Another recommendation drawn from this study is that faculty members need more fundamental and systematic training about instructional design, online learning, teaching and assessment. Qualitative data from the open-ended questions and interviews show that plenty of faculty members designed their courses and assessment systems without a systematic understanding of learning, teaching and instructional design. Many faculty members designed and developed their courses based on their past experiences of teaching and learning. Some faculty directly transformed their face-to-face courses into online courses as well as the assessment strategies within the course. Some faculty transformed their experiences with their own teachers and peers in traditional classrooms to online courses. Many faculty members’ knowledge about the available assessment methods appears to stay the same as those that had been implemented in a traditional classroom. Data in this study also shows that some of the faculty respondents misunderstood the purpose and process of instructional design and considered the jobs of instructional designers as merely supporting the implementation of technology. Their views about test dishonesty and their vision of the purposes of assessing students’ performance sometimes were limited to their own previous experiences. The somewhat pessimistic conception about test dishonesty and the fear of students cheating when taking an unproctored online test have restricted faculty members’ imagination and creativity when they implement online assessment strategies.

Many advantages of assessing students online, such as providing collaboration opportunity, constructive learning experience, and authentic learning opportunities, have been neglected. Traditional training mechanisms such as workshops focused on the nuts and bolts of how to use a course management system to create online quizzes will not be sufficient to address the gaps in assessment practice revealed by this study. Faculty members need access to
professional instructional designers and assessment experts to help with a fundamental rethinking of the functions and mechanisms of assessment in their courses.

This study also addressed the question of how to improve the online assessment tools within current Course Management Systems. Nine categories of suggested improvements are presented in Chapter four, including Usability/interface, Test Dishonesty Prevention, Support to Multimedia and Interactivity, Better support to Quantitative/Math Functions, Enhancement of Collaboration Features, Flexible Feedback Features, Enhancement of data gathering about students’ activities, Job Aids/tech support, and Adding additional options. Although some of the suggestions are more related to faculty training and professional development, such as Test Dishonesty Prevention and Job Aids/tech support, the rest do provide valuable suggestions for CMS program developers to improve their products’ assessment-related features.

**Directions for Future Research**

As people have become more reliant on the Internet for many aspects of their lives, they also have become more accepting of online education. Due to factors such as time, location, flexibility, economic efficiency, and global collaboration, more and more adult learners have chosen online education as the way to obtain their degrees. Online institutions emerged as a response to market demand. Traditional institutions also began expanding their online educational programs to attract more students. However, the lack of understanding about factors that influence faculty members’ decisions and practices on online teaching and assessment impede improvement of online courses and programs. Although this study does address some important questions, it also raises other questions which must be addressed by future research.

First, as noted earlier in the limitations section, the instrumentations that were used in this study can be refined and improved. In the absence of instrumentation specifically tailored for
faculty members’ expertise and experiences of the Internet and online teaching, this study took the first step in developing a survey instrument to evaluate faculty members’ Internet literacy. Further research is needed to continue the development and refinement of this instrument, especially with respect to addressing its validity and reliability. The current Internet literacy scale used the Likert-scale format in order to measure two sub-dimensions, which are general online life and online teaching. However, with the development of Internet technologies and the continuously emerging web applications, the items in this instrumentation must be continuously modified or eliminated and new items may need to be added, in order to keep the scale updated. In addition, except for the measurement of faculty members’ expertise and experiences with the Internet and technologies, a third sub-scale which measures faculty members’ attitudes toward new technologies and experimentation with adding new Internet applications into teaching and assessment can be developed to better monitor the relationships between faculty members’ perceptions toward online technologies and their practices in online teaching and assessment.

This study was an exploratory endeavor in order to understand faculty members’ perceptions toward and practices of online assessment. Despite the limitations of the study, a faculty online teaching and assessment training model can be developed based on the results of this study. The study discovered that many factors influence faculty members’ decisions of their online assessment practice, such as faculty members’ expertise and knowledge about the Internet and web applications, as well as their knowledge about and beliefs toward teaching and learning in the specific context of their academic area. Taking this into consideration, a faculty training model should be developed and validated in a future study.

In addition, this study incorporated Schommer’s (2002) five dimensions of epistemological beliefs into the theoretical framework. The results of data analysis based on
phase I do indicate that there were statistically significant relationships between faculty members’ epistemological world views and their decisions about how to implement online assessment. However, the results of phase II's data analysis contradicted the results from phase I to some degree. This contradiction indicates that different theoretical frameworks should be investigated for future studies. Among these possible theoretical frameworks, the Technological Pedagogical Content Knowledge (TPCK) has the potential to integrate all these factors. According to Mishra and Koehler (2006), TPCK is the interaction of Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), and Technological Content Knowledge (TCK). TPCK represents important knowledge that goes beyond the three components of content, pedagogy and technology (Mishra & Koehler, 2006). Using the framework of the Technological Pedagogical Content Knowledge (TPCK - Technological Pedagogical Content Knowledge, 2011) (see Figure 25), factors that were investigated in this study, such as Internet Literacy, categories of involved disciplines, and the Global Pedagogical Orientation, can all be included and integrated and therefore facilitate the interpretation of faculty members’ practices on online assessment.

![Figure 25. The framework of the Technological Pedagogical Content Knowledge (TPCK).](image_url)
Design based research can be conducted in the future in order to develop and test the faculty training model of online assessment using the results of this study and the theoretical framework of TPCK (van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). This type of research needs to be conducted within a local institution to guarantee the implementation of the research design and data collection. Based on the available resources and timeline, three iterations could be implemented (Bannan-Ritland, 2003; Design-Based Research Collective, 2003; Van den Akker & et al., 2006; Wang & Hannafin, 2005). In the first iteration, faculty members who teach online courses will be surveyed in order to obtain their current knowledge level about TK, TPK, PK, CK, CTK and TPCK. After the survey, faculty members will be provided a series of training workshops which focus on improving faculty members’ knowledge about instructional design, online learning and assessment. Introduction to available online assessment strategies will be provided to faculty members in the training as well.

Another purpose for this proposed study will be to establish peer support among faculty members so that they can communicate their experiences and opinions about online teaching and assessment. Each iteration of this study would take one semester. At the end of the semester, the same group of faculty members will be surveyed using the same instrumentations which have been used at the beginning of the iteration. Faculty members will also be interviewed individually and in focus groups. Data collected from the two surveys and the interviews will then be analyzed. The actual online courses that these faculty members teach will also be analyzed using document analysis. In order to gather more information about the effect of the faculty members’ online teaching and assessment, students in the class should also be interviewed about their perceptions toward the online assessment strategies used in the course.
At the end of the first iteration, the faculty training model should be enhanced. This model will then be implemented during the second iteration of the study. Similar data collection procedures will be implemented with the faculty members and students in the second and third iterations, although the actual participants and the courses involved may be changed. As the theoretical outcome of the study, the faculty training model will help direct future practices in the field of faculty training and support. The practical outcome of the study is to assist the local faculty training and faculty community development in terms of online teaching and learning.

Finally, a different angle for future studies is to ask questions concerning students’ learning and the relationships between online assessment and students’ learning. As discussed earlier in this dissertation, one important purpose for online assessment is to assist students’ learning and to help students acquire self-paced learning and collaboration skills. What kind of online assessment strategies will better support this purpose? How can online assessment help to engage students in learning? How can online assessment encourage effective group work and collaboration? How should faculty training be tailored to the purpose of supporting students’ learning? Future studies need to answer these questions.

Online teaching and learning is a complex process which involves efforts from all stakeholders during this process, such as faculty members, students, instructional designers, and administrative personnel. The growth of online higher education also provides unlimited possibilities for innovative ways of teaching, learning and assessing. Researchers and practitioners should embrace these new opportunities and collaborate with each other to create better learning experiences for online learners.
Chapter Summary

This chapter first reported limitations found during the design and implementation of my dissertation study. Limitations on the design and distribution of each section of the online survey were analyzed, followed by recommendations on modification and improvement. Limitations on data collection process of Phase II were then reported, such as the design of the interview protocol, and the recruitment strategy. Possible solutions to obtain more information-rich data and to recruit more diverse participants were then proposed for future studies. The chapter then provided implications and recommendations based on the findings of the study, such as rewarding systems of the institutions may have influenced the ways faculty assess, more faculty training are needed to improve knowledge about instructional design, online teaching, learning and assessing. Finally, directions for future research were proposed, including refinement and re-development of the instrumentation used in this study, use of alternative theoretical frameworks for future studies, and conducting a Design Based Research based on the findings of this study. Although this study has many flaws as described above, conducting it has prepared me for a lifetime of scholarship. Online education is one of the most important developments in recent years, and it is in need of rigorous research to help improve its quality and extend its availability. I look forward to carrying out future studies in this area, and making contributions that make a difference for all involved.
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APPENDICES

Appendix A   Items Included in the Epistemological Belief Questionnaire (EBQ)

1. If you are ever going to be able to understand something, it will make sense to you the first time you hear it.
2. The only thing that is certain is uncertainty itself.
3. For success in school, it's best not to ask too many questions.
4. A course in study skills would probably be valuable.
5. How much a person gets out of school mostly depends on the quality of the teacher.
6. You can believe almost everything you read.
7. I often wonder how much my teachers really know.
8. The ability to learn is innate.
9. It is annoying to listen to a lecturer who cannot seem to make up his mind as to what he really believes.
10. Successful students understand things quickly.
11. A good teacher's job is to keep his students from wandering from the right track.
12. If scientists try hard enough, they can find the truth to almost anything.
13. People who challenge authority are over confident.
14. I try my best to combine information across chapters or even across classes.
15. The most successful people have discovered how to improve their ability to learn.
16. Things are simpler than most professors would have you believe.
17. The most important aspect of scientific work is precise measurement and careful work.

18. To me, studying means getting the big ideas from the text, rather than details.

19. Educators should know by now which is the best method, lectures or small group discussions.

20. Going over and over a difficult textbook chapter usually won't help you understand it.

21. Scientists can ultimately get to the truth.

22. You never know what a book means unless you know the intent of the author.

23. The most important part of scientific work is original thinking.

24. If I find the time to re-read a textbook chapter, I get a lot more out of it the second time.

25. Students have a lot of control over how much they can get out of a textbook.

26. Genius is 10% ability and 90% hard work.

27. I find it refreshing to think about issues that authorities can't agree on.

28. Everyone needs to learn how to learn.

29. When you first encounter a difficult concept in a textbook, it's best to work it out on your own.

30. A sentence has little meaning unless you know the situation in which it is spoken.

31. Being a good student generally involves memorizing facts.

32. Wisdom is not knowing the answers, but knowing how to find the answers.

33. Most words have one clear meaning.

34. Truth is unchanging.

35. If a person forgot details, and yet was able to come up with new ideas from a text, I would think they were bright.

36. Whenever I encounter a difficult problem in life, I consult with my parents.
37. Learning definitions word for word is often necessary to do well on tests.

38. When I study, I look for the specific facts.

39. If a person can't understand something within a short amount of time, they should keep on trying.

40. Sometimes you just have to accept answers from a teacher even though you don't understand them.

41. If professors would stick more to the facts and do less theorizing, one could get more out of college.

42. I don't like movies that don't have an ending.

43. Getting ahead takes a lot of work.

44. It's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer.

45. You should evaluate the accuracy of information in a textbook, if you are familiar with the topic.

46. Often, even advice from experts should be questioned.

47. Some people are born good learners, others are just stuck with limited ability.

48. Nothing is certain but death and taxes.

49. The really smart students don't have to work hard to do well in school.

50. Working hard on a difficult problem for an extended period of time only pays off for really smart students.

51. If a person tries too hard to understand a problem, they will most likely just end up being confused.
52. Almost all the information you can learn from a textbook you will get during the first reading.

53. Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate.

54. A really good way to understand a textbook is to re-organize the information according to your own personal scheme.

55. Students who are "average" in school will remain "average" for the rest of their lives.

56. A tidy mind is an empty mind.

57. An expert is someone who has a special gift in some area.

58. I really appreciate instructors who organize their lectures meticulously and then stick to their plan.

59. The best thing about science courses is that most problems have only one right answer.

60. Learning is a slow process of building up knowledge.

61. Today's facts may be tomorrow's fiction.

62. Self help books are not much help.

63. You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic.

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Marlene Schommer, Ph.D. (As of July 1, 2000: Marlene Schommer- Aikins) 1995. You must receive written permission from the author to utilize this instrument.
Items included in the Epistemological Belief Questionnaire

(By Qian & Alvermann in 1995)

1. You will just get confused if you try to relate new ideas in a textbook with knowledge you already have about a topic.

2. I try my best to combine information across chapters or even across classes.

3. Educators should know by now which is the best method, lectures or small group discussions.

4. Working hard on a difficult problem for an extended period of time only pays off for really smart students.

5. Some people are born good learners, others are just stuck with limited ability.

6. A really good way to understand a textbook is to re-organize the information according to your own personal scheme or framework.

7. Learning definitions word-for-word is often necessary to do well on tests.

8. Most words have one clear meaning.

9. It's a waste of time to work on problems which have no possibility of coming out with a clear-cut answer.

10. If scientists try hard enough, they can find the truth to almost everything.

11. Today's facts may be tomorrow's fiction.

12. The really smart students don't have to work hard to do well in school.

13. Successful students understand things quickly.

14. Scientists can ultimately get to the truth.
15. Students who are "average" in school will remain "average" for the rest of their lives.

16. Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate.

17. Everyone needs to learn how to learn.

18. If teachers would stick more to the facts and talk less about ideas, one could get more out of school.

19. A course in study skills would probably be valuable.

20. Self-help books are not much help.

21. If a person forgot details, and yet was able to come up with new ideas from a textbook, I would think he or she was very bright.

22. The most important part of scientific work is original thinking.

23. Almost all the information you can learn from a textbook you will get during the first reading.

24. Getting ahead takes a lot of work.

25. Wisdom is not knowing the answers, but knowing how to find the answers.

26. The most successful people have discovered how to improve their ability to learn.

27. The only thing that is certain is uncertainty itself.

28. If a person can't understand something within a short amount of time, he should keep on trying.

29. If you are ever going to be able to understand something, it will make sense to you the first time you hear it.
30. If I find the time to re-read a textbook chapter, I get a lot more out of it the second time.

31. Learning is a slow process of building up knowledge.

32. If a person tries too hard to understand a problem, they will most likely end up being confused.
Appendix B  

Items Included in the Epistemic Beliefs Inventory (EBI)

(Developed by Schraw, Bendixen, and Dunkle in 2002)

1. Most things worth knowing are easy to understand.
2. What is true is a matter of opinion.
3. Students who learn things quickly are the most successful.
4. People should always obey the law.
5. People’s intellectual potential is fixed at birth.
6. Absolute moral truth does not exist.
7. Parents should teach their children all there is to know about life.
8. Really smart students don’t have to work as hard to do well in school.
9. If a person tries too hard to understand a problem, they will most likely end up being confused.
10. Too many theories just complicate things.
11. The best ideas are often the most simple.
12. Instructors should focus on facts instead of theories.
13. Some people are born with special gifts and talents.
14. How well you do in school depends on how smart you are.
15. If you don’t learn something quickly, you won’t ever learn it.
16. Some people just have a knack for learning and others don’t.
17. Things are simpler than most professors would have you believe.
18. If two people are arguing about something, at least one of them must be wrong.

19. Children should be allowed to question their parents’ authority.

20. If you haven’t understood a chapter the first time through, going back over it won’t help.

21. Science is easy to understand because it contains so many facts.

22. The more you know about a topic, the more there is to know.

23. What is true today will be true tomorrow.

24. Smart people are born that way.

25. When someone in authority tells me what to do, I usually do it.

26. People shouldn’t question authority.

27. Working on a problem with no quick solution is a waste of time.

28. Sometimes there are no right answers to life’s big problems.
Appendix C  A Summary of three Epistemological World Views

(by Schraw and Olafson in 2002)

Realist World View (Vignette 1)

There is a core body of knowledge in my course that each student must learn. Some of it is factual, but some of it is based on broad concepts and principles that everyone agrees on. This knowledge doesn't change much over time and represents the accumulation of important truths and understanding in my discipline. It's important for students to acquire this knowledge exactly as it is. The best way to acquire this knowledge is through an expert like me because I have a much better sense than they do of what is important to learn. It's unlikely that students could really create this knowledge on their own, so learning it from me is quicker and more efficient. For this reason, it is important to me to assume a take-charge attitude so students can learn as much as possible. It's important to me that everyone comes away from my class with the big picture. It is my job to present the big picture clearly.

Contextualist World View (Vignette 2)

Students are encouraged to develop their own understanding in my classroom so knowledge is personally useful to them. However, the fact that students are expected to construct their own understanding doesn't mean that all understandings are equally valid. While I believe
that knowledge is subject to interpretation, I also believe that some conclusions are better than others. Students need to understand how to gather and evaluate evidence so they can distinguish good from poor arguments. I can teach them some of these skills, but some they will have to learn by working with other students, or on their own. I believe that each student will bring a unique and valuable perspective with them. I try to structure my class so that students will pool their resources and come to the best understanding possible.

Relativist World View (Vignette 3)

Students in my class need to understand that there are a variety of different ways to understand things. Knowledge comes and goes, and what the so-called experts consider the truth today will be viewed with suspicion tomorrow. Even people who spend years studying a topic disagree about what things mean, and in the long run, one opinion may be regarded as good as another. This means that students have to learn to think for themselves, question the knowledge and authority of others, and evaluate how what they know affects their life. Knowledge has to be used wisely so no one is left out or exploited by society. For these reasons, I don't believe that I can really teach my students what is important, since they all need to know different things. They have to figure it out on their own, taking into account the events that shape their lives, even if the uncertainty of living in a world with conflicting views of truth bothers them. What I know and believe shouldn't overly influence my students. My job is to create an environment where students can learn to think independently and take nothing for granted.
Appendix D  Interview Protocol Used in the Pilot Study

University of Georgia

Interview Protocol for Instructors/Advisors

Faculty Members’ Perceptions towards Online Assessment

To facilitate my note-taking, I would like to audio record our conversations today. For your information, only researchers on the project will be privy to the records, which will be eventually destroyed after they are transcribed. As an alternative process of consent, please read the Informational Letter that I emailed to you. Then you can verbally agree to participate and to being audio-recorded.

I have planned this interview to last no longer than one hour. During this time, there are several questions that I would like to cover.

Introduction

My study seeks to understand faculty members’ perceptions towards the role of assessment within either a purely online or a blended learning environment. Specifically, my study will investigate how faculty members use the built-in assessment functions in existing commercial or open-source Course Management Systems. My study does not aim to evaluate your techniques or experiences as an instructor to teach online. Rather, I am trying to learn more about your experience of conducting assessment in an online or blended course, and hopefully
learn about effective strategies that can help improve the current built-in assessment-creating functions in Course Management Systems.

Possible interview questions

Background information

Please tell me the name of a specific course you teaching online. What percent of this course is online?

Beliefs about knowledge, learning, teaching, and the role of assessment

1. What do you think is your role during the instructional process?
2. What do you think is the meaning of “assessment” in your teaching?
3. When during your course do you think that you need to assess your students?
4. How do you usually assess your students?

Attitudes towards online assessment

1. What do you think of the test dishonesty issue in online assessment?
2. What is the biggest challenge for you in assessing your students online?

Usage of online assessment

1. How much percent of your course assessment is online?
2. Please describe your way that you usually use to assess your students online.
3. What do you think the instructional designers can do to improve the built-in test-creating functions in current Course Management Software?

**Final open-ended question:**

What other observations do you wish to share concerning the use of online assessment in the courses that you are teaching?
Appendix E   Screen Capture of Revised Survey Used in the Formal Study

Online Faculty Perceptions of Online Assessment of Students’ Learning

1. General Information

Dear Professor,
This study is intended to gather information about:
- your usage of and attitudes toward the Internet and online instruction,
- your global pedagogical perspectives, and
- your practices in online student assessment.
Please contribute to this study by filling out this questionnaire. We estimate that it will take about 15-20 minutes to finish this survey. The information you provide will be used to improve online assessment tools. Thank you for your time and ideas.

1. What is the major discipline associated with your academic department?

<table>
<thead>
<tr>
<th>The major discipline of my academic department is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other (please specify)</td>
</tr>
<tr>
<td>Please choose one from the drop-down list.</td>
</tr>
</tbody>
</table>

2. What is the total number of courses that include some types of online assessment which you have taught?

<table>
<thead>
<tr>
<th>Undergraduate course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate course</td>
</tr>
<tr>
<td>Both undergraduate and graduate students</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

Next >>

Online Faculty Perceptions of Online Assessment of Students’ Learning

2. General Use of Computer and Internet

This section is focused on your general and instructional uses of computers, Internet technologies and online teaching tools such as Course Management Systems (see definition below). Please indicate the answers that best reflect your experiences.

Definition: A CMS (Course Management System) is a tool that allows an instructor to post information on the web without the instructor needing to know or understand HTML or other computer languages. It provides an instructor with a set of tools and a framework that allows the relatively easy creation of online course content and the subsequent teaching and management of that course including various interactions with students taking the course (Bleimert, 2003).

Some widely used CMSs are WebCT, BlackBoard, Moodle, Sakai, etc.

3. This question focuses on specific uses of computers and the Internet in your personal life. Please indicate the frequency with which you do the following things:

<table>
<thead>
<tr>
<th>I communicate with people using social networking tools (e.g., Facebook, MySpace, Twitter, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Never) 2 3 4 5 6 7 (Often)</td>
</tr>
<tr>
<td>I read and/or post on online forums or discussion boards.</td>
</tr>
<tr>
<td>I maintain a blog.</td>
</tr>
<tr>
<td>I shop online.</td>
</tr>
<tr>
<td>I play online games.</td>
</tr>
<tr>
<td>I maintain a personal website.</td>
</tr>
</tbody>
</table>

Please add your comments here (optional):

4. This question focuses on specific uses of computers and the Internet in your professional life, including teaching. Please indicate the frequency with which you do the following things:
Online Faculty Perceptions of Online Assessment of Students’ Learning

3. Global Pedagogical Perspective

This section of the survey focuses on your global perspective towards knowledge, learning, and teaching.

5. There are three vignettes related to global pedagogical perspectives described below. Please read each one and then you can assign a total of ten points to the three vignettes, assign the most points to the vignette that you most agree with, and the least amount of points to the one that you least agree with. The points assigned across the three vignettes should add up to 10.

Realist Perspective (Vignette 1) There is a core body of knowledge in my course that each student must learn. Some of it is factual, but some of it is based on broad concepts and principles that everyone agrees on. This knowledge doesn’t change much over time and represents the accumulation of important truths and understanding in my discipline. It’s important for students to acquire this knowledge exactly as it is. The best way to acquire this knowledge is through an expert like me because I have a much better sense than they do of what is important to learn. It’s unlikely that students could really create this knowledge on their own, so learning it from me quicker and more efficiently. For this reason, it is important to me to assume a take-charge attitude so students can learn as much as possible. It’s important to me that everyone comes away from my class with the big picture. It is my job to present the big picture clearly.

Contextualist Perspective (Vignette 2) Students are encouraged to develop their own understanding in my classroom so knowledge is personally useful to them. However, the fact that students are expected to construct their own understanding doesn’t mean that all understandings are equally valid. While I believe that knowledge is subject to interpretation, I also believe that some conclusions are better than others. Students need to understand how to gather and evaluate evidence so they can distinguish good from poor arguments. I can teach them some of these skills, but some they will have to learn by working with other students, or on their own. I believe that each student will bring a unique and valuable perspective with them. I try to structure my class so that students will pool their resources and come to the best understanding possible.

Relativist Perspective (Vignette 3) Students in my class need to understand that there are a variety of different ways to understand things. Knowledge comes and goes, and what the so-called experts consider the truth today will be viewed with suspicion tomorrow. Even people who spend years studying a topic disagree about what things mean, and in the long run, one opinion may be judged as good as another. This means that students have to learn to think for themselves, question the knowledge and authority of others, and evaluate how what they know affects their life. Knowledge has to be used wisely so no one is left out or exploited by society. For these reasons, I don’t believe that I can really teach my students what is important, since they all need to know different things. They have to figure it out on their own, taking into account the events that shape their lives, even if the uncertainty of living in a world with conflicting views of truth bothers them. What I know and believe shouldn’t really influence my students. My job is to create an environment where students can learn to think independently and take nothing for granted.

6. Please write your comments for question 5 in the textbox.
Online Faculty Perceptions of Online Assessment of Students' Learning

4. Use of Different Online Assessment Strategies

This section of the survey focuses on how you use different online assessment strategies to assess your students' learning in one particular course. Please think of a course that you teach either totally or partially online. (The latter is often referred to as a blended course.) Keep this course in mind when answering the questions in this section.

7. What is the name of the course you have in mind:

8. This course is primarily for:
   - undergraduate students
   - graduate students
   - Both undergraduate and graduate students
   - Other (please specify)

9. This course is taught:
   - Totally online
   - Primarily face-to-face, but with the inclusion of some online components
   - Primarily online, but with the inclusion of some face-to-face components
   - Nearly evenly 50-50 face-to-face and online.
   - Please specify the percentage of the course taught online here:

10. Please indicate your use of one or more Course Management Systems (CMS) in this course (check all that apply):
   - I don't use any CMS.
   - I use WebCT.

   - I use BlackBoard.
   - I use Sakai.
   - I use Moodle.
   - I use ANGEL.
   - I use ATutor.
   - I use Claroline.
   - I use DesireLearn.
   - Other (please specify):

11. Please check each of the following statements if they are true of the course you have in mind (check all that apply):
    - My course includes:
      - online quizzes/tests for students to self-test their knowledge.
      - online quizzes/tests so I can see how effective my instruction is.
      - online quizzes/tests because it is the best way to determine if students have learned.
      - authentic tasks and/or projects to assess students' performance (A task or project is considered authentic when it replicates to some extent of the kinds challenges faced in the real world. Authentic tasks and/or projects require students to figure out their own solutions to real world tasks or problems.)
      - authentic tasks and/or projects to provide service learning opportunities.
      - authentic tasks and/or projects because it is the best way for students to learn in this course.
      - assignments such as writing an essay to assess students' knowledge and understanding or completing exercises in written form. (These types of writing assignments and exercises are less connected to real life. They primarily focus on measuring students' understanding of the course materials and related skills. These assignments may include exercises on certain types of problems, questions or problems that a student responds to with a written summary, analysis, or explanation or the task of writing essays or short papers.)
      - threaded discussions in which student contributions are assessed based on the number and quality of responses per week or per topic.
      - threaded discussions so that students can express their ideas and receive feedback from peers.
threaded discussions so that students can express their ideas and receive feedback from me as the instructor.

- the assignment of students writing online journals to foster their self-reflection. (Journals require a student to write either in response to a particular question or about a certain topic or experience, typically involving personal reflection. The frequency of ‘journaling’ assignments can range from daily to occasionally.)

- the assignment of students writing online journals to assess their intellectual development in the course.

- the assignment of students writing online journals to assess their emotional engagement in the course.

- the use of electronic portfolios. (An electronic portfolio is a web-based digital repository of artifacts that demonstrate the students' knowledge and performance. It can contain texts, digital images, video, audio, and other formats of digital media.)

- the use of online games or simulations to assess student learning. (Online games and simulations assess students' multiple aspects of knowledge, skills, and metacognitive strategies that arise in different situations, by developing realistic scenarios with various types of multimedia online.)

- assessment strategies other than the ones specified above. (If so, please identify them below and describe how you use them in your course to assess students' learning. Please specify the percent of the final grade based on these other assessment methods.)

Please add your comments here (optional):

12. If your course includes any type of online assessment strategies that were mentioned in question 11, please specify what percent of the final grade is based on this type of assessment strategy (please only input number of the percentage without “%” in the text box).

- Online quizzes/tests
- Authentic tasks and/or projects
- Writing essays or completing written exercises
- Threaded discussions
- Writing online journals
- Electronic portfolios

The use of online games or simulations

Other assessment strategies

80%

6. Open Ended Questions

This is the last part of this survey. Your answers to the following questions will help us better understand your opinions of online assessment.

13. How can the currently available online assessment tools (both commercial and open source systems) be improved to facilitate your teaching and students' learning?

14. What do you think is the biggest difference between the traditional assessment and online assessment?

15. Please write any comments you would like to share about online assessment.
16. To further understand your use of online assessment, we would be interested in interviewing you. The interview will usually last from 30 to 60 minutes. If you are interested in being interviewed, please leave your contact information here.

Thank you very much for your input. We know your time is valuable and appreciate your contribution to this study.

If you are interested in the survey results and our study outcomes, please contact us at: maggiehu@uga.edu
### Appendix F  Disciplines and Categories according to Biglan (1973a, 1973b).

<table>
<thead>
<tr>
<th>Hard</th>
<th>Soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure-life  Biology, Biochemistry or biophysics, Botany, Environmental science, Microbiology or bacteriology, Zoology, Kinesiology, Nutrition, Forestry, Plant Sciences, Animal Science</td>
<td>Anthropology, Ethnic studies, Political science (incl. gov’t, int’l rel.), Psychology, Sociology, communication, International Studies, Humanities and Arts Communication disorders, human development, Human Development and Family Studies, Human services</td>
</tr>
<tr>
<td>Pure-non-life  Astronomy, Atmospheric science (incl. meteorology), Chemistry, Computer science, Earth science (incl. geology), Mathematics, Physics, Statistics, Information science, library/information sciences</td>
<td>Art, fine and applied, English (language and literature), History, Language and literature (except English), French, German, Spanish, Music, Philosophy, Theater or drama, Geography, I'm a historian within a Liberal Studies Dept., Folklore and Folklife, music lyrics</td>
</tr>
<tr>
<td>Applied-life  Medicine, Dentistry, Veterinarian, Pharmacy, Agriculture, Speech, Rehabilitation Counseling</td>
<td>Theology or religion, Church Professions, Business education, Elementary/middle school education, Music or art education, Physical education or recreation, Nursing, Allied health/other medical, Social work, Family Studies, Criminal justice, health, services, law, Public Health Practice, Technical Communication, gerontology, Music Education</td>
</tr>
<tr>
<td>Applied-non-life  Aero-/astronautical engineering, Civil engineering, Chemical engineering, Electrical or electronic engineering, Industrial engineering, Materials engineering, Mechanical engineering, General/other engineering, Industrial, Systems, and Operations Engineering, urban planning, Applied Mathematics</td>
<td>Journalism, Accounting, Business administration (general), Finance, Marketing, Management, Architecture, Economics, Communications, Public administration, design</td>
</tr>
</tbody>
</table>
Appendix G  Revised Interview Protocol Guided the Interviews

University of Georgia

Interview Protocol for Instructors/Advisors

Faculty Members’ Perceptions towards Online Assessment

To facilitate my note-taking, I would like to audio record our conversations today. For your information, only researchers on the project will be privy to the records, which will be eventually destroyed after they are transcribed. As an alternative process of consent, please read the Informational Letter that I emailed to you. Then you can verbally agree to participate and to being audio-recorded.

I have planned this interview to last no longer than one hour. During this time, there are several questions that I would like to cover.

Introduction

My study seeks to understand faculty members’ perceptions towards the role of assessment within either a purely online or a blended learning environment. Specifically, my study will investigate how faculty members use the built-in assessment functions in existing commercial or open-source Course Management Systems. My study does not aim to evaluate your techniques or experiences as an instructor to teach online. Rather, I am trying to learn more about your experience of conducting assessment in an online or blended course, and hopefully
learn about effective strategies that can help improve the current built-in assessment-creating functions in Course Management Systems.

**Possible interview questions**

**Background information**

Please tell me the name of a specific course you teaching online. What percent of this course is online?

**Beliefs about knowledge, learning, teaching, and the role of assessment**

1. Please give me your own definition about the type of knowledge and skills that your students obtain in your course.
2. Please describe the processes that students in your course use to acquire knowledge?
3. What do you think is your role during the instructional process?
4. What do you think is the meaning of “assessment” in your teaching?
5. When during your course do you think that you need to assess your students?
6. How do you usually assess your students?

**Attitudes towards online assessment**

7. What do you think of the test dishonesty issue in online assessment?
8. What is the biggest challenge for you in assessing your students online?

**Usage of online assessment**
9. How much percent of your course assessment is online?

10. Please describe your way that you usually use to assess your students online.

11. What do you think the instructional designers can do to improve the built-in test-creating functions in current Course Management Software?

**Final open-ended question:**

What other observations do you wish to share concerning the use of online assessment in the courses that you are teaching?
Appendix H  Survey Used in the Pilot Study

1. Your opinions towards assessing students online

Dear Professor,

This study is intended to gather your epistemological belief and attitudes towards assessing students online in teaching and learning environments in higher education. You are invited to participate by filling out the following questionnaire regardless of whether you have ever used online assessment or not. There are totally 20 questions with 65 items (some questions have only one item while others might have more than one) in the questionnaire and it might take you about 25 minutes to answer this questionnaire. Your participation is important to us as it helps to shed light on how current online assessment tools can be improved. Thank you for your time and consideration in this matter.

Please read the following questions and check the responses that reflect your opinions and attitudes or fill in the appropriate blanks.

*  

1. What is the major discipline associated with your academic department?  
Please choose one from the following: (drop-down list was used here)
Other (please specify):________

2. Please identify your gender here.

Please identify your gender here.

- Female
- Male
- I would want to keep it private

3. Please specify the number of each type of environment for all of the classes that you are teaching in this semester:

   Online _______
   Face-to-face _______
   Blended (mixture of online and face-to-face) _______

4. How many years have you been teaching in higher education?

2. General Use of Computer and Internet

This section is focused on your general use of computer technologies and online teaching tools such as Course Management Systems (see definition below). Please circle the answers that best reflect your experiences.

Definition:
A CMS (Course Management System) is a tool that allows an instructor to post information on the web without the instructor needing to know or understand HTML or other computer languages. It provides an instructor with a set of tools and a framework that allows the relatively easy creation of online course content and the subsequent teaching and management of that course including various interactions with students taking the course (Meerts, 2003).

Some widely used CMSs are WebCT, BlackBoard, Moodle, Sakai, etc.

5. Are the following statements true of you? Please check the answer that best reflect your experience and please write your comments in the textbox at the end of this question.

Scale used here:

1 (Not at all true of me)  2  3  4  5  6  7 (Extremely true of me)  N/A

Outside of the class, I regularly communicate with my students with email.

I regularly communicate with people most of time using social network tools (e.g., Facebook, My Space, etc.).

For my research and other scholarly work, I regularly access electronic journals and books.

I regularly use a Course Management System (CMS) such as WebCT, Blackboard, Moodle, etc. in my teaching.

I regularly use asynchronous communication tools (e.g., blogs, wikis, discussion boards, listservs) in my teaching.
I regularly use synchronous communication tools (e.g., virtual conference, Instant messenger, chat rooms, etc.) in my teaching.

Comment:______________________________________________________

6. How often do you do the following things? Please check the answer that best reflects your experience and please write your comments in the textbox at the end of this question.

Scale used here:

Rarely or Never    Rarely Infrequently    Occasionally    Somewhat frequently    Very Frequently    Always

I maintain a Blog.

I play online games.

I make online tests or quizzes using the built-in test-making functions in my Course Management System.

I make online tests or quizzes using other online assessment tools.

Comment:______________________________

3. Epistemological Beliefs

This part is focused on your epistemological beliefs towards knowledge and learning. Please check the answers that reflect your opinions best.

7. Please check the answers that best reflect your experience and write your comments in the textbox at the end of this section.
Scales used here:

Extremely Disagree  Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree  N/A

Most things worth knowing are easy to understand.

What is true is a matter of opinion.

Students who learn things quickly are the most successful.

People should always obey the law.

People's intellectual potential is fixed at birth.

Absolute moral truth does not exist.

Absolute moral truth does not exist. Extremely Disagree

Parents should teach their children all there is to know about life.

Really smart students don't have to work as hard to do well in school.

If a person tries too hard to understand a problem, they will most likely end up being confused.

Too many theories just complicate things.

The best ideas are often the most simple.

Instructors should focus on facts instead of theories.

Some people are born with special gifts and talents.

How well you do in school depends on how smart you are.

If you don't learn something quickly, you won't ever learn it.

Some people just have a knack for learning and others don't.

Things are simpler than most professors would have you believe.

If two people are arguing about something, at least one of them must be wrong.
Children should be allowed to question their parents' authority.

If you haven't understood a chapter the first time through, going back over it won't help.

Science is easy to understand because it contains so many facts.

The more you know about a topic, the more there is to know.

What is true today will be true tomorrow.

Smart people are born that way.

When someone in authority tells me what to do, I usually do it.

People shouldn't question authority.

Working on a problem with no quick solution is a waste of time.

Sometimes there are no right answers to life's big problems.

Please leave your comments here:

4. General Use of Online assessment

If you have not ever used any form of online assessment in your teaching, please skip this page.

This page is focused on your general usage of online assessment tools. Please check the answers that best reflect your experiences for the course in which you use or have used online assessment the most.

8. This question is focused on your general usage mode of online assessment.

Please check the answers that best reflect your experiences. Also, please type in your comments at the end of this question.
• I make online quizzes using the built-in test-making functions in my Course Management System.
• I make online quizzes using other online assessment tools.
• I use the results of online quizzes and/or exams as at least part of my students’ final grades for the course.
• Other (please specify)__________________

9. Please check the assessment formats that you have used as online assessments for your course(s):

• Multiple-choice
• Matching
• Ranking
• True-false
• Fill in the blank
• Short-answer
• Essays
• Online discussion
• Journal
• Electronic Portfolio
• Authentic tasks
• Not applicable
10. What is (are) the most important reason(s) for you to use online assessment?
Please check the answer(s) that best reflect your reason(s).

- It is easy to create a test with the built-in test-creating function in the Course Management System.
- I like to use the auto-grading function from some online assessment tools.
- Online assessment allows my students to take the tests at anytime.
- Online assessment allows my students to take the tests no matter where they are.
- Online assessment allows me to report grades to my students quickly.
- Online assessment tools make it easy for students to self-assess.
- Some online assessment tools allow me to organize and analyze my students’ scores.
- Some online assessment tools can automatically adapt subsequent question items on the basis of students’ performance with previous items.
- Online assessment can incorporate various types of multimedia such as videos, audios, digital images, etc.
- I would like to use online assessment tools because my peers are using them.
- It is required by institution/department.
- Other reason(s).

If you have other reasons or opinions, please specify in the comment box.
11. What is (are) the most important reason(s) for you to discontinue using online assessment in the future?

- It is time consuming to create a test using the built-in test-creating function in the Course Management System.
- It is time-consuming to maintain an online test.
- It is time-consuming to grade online assessments.
- It is time-consuming to report grades of an online assessment to students.
- It is time-consuming to analyze and organize the results from the online assessment.
- I need more technical support to implement an online assessment.
- I feel that I lose the control as an instructor in an online assessment.
- I feel the results of online assessment cannot be trusted.
- If you have other reasons or opinions, please specify in the comment box.

7. Open Ended Questions

Thank you very much for your input!

Now this is the last part of this survey. Please answer the following two questions to help us better understand your opinions towards online assessment.

Thank you very much!
17. How can the current available online assessment tools (both commercial and open source systems) be improved to facilitate your teaching and students’ learning?

* 

18. What do you think is the biggest difference between the traditional assessment and online assessment?

19. Please write any comments you would like to share about online assessment

20. To further understand your perceptions toward online assessment, we wish to have the chance to contact you to see if you would be interested in being interviewed by us. If you are interested, please leave your contact information here.

If you are interested in the survey results and our study outcomes, please contact us at: maggiehu@uga.edu

Thank you!
Appendix I  Additional Cross Tab Tables

Table I1

*Crosstab Analytic Result between Course Level and Use of Authentic Tasks to Assess Students’ Performance*

<table>
<thead>
<tr>
<th>Course Level</th>
<th>Used Authentic Task to Assess Students’ Performance</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>Count</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>31.9%</td>
<td>68.1%</td>
</tr>
<tr>
<td>Graduate</td>
<td>Count</td>
<td>6</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>9.5%</td>
<td>90.5%</td>
</tr>
<tr>
<td>Both</td>
<td>Count</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>18.2%</td>
<td>81.8%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>30</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>21.0%</td>
<td>79.0%</td>
</tr>
</tbody>
</table>

χ²=3.472.

*p=.007<.05.*
### Table I2

*Crosstab Analytic Result between Course Level and Use of Authentic Tasks to Provide Service Learning Opportunities*

<table>
<thead>
<tr>
<th>Course Level</th>
<th>Used Authentic Tasks to Provide Service Learning Opportunities</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>Count</td>
<td>43</td>
<td>26</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>62.3%</td>
<td>37.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Graduate</td>
<td>Count</td>
<td>21</td>
<td>42</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>33.3%</td>
<td>66.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Both</td>
<td>Count</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>36.4%</td>
<td>63.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>68</td>
<td>75</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>% within Course Level</td>
<td>47.6%</td>
<td>52.4%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

$\chi^2 = 9.988.$

* $p = 0.003 < 0.05.$
Table I3

*Crosstab Analytic Result between Course Level and Use of Online Discussion for Students to Express Ideas and Get Feedback from the Instructor*

<table>
<thead>
<tr>
<th>Course Level</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>38</td>
<td>31</td>
<td>69</td>
</tr>
<tr>
<td>% within Course Level</td>
<td>55.1%</td>
<td>44.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Graduate</td>
<td>15</td>
<td>48</td>
<td>63</td>
</tr>
<tr>
<td>% within Course Level</td>
<td>23.8%</td>
<td>76.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Both</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>% within Course Level</td>
<td>45.5%</td>
<td>54.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>85</td>
<td>143</td>
</tr>
<tr>
<td>% within Course Level</td>
<td>40.6%</td>
<td>59.4%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 13.469. \]

*p = .001 < .05.*
Table I4

*Crosstab Analytic Results between Course Level and Use of Online Game Simulation to Assess Student Learning*

<table>
<thead>
<tr>
<th>Course Level</th>
<th>Used Online Game Simulation</th>
<th>Count</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>64</td>
<td>5</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>% within Course Level</td>
<td>92.8%</td>
<td>7.2%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td>Count</td>
<td>57</td>
<td>6</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>% within Course Level</td>
<td>90.5%</td>
<td>9.5%</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>Count</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>% within Course Level</td>
<td>63.6%</td>
<td>36.4%</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>128</td>
<td>15</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>% within Course Level</td>
<td>89.5%</td>
<td>10.5%</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\chi^2 = 8.679$.

*p = .013 < .05.
Table 15

*Crosstab Analytic Results between Percentage of Online Delivery and Using Online Quiz for Online Assessment*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery for the course</th>
<th>Use of Online Quiz for Instructional Effectiveness</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td>85</td>
<td>19</td>
<td>104</td>
</tr>
<tr>
<td>Small part online</td>
<td></td>
<td>15</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Small part face to face</td>
<td></td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Half to half</td>
<td></td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>118</td>
<td>31</td>
<td>149</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% within Online Percentage</th>
<th>100.0%</th>
<th>.0%</th>
<th>100.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% within Online Percentage (No)</td>
<td>100.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

$\chi^2 = 16.274.$

*p*= .003 < .05.
Table I6

*Crosstab Analytic Results between Percentage of Online Delivery and Use of Authentic Tasks to Assess Students’ Performance*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery of Course</th>
<th>Used Authentic Tasks to Assess Student Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>100.0%</td>
</tr>
<tr>
<td>Count</td>
<td>19</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>18.3%</td>
</tr>
<tr>
<td>Small part online</td>
<td>4</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>25.0%</td>
</tr>
<tr>
<td>Count</td>
<td>3</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>21.4%</td>
</tr>
<tr>
<td>Small part face to face</td>
<td>3</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>27.3%</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

$\chi^2 = 15.215.$

* $p = .004 < .05.$
Table I7

*Crosstab Analytic Results between Percentage of Online Delivery and Use of Online Discussion to Assess Student Learning Based on the Number and Quality of Responses*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery of the Course</th>
<th>Used Online Discussion Assessed Based on Quality and Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>75.0%</td>
</tr>
<tr>
<td>100%</td>
<td>23</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>22.1%</td>
</tr>
<tr>
<td>Small part online</td>
<td>13</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>81.2%</td>
</tr>
<tr>
<td>Small part face to face</td>
<td>7</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>50.0%</td>
</tr>
<tr>
<td>Half to half</td>
<td>6</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>54.5%</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>34.9%</td>
</tr>
</tbody>
</table>

$\chi^2 = 28.716.$

*$p = 0.000 < .05.$
Table 18

*Crosstab Analytic Result between Percentage of Online Delivery and Use of Online Discussion for Students to Post Comments and to Receive Feedback from Peers*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery</th>
<th>Used Online Discussion for Posting Comments and Getting Feedback from Peers</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Count</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>100%</td>
<td>No</td>
<td>25</td>
<td>79</td>
<td>104</td>
</tr>
<tr>
<td>100%</td>
<td>% within Online Percentage</td>
<td>75.0%</td>
<td>25.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Small part online</td>
<td>Count</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Small part online</td>
<td>% within Online Percentage</td>
<td>24.0%</td>
<td>76.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Small part face to face</td>
<td>Count</td>
<td>4</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Small part face to face</td>
<td>% within Online Percentage</td>
<td>28.6%</td>
<td>71.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Half to half</td>
<td>Count</td>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Half to half</td>
<td>% within Online Percentage</td>
<td>27.3%</td>
<td>72.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>45</td>
<td>104</td>
<td>149</td>
</tr>
<tr>
<td>Total</td>
<td>% within Online Percentage</td>
<td>30.2%</td>
<td>69.8%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 13.662 \]

*p* = 0.008 < 0.05.
Table I9

*Crosstab Analytic Result between Percentage of Online Delivery and Use of Online Discussion for Students to Receive Feedback from the Instructor*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery</th>
<th>Used Online Discussion for Feedback from the Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>0 Count</td>
<td>4</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>100.0%</td>
</tr>
<tr>
<td>100% Count</td>
<td>38</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>36.5%</td>
</tr>
<tr>
<td>Small part online Count</td>
<td>11</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>68.8%</td>
</tr>
<tr>
<td>Small part face to face Count</td>
<td>4</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>28.6%</td>
</tr>
<tr>
<td>Half to half Count</td>
<td>5</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>45.5%</td>
</tr>
</tbody>
</table>

\[
\chi^2 = 12.611.
\]

*p* = .013 < .05.
### Table I10

*Crosstab Analytic Result between Percentage of Online Delivery and Use of Online Course Journal to assess their intellectual development*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery</th>
<th>Used Online Journal to Assess Students’ Intellectual Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>100.0%</td>
</tr>
<tr>
<td>100%</td>
<td>101</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>97.1%</td>
</tr>
<tr>
<td>Small part online</td>
<td>15</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>93.8%</td>
</tr>
<tr>
<td>Small part face to face</td>
<td>14</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>100.0%</td>
</tr>
<tr>
<td>Half to half</td>
<td>8</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td>72.7%</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
</tr>
</tbody>
</table>

$\chi^2 = 14.258.$

*p* = .007 < .05.
Table II1

*Crosstab Analytic Results between Percentage of Online Delivery and Use of Online course Journal to assess their emotional engagement in the course*

<table>
<thead>
<tr>
<th>Percentage of Online Delivery</th>
<th>Used Online Journal to Assess Emotional Engagement of the course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>Count</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
<tr>
<td>Small part online</td>
<td>Count</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
<tr>
<td>Small part face to face</td>
<td>Count</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
<tr>
<td>Half to half</td>
<td>Count</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
</tr>
<tr>
<td>% within Online Percentage</td>
<td></td>
</tr>
</tbody>
</table>

$\chi^2 = 11.989.$

*p* = .017 < .05.