SCAFFOLDING PRESERVICE TEACHERS’ DESIGN OF WEBQUESTS

by

FENG WANG

(Under the Direction of Michael J. Hannafin)

ABSTRACT

In recent years, WebQuests have been widely used to integrate technology with domain pedagogy; teacher educators have explored the WebQuest model to assist preservice teachers in developing technology integration skills akin to those of practicing teachers in everyday schools. Given sufficient support, preservice teachers may design effective WebQuests and improve their technology integration skills prior to entering the teaching profession.

During the past two decades, scaffolding has been studied as a strategy to support the acquisition of knowledge and skills. Appropriately designed scaffolds may enable preservice teachers to both understand the underlying assumptions and assess the viability of their WebQuest designs in everyday classrooms.

This qualitative study examined how preservice teachers reported they used and perceived scaffolds when designing WebQuests. The study was guided by the following research questions:

1. How do preservice teachers report using scaffolds when designing their WebQuests?
2. How do preservice teachers perceive the effectiveness of scaffolds in designing their WebQuests?
Sixteen participants were purposefully selected from an undergraduate-level introductory course section designed to prepare preservice teachers to integrate technology into their teaching. Data from multiple sources were collected, including interviews with five participants and the instructor, surveys on preservice teachers’ backgrounds and opinions about scaffolding materials and procedures, videotaped classroom activities, course project assignments submitted to the instructor, and handouts and course website postings provided by the instructor.

Data were analyzed using constant comparison methods, and several major themes, subthemes, and patterns emerged. The results indicated that preservice teachers followed, adapted, and combined scaffolds as they designed their WebQuest projects. They valued provided scaffolds that explicitly directed their designs or could be modeled, as well as peer or instructor feedback and discussion. They also sought additional scaffolding to support their design needs, and they did not use scaffolds they perceived as ineffective.

This study operationalized WebQuest scaffolds of different types and functions in order to support preservice teachers’ design of WebQuests. The results supported some reports related to designing and implementing WebQuest scaffolds, but contradicted others. Implications for future research are discussed.

INDEX WORDS: Scaffolding, WebQuest, Teacher Education, Preservice Teachers, Technology Integration
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To my wife, Haiyan Sun, and my daughter, Karen S. Wang
   For their love and encouragement

To my major professor, Dr. Michael J. Hannafin
   For his valuable advice and endless patience

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   For her passion and continuous support

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CHAPTER 1

INTRODUCTION

Research on the use of technology in learning and instruction can be traced back from the Internet to computers, instructional TV, film, radio, and even chalk and blackboards (Cuban, 1986; Kent & McNerney, 1999). Enthusiasm for the educational potential of new technology has stimulated considerable research. Technology, especially computers, is viewed by many as accommodating authentic and complex learning goals (Ertmer, 1999; Jonassen, Peck, & Wilson, 1999; Reiser, 2001; Sandholtz, Ringstaff, & Dwyer, 1997). According to the Integrated Studies of Educational Technology [ISET], most educators and parents now consider technology to be “an integral part of providing a high-quality education” (U.S. Department of Education, 2003, p.3).

The high expectation for educational uses of technology has contributed to the rapid improvement of technology accessibility in schools (Cuban, 2001). The sheer amount of technology in US schools has greatly increased since 1995 (Becker, 2000; Reiser, 2001). The CEO Forum (2001) report indicates that the number of students per computer decreased from 10:1 during 1995-1996 to a little over 5:1 during the period of 1999-2000 and the percent of public schools connected to Internet increased from 35 percent in the year of 1994 to 98 percent in 2000. A recent report from the National Center for Educational Statistics ([NCES], 2005) revealed that in 2003, nearly 100 percent of public schools and 93 percent of their instructional rooms had Internet access. Broadband connections were used by nearly 95 percent of the public schools to access Internet and wireless connections were available in 32 percent of the public schools. The ISET study revealed that 81 percent of teachers have “two or more computers in the
classroom” and/or have access to “a computer laboratory with 25 or more computers” (USDOE, 2003, p. 8). In short, computers and high-speed Internet are ubiquitous and widely accessible to students and teachers in the vast majority of U.S. public schools.

Professional development activities have also been widely provided to support teachers’ use of technology for instructional purposes. In 2003, 82 percent of the U.S. public schools with Internet access reported that their teachers had been offered with professional development on curriculum-based, technology integration (NCES, 2005). According to the CEO Forum (2001), 86 percent of U.S. teachers reported feeling somewhat prepared or well prepared to use technology. The ISET study reported a “positive association between the amount and type of professional development activities teachers received and their increased use of educational technology” (USDOE, 2003, p. 15).

However, as the ISET study indicates, teachers use technology mostly for low-level tasks, such as writing, polishing computer skills, doing research with Internet, and doing practice drills (USDOE, 2003). Similarly, Russell, Bebell, O’Dwyer, and O’Connor (2003) found that teachers generally use technology more for communication and preparation than for instruction and student learning. Higher-level use of technology requires teachers to shift their pedagogies from teacher-centered, objectivist approaches typical in existing classrooms to student-centered, constructivist approaches. This shift is especially challenging since teaching beliefs and experiences are developed by years and difficult to change in the short term (Wang & Reeves, 2003). Thus, higher-level use of technology is infrequent in current classrooms and most teachers use technology to sustain their existing teaching patterns rather than to innovate their teaching (Cuban, 2001; Ertmer, 2005).
Relevant preparation while prospective teachers are in preservice programs is critical if we expect effective technology integration in their eventual classrooms (Doering, Hughes, & Huffman, 2003). However, recent attempts by teacher education programs to prepare preservice teachers to teach with technology have proven disappointing (Schrum, 1999). Teacher education programs have lagged behind k-12 schools regarding the integration of technology in instruction (Gillingham & Topper, 1999). As a result, beginning teachers are often inadequately prepared to use technology for their teaching (Strudler et al., 1999). Although beginning teachers report being more comfortable with technology, they use it significantly less often for teaching and student learning than do more experienced teachers (Russell et al., 2003). According to the ISET study, the vast majority of beginning teachers still reported that “professional development to integrate technology into instruction was their greatest need” (USDOE, 2003, p. 13). Consequently, schools and school districts have been forced to re-train newly-hired, beginning teachers (Russell et al., 2003) who graduate from preservice programs ill-prepared to integrate technology into their everyday classroom practices.

Teacher education programs need to explore new ways of educating preservice teachers on technology integration skills. Doering et al. (2003) argued that preservice teachers should be educated to integrate technology within their disciplines and use technology to support and extend student learning. Likewise, Russell et al. (2003) suggested,

One approach to preparing teachers to teach with technology is to move away from focusing on teaching technology and instead focus on teaching with technology—rather than introducing technology as an available yet peripheral tool, emphasizing technology as an integral tool with diverse uses and inherent
potential to enhance teaching and learning beyond what the traditional methods allow (p. 309).

During the past decade, WebQuests have become widely used by teachers to integrate technology, especially computers and Internet, into learning and teaching (Frazee, 2004; Lamb & Teclehaimanot, 2005). Recently, teacher educators have explored the WebQuest model for preservice teachers to develop technology integration skills akin to those used in everyday schools (e.g., King, 2003; Kundu & Bain, 2006; Summerville, 2000). According to Dodge (1995), WebQuest is “an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet” (p. 12). During WebQuests, students learn by solving ill-structured problems, with effective utilization of the web (e.g., multiple resources, communication with experts) and collaboration with peers (Dodge, 1995; March, 2004). Learning with WebQuests involves technology integration for meaningful learning and requires learners to “analyze and synthesize information and exercise information seeking strategies” (MacGregor & Lou, 2005, p. 172).

A WebQuest usually consists of 6 sections: Introduction, Task, Process, Resources, Evaluation, and Conclusion. In the introduction, an authentic and complex problem is established and relevant background information is provided, followed by a general description of the learning task (Dodge, 2001b). In order to motivate students, the task typically is interesting and challenging but do-able. The process section of a WebQuest details procedures or steps for accomplishing the task (Dodge, 1995). “Help” strategies and tools may be provided, such as flowcharts, tables, concept and maps (Dodge, 2001b). A set of Websites or information about available materials is provided in the resources section, which establish a pool of relevant resources that help learners to focus on essential aspects of learning rather than surfing the web.
aimlessly (March, 2000). The evaluation section describes how learners’ work will be evaluated, usually by employing a rubric (Yoder, 1999). Finally, the conclusion encourages the learners to reflect on what they have learned and to extend their thinking to other settings or problems (Dodge, 1995).

One reason that WebQuests have gained popularity is that they are designed or can be flexibly adapted by teachers. WebQuest design requires both technical and higher-order thinking skills (Lim, 2001). Although pre-defined sections make WebQuests comparatively easy for preservice teachers to create, they may create “shallow” WebQuests that do not engage students in meaningful learning (Jonassen, Howland, Moore, & Marra, 2003), and fail to develop pedagogical understanding of technology-enhanced, student-centered learning.

In his dissertation study, Frazee (2004) identified several associated problems in examining the effects of WebQuest strategies on student learning:

“There is very little in the way of empirical research on the elements that make a WebQuest effective…most evidence of its effectiveness is anecdotal. In short, the WebQuest model suffers from a lack of scholarly research, which may hinder those practitioners interested in using this approach to design and deliver effective Web-enhanced instruction” (p. 7).

Similarly, other researchers have characterized WebQuest evidence as primarily anecdotal and lacking empirical support (Draper, Smith, & Sabey, 2004; Lamb & Tecelehaimanot, 2005; Milson; 2001). Preservice teachers lack teaching experience needed to assess the feasibility of WebQuest problems they select or support they provide, and typically have no opportunity to implement them to confirm or disprove their assumptions. It is important
to examine preservice teachers’ use and perceptions of scaffolds to support their WebQuest designs.

Given sufficient support, preservice teachers may design effective WebQuests and improve their technology integration skills prior to entering the teaching profession. Wood, Bruner, and Ross (1976) proposed the term of scaffolding as an “adult ‘controlling’ those elements of the task that are initially beyond the learner’s capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence” (p. 90). In recent years, scaffolding has been used as a strategy to support gradual acquiring of knowledge and skills (Puntambekar & Hubscher, 2005; Sharma, 2001). Scaffolding may help preservice teachers to gradually understand underlying assumptions and assess the feasibility of their individual WebQuests.

WebQuest scaffolds for preservice teachers can be fixed materials (e.g., web resources, handouts) designed or adapted by teacher educators or initiated by preservice teachers themselves during their design processes. The scaffolds can also be dynamically provided by teacher educators or peers in response to emergent learning or performance needs. In a dissertation study, Lim (2001) reviewed WebQuest-appropriate scaffolds available on various websites for teachers’ professional development and categorized them as 1) supplementary tools, including checklists, rubrics, templates, and the Inspiration® software tool, 2) electronic performance support systems (EPSSs, e.g., design templates with which teachers can input contents and generate their WebQuests without saving or uploading files), and 3) online community interactions where teachers can interact with peers and mentors (e.g., the forum created by Dodge on his WebQuest website). Menchaca and McVicker (2003) proposed strategies to assist experienced teachers in collaboratively designing WebQuests step by step,
including scaffolds for brainstorming ideas, diagramming concepts, narrowing a focus, facilitating group work, collecting feedback data, and evaluating and modifying a WebQuest. The availability of various scaffolds seems promising for preservice teachers to successfully design WebQuests, but their effectiveness has yet to be established.

**Statement of the Problem**

While the importance of preparing preservice teachers to integrate technology into everyday instruction continues to grow, comparatively little research has been conducted to identify successful approaches. The emergence of WebQuests among practicing teachers provides a focal point for teacher development and classroom integration, and links several key benefits of meaningful technology use including meaningful ties to curriculum, student-centered teaching and learning activities, and tool uses of technology. WebQuests leverage teachers’ prior teaching experience and extend their ability to teach with technology.

The increased popularity of WebQuests among inservice teachers suggests that these benefits have potential for preservice teachers as well. However, comparatively little research has been conducted on WebQuest implementation. Given the limited prior teaching experience of preservice teachers, some have suggested they lack the experience needed to leverage their WebQuest designs. Lacking adequate support for their designs, WebQuest use among preservice teachers may be naive and ineffective. To better inform both preservice educators and WebQuest designers, research is needed to examine how WebQuest scaffolds are perceived and used by preservice teachers.
Research Purpose & Questions

The purpose of this study was to investigate how preservice teachers use and perceive scaffolds when designing WebQuests. This study was guided by the following research questions:

1. How do preservice teachers report using scaffolds when designing their WebQuests?

Scaffolds, presumed to be effective by designers, might not help preservice teachers when used in ways other than those initially intended; alternatively, deviations in planned use could reveal uniquely effective individual uses not initially anticipated. In order to successfully scaffold WebQuest design, I investigated potential gaps between designers’ assumptions and preservice teachers’ use of scaffolds.

2. How do preservice teachers perceive the effectiveness of scaffolds in designing their WebQuests?

This question was primarily concerned with preservice teachers’ perceptions about the scaffolds’ utility for their WebQuest designs. Some WebQuest scaffolds presumed useful by their designers might not be helpful for preservice teachers to design WebQuests. This investigation allowed both researchers and practitioners to better understand conditions of effective scaffolds for designing WebQuests.

Significance of this Study

This study provides several benefits. First, teachers who want to use WebQuests for their teaching may be informed about different processes of and resources for designing WebQuests. Second, teacher educators can better scaffold their preservice teachers’ WebQuest designs. Third, WebQuest designers can better understand the factors affecting preservice teachers’ actual
use and perceptions of scaffolds and provide them accordingly. This study might also encourage further research and design of various WebQuest scaffolds.

In addition to practical implications, this study contributes several important perspectives to research on WebQuests. Existing empirical research on WebQuests is primarily focused on 1) the effectiveness or problems of the WebQuest model in students’ learning (e.g., Frazee, 2004; MacGregor & Lou, 2004; McGlinn & McGlinn, 2003; Milson, 2001; Orme & Monroe, 2005; Zheng et al., 2005) and 2) the effectiveness of designing WebQuests as a means for learning to teach with technology (e.g., Arhar, Koontz, & Hill, 2002; Dobson, 2003; King, 2003) or for professional development (e.g., Lim, 2003). While considerable WebQuest literature exists, the results regarding preservice teachers’ design and implementation of WebQuests are equivocal. This study offers the potential to document the use and perceptions of scaffolds that guide WebQuest design to inform the design of both teacher and embedded support.
CHAPTER 2
REVIEW OF LITERATURE

The purpose of this study was to investigate how preservice teachers use and perceive scaffolds when designing WebQuests. To inform the design of this study, a thorough literature review was conducted. Four areas of research, theory, and practice are especially relevant to this study: 1) technology integration, 2) WebQuests, 3) scaffolding, and 4) supporting WebQuest design.

Technology Integration

Practices and Issues in K-12 Settings

Recent statistics on classroom uses of technology reveal that computers and Internet are ubiquitous and widely accessible to students and teachers in the vast majority of U.S. public schools (CEO Forum, 2001; NCES, 2005). Professional development activities have also been widely provided to support teachers to use technology for instructional purposes (NCES, 2005), increasing the frequency of teachers’ use of technology (USDOE, 2003). As a result, the majority of U.S. public school teachers have reported feeling somewhat prepared or well prepared to use technology (CEO Forum, 2001).

In contrast to the ubiquitous accessibility of computers and widespread professional development initiatives, computer usage in classrooms remains disappointingly low (Kent & McNerney, 1999). Where incorporated into the classroom, researchers report that teachers use technology mostly for low-level tasks, such as communication, writing, polishing computer skills, doing research with Internet, and doing practice drills (Russell et al., 2003; USDOE, 2003). Higher-level use of technology is infrequent in current classrooms and most teachers still

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tend to use technology to sustain their existing teaching patterns rather than to innovate their teaching (Cuban, 2001; Ertmer, 2005).

Zhao, Pugh, Sheldon, and Byers (2002) conducted a qualitative case study of 10 K-12 teachers’ technology use in order to identify factors that hinder or facilitate teachers’ use of technology in K-12 classrooms. Using constant comparative analysis to analyze collected data, including surveys, interviews, observations, and teacher artifacts (e.g., emails, journals), three salient factors were identified that significantly impact classroom technology integration: the teacher, the project, and the context. Teacher-related factors include technology proficiency, the compatibility between pedagogy and the technology, and knowledge of the social and organizational culture of the school. Project-related factors include the gaps between the technology application and available resources, school culture, and the teacher’s current practice. Finally, context-related factors include technological infrastructure (e.g., equipment, facility), human infrastructure (e.g., technical support staff, polices), and organization culture. Zhao, et al. further reported that while the impact of project- and context-related factors cannot be underestimated, teachers themselves are most important to successful classroom technology integration.

Relevant preparation of K-12 teachers is critical to improve their use of technology for their teaching. According to the Integrated Studies of Educational Technology (ISET), there is a “positive association between the amount and type of professional development activities teachers received and their increased use of educational technology” (USDOE, 2003, p. 15). Ironically, while more comfortable using technology, beginning teachers use technology significantly less often for teaching and student learning than do more experienced teachers (Russell et al., 2003). According to the ISET study, the vast majority of beginning teachers
reported that their greatest need of professional development is to integrate technology into instruction (USDOE, 2003). Consequently, schools and school districts have been forced to retrain newly-hired, beginning teachers (Russell et al., 2003) who graduate from preservice programs ill-prepared to integrate technology into their everyday classroom practices.

Practices and Issues in Preservice Teacher Preparation

Effective preservice teacher preparation is needed if we expect meaningful technology integration activities in eventual K-12 classrooms (Doering et al., 2003). To prepare for the challenges of integrating technology into everyday classrooms, preservice teachers need to not only be proficient with technology but develop their understandings and skills of integral, rather than peripheral, use of technology for student learning (Duhaney, 2001; Russell et al., 2003).

Four approaches have been generally used by teacher education programs to prepare preservice teachers to integrate technology into their teaching: stand-alone course, case-based methods, infusion across the curriculum, and field experience (Gillingham & Topper, 1999). In the stand-alone course approach, a technology integration course is often required for preservice teachers to take early in the sequence of their teacher preparation courses, and is usually separate from the teaching methods curriculum. The case-based approach requires preservice teachers to study and reflect on cases of teachers who have integrated technology into their classroom teaching. Although these approaches are straightforward to implement in teacher education programs, researchers have criticized that both fail to prepare preservice teachers to integrate technology into the subject matter (Brush et al., 2003; Zhao et al., 2002).

To solve this problem, some researchers have suggested that technology needs to be infused across the teacher education curriculum (Willis & Mehlinger, 1996). While this approach offers long-term exposure to technology within subject-matter courses, it has been implemented
inconsistently across courses and instructors. In some teacher preparation programs, it is not considered feasible (Gillingham & Topper, 1999).

During recent years, the integration of technology into field experience has been described as critical for preservice teachers’ successful technology integration (e.g., CEO Forum, 2001; Dexter & Riedel, 2003). Successful implementation examples of the field-based approach have been reported in several teacher education programs (e.g., Strudler & Wetzel, 1999) and projects funded by the Preparing Tomorrow’s Teachers to Use Technology (PT3) initiatives (Brush et al., 2003; Strudler, Archambault, Bendixen, & Weiss, 2003). Although field-based approaches appear promising, researchers have cautioned that many factors may hinder its success, such as insufficient technical and instructional support and limited access to technology at the field site (Brush et al., 2003; Dexter & Riedel, 2003). Teacher education programs need to consider both goals and practical constraints before choosing and implementing their approaches for preservice technology integration.

While various approaches have been proposed and implemented to prepare preservice teachers to integrate technology into classroom instruction, efforts have proven disappointing (Ertmer, 2003; Schrum, 1999; Zhao et al., 2002). Roughly a decade ago, Willis and Mehlinger (1996) observed:

Most preservice teachers know very little about effective use of technology in education and leaders believe there is a pressing need to increase substantially the amount and quality of instruction teachers receive about technology….Teacher education, particularly preservice, is not preparing educators to work in a technology-rich classroom (p. 978).
Evidence suggests that teacher education programs have lagged behind K-12 schools regarding the integration of technology in instruction. According to a report commissioned by the National Council for Accreditation of Teacher Education (NCATE, 1997), many college faculty do not model technology use in their teaching because they underestimate the importance of technology in K-12 education or lacked technology integration knowledge and skills themselves. As a result, beginning teachers are often inadequately prepared to use technology for their teaching (Strudler et al., 1999).

Successful technology integration requires that preservice teachers “view technology use as an integral part of the learning process”; otherwise technology will “remain a peripheral ancillary to his or her teaching” (Pierson, 2001, p. 427). The gap between preservice preparation and the pedagogical and social contexts of everyday classroom settings has proven difficult to overcome (Zhao et al., 2002). Researchers have argued for both the need and importance of preservice teachers to acquire skills in integrating technology within their instruction (e.g., Ertmer, 1999; Means & Olson, 1995; Russell et al., 2003). In some cases, this has been accomplished by integrating technology into preservice field experience (e.g., Brush et al., 2003; Dexter & Riedel, 2003); others have focused on preservice teachers’ design of technology-enhanced curriculum materials (Mishra & Koehler, 2003).

To develop the skills needed to integrate technology into everyday pedagogy, preservice teachers need exposure to examples of curricular and classroom use of technology that “enhance teaching and learning beyond what the traditional methods allow” (Russell et al., 2003, p. 309). Preservice teachers should also be prepared to use technology to design non-trivial, higher-level learning materials that address authentic pedagogical problems (Mishra & Koehler, 2003).
During the past decade, WebQuests have been widely designed and implemented by practicing K-12 teachers (Frazee, 2004). WebQuest designs connect technology with domain content and pedagogy, and are designed to engage students and teachers in higher-level learning activities. Considering their popularity and widespread use in everyday schools, there is a need to examine the potential for WebQuest design and implementation to improve preservice teacher preparation on technology integration.

**WebQuests**

In recent years, WebQuests have been widely used for integrating technology with domain pedagogy. In the following sections, I briefly introduce the WebQuest model and review research about K-12 teachers’ design and implementation of WebQuests in their classrooms. Then, I will examine evidence of its impact on student learning. Finally, I review how preservice teachers are prepared to design and implement WebQuests.

According to Dodge (1995), a WebQuest is “an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet” (p. 12). Technology, as well as teachers and peers, guide learners in utilizing available resources to support higher-order thinking, collaboration, and authentic learning (Dodge, 1995; March, 2004). WebQuests have been used to structure learning through inquiry (Milson, 2001), as well as to enhance motivation and help students to understand the benefits of conducting research on the web (McGlinn & McGlinn, 2003).

A WebQuest usually consists of 6 sections: Introduction, Task, Process, Resources, Evaluation, and Conclusion. In the introduction, an authentic and complex problem is established and relevant background information is provided. For example, the following introduces a WebQuest related to classic broadcast radio drama:
Back before there were televisions and computers, there was radio….Radio allowed the listener to create their own images of characters and settings, a luxury that we no longer have in these days of television. Take a journey back to the "Golden Age of Radio" as you learn about Radio Days.

(http://www.thematzats.com/radio/index.html)

The introduction is followed by a general description of the learning task, which is considered the key to successful WebQuests (Dodge, 2001b). In order to motivate students, tasks typically are challenging but do-able, such as composing a radio drama or compiling web resources for a virtual exhibition. The process section of a WebQuest details procedures or steps for accomplishing the task (Dodge, 1995). “Help” strategies and tools may be provided, such as flowcharts, tables, and concept maps (Dodge, 2001b). A set of Websites or information about available materials is provided in the resources section, which establishes a pool of relevant resources that help learners to focus on essential aspects of learning rather than surfing the web aimlessly (March, 2000). The evaluation section describes how learners’ work will be evaluated, usually by employing a rubric (Yoder, 1999). Finally, the conclusion encourages the learners to reflect on what they have learned and to extend their thinking to other settings or problems (Dodge, 1995). For instance, in the aforementioned radio drama WebQuest, the following is provided in the conclusion section:

The "Golden Age of Radio" is an important part of the history of our country…After completing this WebQuest, you hopefully have a better understanding of the history of radio drama and have a better understanding of what it takes to create a radio drama. To learn more about old-time radio, visit [the following websites]…
WebQuests, now widely used for teachers’ professional development (Lim, 2001), have been characterized as a practical and effective way for K-12 teachers to meaningfully integrate computers and the web with minimal stress (Watson, 1999). According to Dodge (2001b), “the WebQuest model has been incorporated into hundreds of education courses and staff development efforts around the globe” (p. 7). WebQuest workshops and sessions are now common at professional education conferences (Milson, 2001).

One reason that WebQuests have gained popularity is that they can be adapted by teachers. To design a successful WebQuest, teachers need to “compose explanations, pose questions, integrate graphics, and link to websites to reveal a real-world problem” (Peterson & Koeck, 2001, p. 10). Teachers report that their experience with designing and implementing WebQuests helps them “discover new resources, hone technology skills, and gain new teaching ideas by collaborating with colleagues” (Peterson & Koeck, 2001, p. 10). Moreover, WebQuest design and implementation may help teachers not only understand the potential of technology for teaching and learning but also promote student-centered pedagogy.

Perkins and McKnight (2005), following their online survey of K-12 teachers, and included administrators, higher education faculty, and technology vendors, reported that teachers new to WebQuests focused on learning about the basics of WebQuests, while teachers with prior WebQuest experience focused on integrating WebQuests into their classroom teaching practice. They also reported that teachers who had developed webpages and used them with their students were more likely to integrate them into their instruction. Unfortunately, since data from respondents were combined rather than differentiated, findings specific to teachers was not parsed in the analysis.
In a dissertation study, Lim (2001) conducted a descriptive analysis of the WebQuest model which focused on guidelines for designing online inquiry-based learning environments for teacher professional development. WebQuest-related data were collected primarily from email interviews with K-12 teachers and WebQuest designers. The results indicated that designing WebQuests helped practicing K-12 teachers to reflect on their teaching practices, develop instructional design and critical thinking skills, and become better inquirers.

In summary, K-12 teachers have implemented WebQuests extensively in their classrooms, but empirical research regarding the design and implementation remains sparse. Many articles provide intuitive, though largely unsubstantiated, claims and strategies for designing and implementing WebQuests in K-12 classrooms (e.g., Dodge, 2001b; Watson, 1999; Yoder, 1999). The implementation of teacher-designed WebQuests, though widespread, requires further study to identify strategies that support implementation, as well as to identify where specific additional support is needed.

**Impact on Student Learning**

Research on the effects of WebQuests for domain-specific learning has been reported. Orme and Monroe (2005) conducted an analysis of audio-recorded discourse among small groups of 5th and 6th graders engaged in a WebQuest designed to help them “deepen their understanding of the base-ten numeration system” (p. 137). The findings varied by gender and tasks, but overall supported the conclusion that the WebQuest helped to evoke exploratory discourse about mathematical concepts. Likewise, Chuo (2004) conducted an experimental study on the effect of WebQuests on students’ writing apprehension and performance, and their perceptions of the WebQuest learning experience. Students in two undergraduate English as a Foreign Language (EFL) classes participated in the study. One class (N=52), the control group,
was provided only traditional classroom writing instruction while the experimental class (N=51) received WebQuest writing instruction. The results indicated that the WebQuest lesson improved student writing significantly but did not significantly reduce writing apprehension. In addition, while students reported a favorable perception of their WebQuest learning experience, no significant correlations were found between perceptions and writing performance. These studies provide empirical, though somewhat limited, evidence of WebQuests’ positive impact on learning in specific domains.

As with other technology innovations, WebQuests have not always proven effective in improving learning. Burke, Guffey, Colter, and Riehl (2003) conducted an experimental study on the effectiveness of WebQuests in an undergraduate biology course. Participants (N=365) were randomly assigned to a WebQuest laboratory group or a traditional laboratory group. Participants in the WebQuest laboratory group engaged in three researcher-designed WebQuest modules, which incorporated “leading questions, directed research sources, and instructions for organizing group effort and developing products” (p. 3). The learning activities in the traditional laboratory group were not specified. At the end of the laboratory sessions, all participants took an exam designed to measure their comprehension of and engagement in fundamental biology concepts. Although the WebQuest laboratory group had slightly higher average exam scores than the traditional laboratory group, the differences were not statistically significant.

Leite, McNulty, and Brooks (2005) reported two experiments on the impact of WebQuests on students’ learning. In the first experiment, 72 freshmen enrolled in a high school history class were randomly assigned to a classroom group (N=41) or a WebQuest computer lab group (N=31). During the next four sessions, students in both groups studied the same course content: the classroom group participated in four regular history classes while students in the lab
group worked individually on a WebQuest created by the researchers. The instructors were present in both settings and provided support according to students’ needs. At the end of the study, a posttest was administered on the unit content and the researchers conducted unstructured interviews with the instructors and 12 students. The second experiment, focusing on geology, was conducted using procedures similar to the first experiment. Although both instructors and students reported positive experiences with WebQuests, both experiments yielded no differences in student learning between typical classroom and WebQuest learning activities.

Some researchers have documented negative student reactions to WebQuest use. Lipscomb (2003) conducted a study on WebQuest’s effect on 8th graders’ understanding of history. Forty students in two history classes participated in this study and data sources included interviews, surveys, and student journals. Lipscomb reported that multiple WebQuest resources (e.g., Websites and online databases of the Civil War) provided were confusing to some students who experienced difficulties examining and interpreting varied perspectives about historic events. This finding suggests that scaffolding is needed for WebQuest teacher-designers to account for typical students in everyday classrooms. Given their lack of experience, preservice teachers may require support beyond that needed by practicing classroom teachers.

Researchers have identified other WebQuest design and implementation issues. Vidoni and Maddux (2002) pointed out that the WebQuest model does not account for the developmental nature of cognition; that is, many WebQuests are written similarly for students across different grades. Moreover, some WebQuests may not address individual differences and learning preferences, rendering them ineffective or of little use for certain students (e.g., students who are good at working individually). Teachers need to be aware of these shortcomings to ensure that their WebQuests designs are suitable for their students.
In summary, despite growing popularity, empirical studies on the impact of WebQuests on student learning are limited and tentative; in some instances, the results are contradictory. Existing evidence regarding effectiveness is largely anecdotal (Draper, Smith, & Sabey, 2004; Frazee, 2004; Lamb & Tcelehaimanot, 2005; Milson, 2001). While further empirical research is needed to examine both the effectiveness and shortcomings of WebQuests for student learning, it is beyond the scope of this dissertation research. The present program of research focuses on supporting preservice teachers through the varied demands and requirements of WebQuest design.

*WebQuests in Preservice Teacher Preparation*

In recent years, teacher educators have applied the WebQuest model in preservice teacher education to develop technology integration skills akin to those used in everyday schools (e.g., Dobson, 2003; King, 2003). Design activities may help preservice teachers to understand technology’s affordances, constraints, contextual sensitivity, and manipulability (Mishra & Koehler, 2003). Designing WebQuests may help prepare preservice teachers for integrating technology into their future teaching (Kundu & Bain, 2006). However, this may prove challenging because preservice teachers lack the everyday pedagogical and student knowledge, skill, and insights of practicing teachers.

Dobson (2003), in a dissertation study on preservice English language arts teachers’ design of WebQuests, detailed the processes used to integrate technology in a methods course and to teach preservice teachers WebQuest design. Questionnaires, final WebQuests created by the preservice teachers, and transcripts of the course’s electronic conferences were the primary data sources. She found that preservice teachers, given sufficient technical support, can integrate content knowledge and pedagogical skills into an effective web-based lesson by creating a
WebQuest. She concluded that WebQuest design activities help preservice teachers to learn
technical skills (e.g., creating webpages) and to examine the potential and strategies of teaching
with technology. However, this study was mainly descriptive and not rigorously conducted.
There was no detailed description of the research design or data analysis procedures. Findings
were not supported by data analysis results and discussion of the findings was not sufficiently
connected to previous research. Thus, the findings or conclusions from this study were
questionable and of limited value to other research.

Draper et al. (2004) reported that preservice teachers benefited from WebQuest design
and implementation activities that modeled alternative technology integration approaches.
Although the authors identified multiple data sources (e.g., student questionnaires, teaching
journals) and data analytical frameworks (e.g., national teaching standards), they detailed neither
data collection nor analysis procedures in their findings. Likewise, Almeida, Viseu, and da Ponte
(2004) conducted a qualitative study documenting a preservice teacher’s WebQuest design and
implementation for 7th graders. The researchers conducted two semi-structured interviews,
analyzed a 1-page reflection paper written by the preservice teacher, and reported findings
regarding WebQuest design and implementation (e.g., difficulties, feelings). These findings
provided interesting perspectives on preservice teacher perceptions about WebQuest, but few
insights as to similarities with or differences from previous WebQuest studies.

In the same vein, Arhar, Koontz, and Hill (2002) reported a description of WebQuests
implementation in a middle school education program, involving preservice teachers, teacher
educators, and mentor teachers. They informally interviewed the preservice teachers and
collected various artifacts, such as preservice teachers’ final WebQuests, middle-school students’
project documents, and evaluations of the preservice teacher’s WebQuest implementation. Their
results indicated that preservice teachers successfully designed and implemented WebQuests in their middle-school classrooms. Preservice teachers also reported satisfaction with WebQuests for learning and teaching. Arhar et al. concluded that WebQuest activities “resulted in on-site, job-embedded professional development” (p. 53) for both preservice and mentor teachers in their teacher education program.

Prior experience with technology or WebQuests may encourage preservice teachers to design and implement WebQuests. In a case study conducted by Roberts (2005) on preservice teachers’ creation of WebQuests, all 7 participants reported that their prior experience with technology helped them design WebQuests. Likewise, in a survey administered by Leahy and Twomey (2005), more than 90 percent of preservice teachers reported their intention to use WebQuests in their future teaching.

King (2003) conducted an experimental study on how preservice teachers’ WebQuest implementation in real elementary classrooms influenced their perceived efficacy and outcome expectancy about teaching. King found that implementing WebQuests in real classrooms could significantly help preservice teachers develop meaningful and workable WebQuest lessons. But the results also indicated that preservice teachers who actually implemented WebQuests in real classrooms had lower outcome expectancy than those preservice teachers who did not actually implement them. In effect, those with classroom implementation experience developed more realistic expectancies of use and impact than those without implementation experience. A possible reason was that working with actual elementary students “challenged their beliefs that their instruction could affect the learning outcomes of students” (p. 9). As suggested previously, WebQuest design and implementation—even during preservice preparation—may help to
mitigate the practical knowledge and experience gaps between prospective and practicing teachers.

In summary, while empirical studies have been reported, the results regarding preservice teachers’ design and implementation of WebQuests are equivocal. The challenges confronting preservice teachers when designing WebQuests, as well as the guidance and support for their implementation, have yet to be examined closely. Several supports for designing and implementing WebQuests are available, but their utility for preservice teachers has yet to be established. Research is needed to identify the types of support needed by preservice teachers and the utility of existing resources in supporting their WebQuest designs.

**Scaffolding**

In recent years, scaffolding has been used to describe support provided to assist or guide learning or performance (Puntambekar & Hubscher, 2005; Reiser, 2004). Wood, Bruner, and Ross (1976) proposed the term of scaffolding as an “adult ‘controlling’ those elements of the task that are initially beyond the learner’s capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence” (p. 90). Since then, scaffolding has been widely used as a metaphor for a structure that helps learners in accomplishing tasks that would otherwise be impossible without assistance; the structure is gradually removed as it on longer needed (Dennen, 2003; Reiser, 2004). Some have argued that scaffolding involves not so much guiding learners toward a well-structured goal but a learner-centered strategy that supports the learner’s knowledge construction (Duffy & Cunningham, 1996; Hogan & Pressley, 1997).
Features

Puntambekar and Hubscher (2005) identified several scaffolding features: shared understanding, a scaffolder, ongoing diagnosis and calibrated support, and fading. According to Puntambekar and Hubscher, the scaffolder (e.g., the teacher, computer tools) and the learner should have a shared understanding of the learning goal, referred to as intersubjectivity (e.g., Dennen, 2003; Hogan & Pressley, 1997). A scaffolder may help a learner to focus persistently on learning goals by asking questions, requesting clarifications, and offering encouragement (Hogan & Pressley, 1997).

Support is provided based upon an ongoing learner assessment and adaptation of his/her learning needs. Similar to Vygotsky’s (1978) concept of zone of proximal development, scaffolding should support activity just above the learner’s autonomous abilities and change as the learner develops skills and understanding. Moreover, the scaffolder needs to create a safe environment where the learner can try out alternatives and not be punished by making mistakes (Hogan & Pressley, 1997).

Finally, fading of support, a fundamental scaffolding construct, involves the gradual rather than abrupt removal of support as the learner becomes increasingly capable of performing independently. Ultimately, through gradual fading, the learner can maintain and demonstrate the knowledge and skills needed to complete a desired task without external support. In addition, the scaffolders may further provide opportunities for the learner to transfer the new knowledge and skills to new contexts (Hogan & Pressley, 1997).

Functions

According to Puntambekar and Hubscher (2005, p. 1), scaffolding functions are “no longer restricted to interactions between individuals” but include “the support provided in
technology tools, peer interactions, and discussions aimed at the whole class”. Hannafin, Land, and Oliver (1999) classified scaffolds according to the functions they serve. Procedural scaffolding provides operational steps for finishing a task, such as step-by-step manuals for using web editors or creating a WebQuest. Conceptual scaffolding guides learners in what to consider, using supports such as conceptual maps and outlines. Strategic scaffolding suggests alternative ways of conducting a task and helps learners choose and implement the best suited tactics. Metacognitive scaffolding helps learners reflect on their learning goals, monitor their own learning processes, assess what they have done, and become aware of their strengths and weaknesses as learners.

Research has been reported on the impact of scaffolds designed to support different functions. MacGregor and Lou (2005) conducted a mixed-methods study on the effect of instructional scaffolds to fifth-grade science students’ learning with WebQuests. Statistical methods were used to analyze quantitative data collected from pre- and post- tests; constant comparative analysis was employed to identify themes and patterns in interview transcripts and field notes. The results revealed that procedural scaffolds (e.g., clustered texts with textboxes and subheadings in a webpage) helped learners to focus on the most important contents and tasks by reducing their cognitive burden, while conceptual scaffolds (e.g., a study guide, a concept map) helped learners to organize and synthesize information they encountered.

Based on a design experiment on the potential of web-based scaffolds and resources for developing critical thinking and supporting problem-based social studies, Saye and Brush (2002) examined the role of procedural scaffolds on cognitive load. A teacher and students in three 11th grade U.S. history classes participated in this longitudinal study. Qualitative methods were employed to analyze collected data, including interview transcripts, field notes, student artifacts,
and log files of students’ access to a resources database. The results revealed that procedural scaffolds (i.e., guidance about how to use available resources and tools) reduced cognitive load for both learners and teachers. As a result, procedural scaffolding directly improved both the quality and likelihood of completing a learning activity. Expert guidance embedded in the system provided strategic scaffolding, guiding students “through approaches they might employ to make more effective decisions (p. 93).”

Others have examined how procedural scaffolds are perceived and used. Oliver and Hannafin (2000) conducted a qualitative case study focusing on the use of technological tools to support students’ learning using the Knowledge Integration Environment (KIE)—a web-based science teaching and learning system. One teacher and 12 middle school students participated in this study; data sources included interviews, observations, student artifacts, and pre- and post-tests. The results indicated that students tended to use procedural scaffolding (e.g., instructions on what to do for a learning activity) most frequently. The authors speculated that while students might experience difficulties completing learning activities without procedural guidance, they may assume such guidance specified “explicitly what to do” (p. 87). However, the results also revealed that students were often reluctant to use metacognitive scaffolds to evaluate their learning processes and reasoning behind their ideas. As a result, they tended to “make naïve assumptions, overlook multiple problem perspectives, and fail to validate their ideas or elicit alternative views” (p. 88). In effect, KIE metacognitive scaffolds failed to engender either the use of reflection assumed by designers.

In their qualitative case study conducted, focusing on 18 college students’ use of scaffolds when learning with Internet resources, Greene and Land (2000) also suggested that metacognitive scaffolds may be glossed over by students. Comparative methods were employed
to analyze data, primarily consisting of videotaped observations and students’ “think-aloud” verbalizations. The results indicated that metacognitive scaffolds (in this case, a set of guiding questions intended to prompt intentional reflection) were sometimes omitted or superficially used by students, who considered them a restriction to their learning progress and thereby failed to engage in higher-order thinking. Designers may need to augment and cue students more explicitly as to the value and purposes of metacognitive scaffolds.

In summary, differences are apparent in both how scaffolds are designed and used, as well as their perceived value. Often, researchers have examined scaffolds in the form of static materials. As both Saye and Brush (2002) and Oliver and Hannafin (2000) reported, however, spontaneous teacher and peer scaffolding emerged. Dynamic scaffolds—those that emerge “in the moment”—may prove especially helpful in supporting high-level conceptual tasks (e.g., synthesizing evidence, identifying patterns) often encountered during WebQuest design. Some performance or learning needs cannot be anticipated in advance, and may require dynamic teacher or peer support.

**Types**

*Directive and supportive scaffolds.* Silliman and Wilkinson (1994) proposed that scaffolds can be either directive or supportive according to classroom communication needs and means. Directive scaffolds are provided by teachers or designers to support the learning goals, content, and strategies provided. Supportive scaffolds are student-centered approaches, through which a student collaborates with a teacher (or a more knowledgeable adult) to plan the learning task, select learning strategies, and monitor learning effectiveness until the responsibility of learning is gradually transferred from the teacher to the student.
Since supportive scaffolds usually require extensive interaction and collaboration between individual students and the teacher, they are rarely implemented in current learning environments including WebQuests. Rather, designers, who are sometimes teachers themselves, typically determine the learning tasks, goals, and strategies, and provide directive scaffolds for student learning. For instance, WebQuests provide explicit help and guidance to facilitate tasks such as processing resources, creating learning products, and making decisions (Dodge, 2001b). Likewise, directive scaffolds are also provided in the Web-based Inquiry Science Environment (WISE) (Linn, Clark, & Slotta, 2003): an inquiry map and detailed instructions are provided for each step so that students can closely investigate a topic; question prompts are incorporated to help students monitor and reflect on their learning progresses. Given the demands for WebQuest design, directive scaffolds may be most critical to developing procedural fluency while supportive scaffolds may help to bridge the knowledge and experience gaps between preservice and practicing teachers.

**Fixed and dynamic scaffolds.** Based on two closely related scaffolding classifications (i.e., Azevedo, Cromley, & Seibert, 2004; Saye & Brush, 2002), scaffolds can be classified as either fixed or dynamic. Fixed scaffolds are static, not adaptive to individual learning needs, while dynamic scaffolds are usually initiated or created during learning and adaptive to individual learning needs. Particularly, dynamic scaffolding often requires a teacher or a more capable peer to continuously diagnose the learner understanding and provide timely support accordingly.

Fixed scaffolds and dynamic scaffolds can prove mutually beneficial. Fixed scaffolds can serve as an intermediate structure for dynamic scaffolds by creating time for teachers to reflect on and think about the task before providing assistance; in other words, they provide a “thinking
space between the student’s initial response and the teacher’s supporting response” (Saye & Brush, 2002, p. 93). A conceptual map illustrating the procedures of conducting an experiment on water quality, for example, may help the teacher to consider how best to provide suggestions. Fixed scaffolds may be especially useful for teachers who have difficulties spontaneously supporting student effort; conversely, dynamic scaffolds may improve the effectiveness of fixed scaffolds that otherwise fail to support student learning (Saye & Brush, 2002). Greene and Land (2000) reported that their students were unable to use fixed scaffolds (e.g., Internet resources, static guiding questions) to expand their current thinking when dynamic scaffolds (e.g., instructor and peer interaction) were not provided. Research is needed to better understand the unique as well as synergistic contributions of fixed and dynamic scaffolds to preservice teachers’ WebQuest designs.

To summarize, considerable scaffolding theory and research have been published during the past two decades. However, it is unclear how existing scaffolds are used, or the types of scaffolds needed, to support preservice teachers’ WebQuest design. Scaffolding may help to bridge the gap between preservice teachers’ limited teaching experience and the more advanced experiences and technology integration skills required for WebQuest design. Different scaffolds may address specific problems that prospective teachers encounter. It is important to explore how scaffolding types and functions are used and can be applied to support preservice teachers’ WebQuest designs.

**Scaffolding Preservice Teachers’ WebQuest Design**

Lim (2001) categorized available web-based scaffolds as supplementary tools (including checklists, rubrics, templates, and *Inspiration®*), electronic performance support systems (EPSSs, e.g., design templates and tools with which teachers can input contents and generate their
WebQuests without saving or uploading files), and online communities where teachers interact with peers and mentors (e.g., the forum created by Dodge on his WebQuest website). Likewise, Menchaca and McVicker (2003) proposed strategies for scaffolding teachers’ collaborative design, including brainstorming, diagramming concepts, narrowing a focus, facilitating group work, collecting feedback data, and evaluating and modifying a WebQuest. In addition, teacher educators often provide support materials or communicate face to face to help preservice teachers design WebQuests. In the following sections, I present a research framework which operationalizes scaffolding types and functions to support WebQuest design.

**Fixed Scaffolds**

**Fixed procedural scaffolding.** Procedural scaffolds have been developed to support low-level production activities that enable teacher-designers to focus on the pedagogical aspects of their WebQuests (Lim, 2001). Templates, for example, provide descriptions of WebQuest structures and components along with useful tips and prescribed space to add content. Although most WebQuest templates have similar components and structures (i.e., introduction, task, process, resources, evaluation), they vary in styles, focus, and topic/content; thus, they allow preservice teachers in various education domains to easily and quickly initiate WebQuest designs (Lim, 2001).

Procedural scaffolds may prove especially helpful to reduce preservice teachers’ cognitive burden and improve performance (MacGregor & Lou, 2004; Saye & Brush, 2002). Procedural scaffolds provided as Electronic Performance Support Systems (EPSSs) may minimize technical demands, such as editing and uploading webpages, and enable them to focus on teaching-learning content (Lim, 2001).
Fixed procedural scaffolding may help preservice teachers avoid being distracted or overwhelmed by the cognitive burden associated with technical design issues. QuestGarden (http://webquest.org/questgarden/), an EPSS recently developed by Bernie Dodge, enables preservice teachers to input content into designated template fields, save them for further editing, or directly publish their WebQuests. As a result, QuestGarden makes it “easier and quicker to create a high quality WebQuest” (see http://webquest.org/questgarden/author/overview.htm).

Other existing materials may also serve as fixed procedural scaffolds to guide preservice teachers through the steps involved in designing WebQuests. The “WebQuest Design Process”, for example, uses a flowchart to illustrate the steps involved in creating a WebQuest and provides explicit instructions regarding what to read, think, and accomplish during each step (Dodge, 2004). Likewise, rubrics for evaluating WebQuests can also explicitly guide preservice teachers to design their WebQuests by listing specific requirements and grading criteria for aspects of WebQuest design, such as visual appeal, connection to curriculum standards, and quality of resources (see http://webquest.sdsu.edu/webquestrubric.html). In effect, fixed procedural scaffolding may enable preservice teachers to engage in designing WebQuests that might otherwise be not accomplishable.

**Fixed conceptual scaffolding.** Resources may also guide and induce understanding about, or help to identify key conceptual knowledge of, WebQuest design. For instance, Building Blocks of a WebQuest (http://projects.edtech.sandi.net/staffdev/buildingblocks/p-index.htm) provides purposes, explanations, and examples for each WebQuest section. Yoder (1999) reported anecdotal evidence suggesting that similar approaches guided teachers in the WebQuest designs. Although each WebQuest section is self-explanatory, fixed conceptual scaffolding may
help preservice teachers understand specific requirements and expectations of, as well as the process underlying, effective designs.

Choosing a suitable WebQuest topic, for example, requires the teacher-designer to consider potential topics worthy of investigation and to examine their authenticity, complexity, and connections to curriculum standards (Peterson, Caverly, & MacDonald, 2003; Yoder, 1999). Since many inservice K-12 teachers report difficulty in identifying WebQuest-appropriate topics in their established teaching practice, this may prove especially daunting to preservice teachers (Lim, 2001). Conceptual scaffolding may help preservice teachers independently judge the suitability of possible WebQuest topics prior to initiating their WebQuest designs. In addition, some conceptual scaffolds, such as diagrams and semantic maps, may help preservice teachers to both brainstorm, discuss, and choose suitable WebQuest topics as well as to identify appropriate content (Menchaca & McVicker, 2003).

Preservice teachers may be assisted in developing classroom technology integration awareness and knowledge by analyzing related classroom technology integration examples of more seasoned teachers (Gillingham & Topper, 1999). Since preservice teachers rarely implement their WebQuests, concrete, authentic classroom implementation examples may help to mitigate the teaching knowledge and experience gap between pre- and in-service teachers. For instance, some WebQuest sites (e.g., http://www.thirteen.org/edonline/concept2class/webquests) introduce, via text and video, critical WebQuest perspectives, classroom implementation examples, and possible implementation difficulties. Using captured experience and teacher wisdom, fixed conceptual scaffolds may enable preservice teachers to anticipate the complexities of everyday classrooms, thereby helping improve the practicality of their WebQuests.
Fixed metacognitive scaffolding. Lacking first-hand experience and knowledge about classroom teaching, preservice teachers may experience difficulties enacting important WebQuest principles (e.g., meaningful learning, collaborative learning). As a result, their WebQuest designs may prove shallow or impractical, or fail to represent the WebQuest model (Dodge, 2001b). Metacognitive scaffolding are very helpful to improve the quality of preservice teachers’ WebQuests by encouraging or prompting them to monitor, assess, and reflect on their WebQuest design processes. For instance, prompt questions or hints (Hmelo-Silver, 2004; Lin, 2001), have been provided in handouts or webpages as fixed metacognitive scaffolds to encourage preservice teachers to reexamine their designs by asking: Is your WebQuest task challenging and doable? Do your students need to think independently and critically during the WebQuest activity?

Sometimes obvious, but critical, problems (e.g., poor readability, navigation problems) may be overlooked by preservice teachers. Metacognitive scaffolds can help learners detect errors, question and explain ideas, activate prior knowledge, and refine their own understandings (Lin, 2001). Likewise, metacognitive scaffolding may help preservice teachers to identify and fix WebQuest design problems before concluding their WebQuest designs. For example, Menchaca and McVicker’s (2003) feedback scaffold encouraged teachers to seek colleagues’ feedback regarding the usability and potential of their WebQuests for student learning. In addition, fixed metacognitive scaffolds such as checklists are helpful for teacher-designers to reflect on their own design processes and identify specific problems to be fixed (Lim, 2001). For example, checklists may list specific aesthetic fine points (e.g., webpage background color, font size, line spacing) or specific details in the process section (e.g., individual student roles during
collaboration, guidance for conducting a task) for preservice teachers to reflect upon (see Dodge, 1999a, 199b).

**Fixed Strategic Scaffolding.** Fixed strategic scaffolds may help preservice teachers to consider various WebQuest approaches and choose those best suited to their topics. The Design Patterns webpage ([http://webquest.sdsu.edu/designpatterns/all.htm](http://webquest.sdsu.edu/designpatterns/all.htm)), for instance, lists different strategies for designing WebQuests, such as designing a travel itinerary, telling a history story, and clarifying important concepts. Each strategy includes a brief description, statement of instructional purpose, and related WebQuest examples and templates. According to the webpage introduction, these design patterns, while distinct from others in content and organization, can be used to address different content with the same structure (e.g., introduction, process, task).

Considering the importance of WebQuest task specification, it is important to help preservice teachers develop tasks that engage students in meaningful learning, design, creativity, and judgment (Dodge, 2001b). Fixed strategic scaffolds may help preservice teachers choose from alternatives and implement the best tactics for their WebQuest tasks. The *Taxonomy of WebQuest Tasks* (Dodge, 2002), for instance, lists 11 types of tasks that are both doable and engaging. Detailed explanations, examples, and specific design tips are provided for each type of task. Preservice teachers may choose one or combine several based on their design. Dodge (2001b, p. 9) reported these supports as “useful in helping [teachers] see alternative ways to frame what they ask of their students.” Empirical research is needed to examine whether and how fixed strategic scaffolds help preservice teachers design WebQuest tasks and other specific sections.
Dynamic Scaffolds

Dynamic scaffolds provide emergent and adaptive support for preservice teachers’ WebQuest designs. These interactions may take place in traditional classroom environments or in virtual interactive spaces (e.g., online forums, listserves, emails). Teacher educators, as well as peers, provide various dynamic scaffolds for preservice teachers to design WebQuests (Lim, 2001), such as step-by-step instruction, demonstration and discussion of examples and resources, and spontaneous suggestions of how to choose a design pattern and task type. Modeling and coaching, often effective in preparing preservice teachers to teach (Schön, 1987), have also been implemented through questioning strategies (Hmelo-Silver, 2004).

Dynamic procedural scaffolding. Preservice teachers new to WebQuests may be confused by available design guidance, find it of little help, or simply require assistance beyond that provided to address needs “in the moment”. Thus, fixed scaffolds per se may not be sufficient to support preservice teachers as they initiate and develop their designs (Lim, 2001). Dynamic procedural scaffolding, in contrast, emerges from and adapts to individual needs. For instance, an instructor may advise a preservice teacher to start with WebQuest templates to avoid unproductive topics such as treasure hunting and simple information gathering. As such, dynamic procedural scaffolding may help anticipate and minimize WebQuest design hurdles before they emerge.

Preservice teachers may also need dynamic procedural scaffolding from instructors or peers to solve emergent problems. Many preservice teachers eventually report technical difficulties when creating their WebQuests (Summerville, 2000). Although they may refer to manuals or technical documents, the additional cognitive load and complexity can significantly impede their performance (Wood & Wood, 1999). Thus, preservice teachers may benefit from
dynamic procedural scaffolding to accommodate individual “how to” problems and concerns that emerge during WebQuest design.

Dynamic conceptual scaffolding. Teacher scaffolding, designed to address confusions during web-enhanced instruction, has proven important for high school students to complete conceptual tasks (e.g., synthesizing information) (Saye & Brush, 2002). Likewise, preservice teachers may benefit from dynamic scaffolding to understand key concepts applicable to their WebQuests. For example, instructors may introduce the WebQuest history and underlying theories, discuss the importance of web resources, explain critical concepts, demonstrate different examples, or identify prototypical WebQuest design problems (e.g., Stohr-Hunt & Joyce, 2003; Summerville, 2000). In addition, instructors may identify new, or explain how existing, scaffolds can guide preservice teachers’ designs.

According to Azevedo et al. (2004), dynamic instructor scaffolding (e.g., providing feedback, questioning) significantly improved undergraduate students’ conceptual understanding of complex topics (i.e., the circulatory system) during learning from hypermedia. Likewise, instructors may address WebQuest design questions or prompt preservice teachers with specific WebQuest design issues, such as choosing a suitable topic and designing a challenging but feasible task. As a result, dynamic conceptual scaffolding may help preservice teachers think about important WebQuest concepts that they may otherwise gloss over, thereby developing deep understandings about the WebQuest model.

Dynamic metacognitive scaffolding. According to Greene and Land (2000), instructors better diagnosed the strengths and limitations in college students’ thinking than did fixed metacognitive scaffolds during learning with Internet resources; as a result, metacognitive instructor scaffolding significantly helped these students to “expand, formalize, and refine
reasoning behind ideas” (p. 175). Likewise, instructors may diagnose preservice teachers’ WebQuest designs, helping them to reexamine their specific WebQuest tasks en route and to reflect on their design processes.

Peer evaluation enables peers to engage in both the evaluation process and the learning process (Sluijsmans, Dochy, & Moerkerke, 1999). Peer evaluation may also help preservice teachers engage in refining their own WebQuests as well as assessing others. For example, teachers reported that WebQuests’ online forum (http://www.webquest.org) enabled them to ask peers questions, solicit feedback, and share resources and ideas to improve their WebQuests (Lim, 2001). Thus, dynamic metacognitive scaffolding from peers or instructors may help preservice teachers identify and address specific problems that they may otherwise overlook.

Dynamic strategic scaffolding. Guidance strategic scaffolding by experts has improved high school students’ decision making for their own learning (Saye & Brush, 2002). Similarly, strategic guidance from instructors may scaffold preservice teachers to examine various WebQuest patterns or task types and help them to choose and implement the best suitable tactics of designing WebQuests.

Peers may provide different types of dynamic support than instructors. Peer interaction may prompt learners to justify their own positions and to acknowledge alternative points of view (Ge & Land, 2004). Based on their observation of 48 high-school students’ design of WebQuests, Peterson and Koeck (2001) reported that peer interactions motivated student-designers to seek WebQuest designs potentially valued by their peers. Likewise, peer interaction may provide dynamic strategic support for preservice teachers to examine and implement alternative WebQuest design strategies, hereby helping them design WebQuests better attuned to student interests.
Implications for Research

Different scaffolding types and functions have considerable, but as yet untested, potential to support preservice teachers’ WebQuest designs. The following questions need to be addressed.

*What challenges do preservice teachers confront when designing WebQuests?*

Preservice teachers rarely implement their WebQuests in real classrooms and lack the everyday pedagogical and student knowledge, skill, and insights of practicing teachers. However, successful WebQuest designs require high-level teaching knowledge and skills that preservice teachers have yet to develop, such as accommodating student needs, anticipating implementation complexities, and situating WebQuests within curriculum standards (Lim, 2001; Peterson, Caverly, & MacDonald, 2003; Summerville, 2000; Yoder, 1999). Thus, lacking first-hand teaching experience, they may design shallow or impractical WebQuests, or fail to understand or implement essential WebQuest principles (Dodge, 2001b).

In order to better scaffold preservice teachers’ design of WebQuests, research is needed to examine the challenges preservice teachers confront when designing WebQuests and the conditions of successful WebQuest designs. Some of the challenges and conditions may be applicable to all teacher-designers while some may be specific to preservice teachers due to their limited teaching knowledge and experience. Empirical research on these issues will help improve the utilities of WebQuest scaffolds for both teacher-designers in general and preservice teachers in particular.

*How do preservice teachers perceive and use available scaffolds to support WebQuest design?*

Gaps have been evidenced between designers’ assumptions and adult learners’ use of technological scaffolds during learning with a hypermedia learning environment (Iiyoshi, 1999). Potential gaps may also exist between designers’ assumptions and preservice teachers’ use and
perception of WebQuest scaffolds. Most existing WebQuest scaffolds are designed for teacher-designers in general, who possess the requisite experience, knowledge, and skills, rather than specifically for preservice teachers. However, researchers have yet validated or examined how existing and emergent WebQuest scaffolds are used or perceived by preservice teachers. Scaffolds, presumed to be effective by designers, may not help preservice teachers when used in ways other than those initially intended; alternatively, deviations in planned use may reveal uniquely effective individual uses not initially anticipated. Thus, research is needed to investigate whether and how preservice teachers access and follow guidance when designing their WebQuests. Further, some WebQuest scaffolds presumed useful by designers might not be valued by preservice teachers when designing WebQuests. Thus, there is a need to investigate preservice teachers’ perceptions of WebQuest scaffolds.

Many methods can be used to investigate these issues. Interviews, particularly useful for deep understanding of experience and social phenomena (Kvale, 1996; Silverman, 2000), may help to clarify preservice teachers’ intentions, uses, and perceptions of WebQuest scaffolds. Surveys may provide useful data as well, especially regarding their perception of existing scaffolds. Electronic log files (Saye & Brush, 2002) may provide data to document access (e.g., time, frequency) to specific scaffolds.

*Do existing and emergent scaffolds influence the quality of preservice teachers’ WebQuest designs?*

Currently, few WebQuest scaffolding strategies—existing or emergent—have been studied; existing reports have provided largely anecdotal support (e.g., Dodge, 2001b; Yoder, 1999). Scaffolds described as effective may fail to improve quality, while scaffolds described as ineffective may ultimately prove beneficial to WebQuest designers. Likewise, evidence from
practicing teachers may provide important insights as WebQuest design, but fail to inform how to scaffold preservice teacher design. Emergent scaffolds provided by teacher educators and peers have been characterized as helpful for designing WebQuests (Lim, 2001), but their effectiveness has not been established. Metacognitive scaffolds, for example, were often undervalued by learners despite being considered by designers as critical to support higher-order thinking and meaningful learning (Greene & Land, 2000; Oliver & Hannafin, 2000). The use and design impact—perceived, reported, and actual—of existing and emergent WebQuest scaffolds needs to be empirically examined.

Two issues warrant further investigation. First, we need to determine the extent to which existing and emergent scaffolds influence preservice teachers’ WebQuest designs. Researchers might adopt or adapt the existing WebQuest supports for preservice teacher use to determine the extent to which they are used, as well as the quality of the resulting designs. Likewise, it may prove helpful to both document peer-to-peer support for WebQuest design among practicing teachers and to test their potential applicability for inexperienced preservice teachers. Contextual factors, such as limited prior experience with technology and access to technical support, may influence the effectiveness of existing scaffolds for preservice teachers. Research methods, such as interviews, observation, and surveys, may help researchers identify these contextual factors as well as their impact to WebQuest scaffolding for preservice teachers.

Does WebQuest design during preservice education influence teachers’ subsequent integration of WebQuests (and technology) into classroom teaching practice?

Two primary goals of preservice teachers’ WebQuest design are to develop an understanding of how to create WebQuests as well as to integrate WebQuests into classroom teaching practice. However, empirical research results on preservice teachers’ design of
WebQuests are equivocal (e.g., King, 2003, Roberts, 2005); no empirical research has been conducted regarding the impact of preservice teachers’ design on the likelihood or quality of teaching with WebQuests after graduation.

Longitudinal studies are helpful to investigate the impact over time. First, it is important to determine whether scaffolds aid preservice teachers in differentiating superficial from essential WebQuest activities and design features. Next, it is important to determine whether prospective teachers who have successfully designed WebQuests during preservice education subsequently integrate them effectively into their everyday classroom teaching practice. Scaffolding WebQuest’s underlying principles (e.g., authentic learning, accommodating student interests, and promoting critical thinking), considered vital to classroom implementation, may better prepare prospective teachers to both design and implement WebQuests in their real-world classrooms. In addition, research is needed to further examine the influence of WebQuest implemented on their students’ learning.

**Conclusion**

In conclusion, while considerable research has been conducted on teachers’ design of WebQuests, the applicability of these studies to preservice teacher education has not been established. Further research on preservice teachers’ WebQuest design is needed to identify both where existing research adequately informs practice as well as where unique needs must be addressed. Empirical research on these and related issues should provide valuable evidence to guide both researchers and teacher educators in better preparing preservice teachers to design as well as integrate WebQuests in their classroom teaching and learning activities.
CHAPTER 3

METHODOLOGY

The purpose of this study was to investigate how preservice teachers use and perceive scaffolds when designing WebQuests. Two research questions guided this study:

1. How do preservice teachers report using scaffolds when designing their WebQuests?
2. How do preservice teachers perceive the effectiveness of scaffolds in designing their WebQuests?

Research Design

I designed a qualitative research study in order to explore preservice teachers’ use and perceptions of WebQuest scaffolds and report with rich descriptions. Qualitative research approaches are suitable for research questions about people’s experiences in the context of naturalistic environments (Patton, 2002). In contrast to quantitative approaches, which are usually used for the goals of prediction, hypothesis testing, control, and confirmation (Merriam, 1998), qualitative research approaches allowed me to deeply inquire into preservice teachers’ experience of utilizing WebQuest scaffolds.

Merriam (1998) identified five major characteristics of qualitative research. First, qualitative researchers investigate how people construct meaning through interaction with their social worlds. Second, data collection and analysis are mediated through the human researcher who adjusts responsively to the research context. Third, field work is usually involved with qualitative research and requires the researcher’s physical presence in the research setting. Fourth, inductive research is the primary qualitative research strategy, used to build theories, abstractions, concepts, or hypothesis rather than test existing theories. Finally, qualitative
research products are richly descriptive to convey the researcher’s understanding about the phenomenon.

This study featured each of these characteristics. I stayed in the research setting, collected field-based data, processed data immediately, and adapted research techniques according to the classroom context. Furthermore, this study was a generic qualitative study as classified by Merriam (1998). This type of study simply seeks to “discover and understand a phenomenon, a process, or the perspectives and worldviews of the people involved” (p. 11). In this type of study, data are often collected through observations, interviews, and document analysis, analyzed with concepts from the underlying theoretical framework; constant comparative methods are often employed to seek recurring patterns that cut across the data. These principles and techniques were used in this study to investigate preservice teachers’ use of scaffolds and to assess their perceptions of scaffold utility.

Setting and Participants

EDIT 2000 was an introductory course for preservice teachers to learn how to integrate technology with their teaching, offered in the College of Education of a large university in the Southeastern United States. EDIT 2000 focused on both technological skill acquisition and technology integration, and helped preservice teachers to learn to create technology-enhanced teaching and learning activities in PK-12 classrooms. Most students were sophomores or juniors majoring in specific areas of education. In order to develop their understandings of classroom technology integration, preservice teachers were required to read articles related to technology application in educational settings and to explain how technology could be used to enhance learning and teaching. Reflecting the growing role of the Web in teaching, this course also supported preservice teachers in evaluating and utilizing various Web resources. At the end of
this course, each preservice teacher produced an online electronic portfolio comprising learning and teaching products, such as a PowerPoint game, an idea flowchart, a newsletter, and a personal website. Through EDIT 2000, preservice teachers were expected to design learning materials that supported diverse learner needs.

This course was selected mainly because it focused on preparing preservice teachers to integrate technology prior to entering their classrooms. During recent course offerings, the instructor required preservice teachers to design WebQuests and to incorporate them in their electronic portfolios. Thus the WebQuest project, which also accounted for 15% of the final course grade, provided a strong incentive for preservice teachers to engage and perform in their WebQuest design activities. Preservice teachers were provided with two WebQuest templates, one for students (Appendix A) and the other for teachers (similar to a lesson plan). Each template presented a design structure and a visual style (e.g., font, color), as well as instructions about what each WebQuest section should include.

A further reason for selecting this course was that the instructor had developed insights and experience for helping preservice teachers to design WebQuests. During preliminary studies, the instructor provided suggestions for refining the course syllabus and scaffolds related to WebQuest design. Moreover, she was both motivated to improve the course and willing to incorporate new materials and procedures. Active collaboration was critical to this study because the instructor directly influenced how WebQuest scaffolds were introduced and used by preservice teachers.

**Scaffolding Materials**

In recent years, scaffolding has been used to describe support provided to assist or guide learning or performance (Puntambekar & Hubscher, 2005; Reiser, 2004). This study provided a
total of 12 WebQuest scaffolds (see Appendices A to L), selected from various WebQuest websites or designed and validated by the researcher during pilot studies. Using these scaffolds, student-designers needed to identify suitable topics and apply effective strategies within the WebQuest framework. While a range of scaffolding types and classifications had been reported in the literature, I operationalized fixed and dynamic scaffolds using Hannafin et al.’s (1999) functional classifications to support WebQuest design. Table 3.1 illustrates how scaffolds provided in this study were aligned. [Note: Scaffolds assume multiple functions depending on the context of their use; they are shown in specific classifications as examples only.]

**Scaffold Types**

Hannafin et al. (1999) noted that scaffolds serve different functions, and classified them as procedural, conceptual, metacognitive, and strategic in nature. In practice, a scaffold often supports multiple functions. In this study, this framework was used to classify the functional attributes of scaffolds and to investigate how specific functions were used and perceived by preservice teachers.
## Table 3.1

**Scaffolds for WebQuest Design**

<table>
<thead>
<tr>
<th>Scaffold Type</th>
<th>Function</th>
<th>Fixed Scaffolds</th>
<th>Dynamic Scaffolds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adapted/Adopted</td>
<td>Researcher-Designed</td>
</tr>
</tbody>
</table>
| **Procedural**| • Guide on how to utilize tools and resources.  
• Help on function and features of technological tools.  
• Steps of finishing a certain task. | • The WebQuest Design Process  
• WebQuest Templates | See Appendix M | See the “Seeking Additional Support” section (p. 105-106) |
| **Conceptual**| • Guide learners on what to consider through ways such as conceptual maps, outlines, etc.  
• Remind learners the availability of technological tools and resources. | • Course Grading Rubric for the WebQuest Assignment  
• Building Blocks of a WebQuest  
• The WebQuest Workshop Website at thirteen.org  
• WebQuest Definitions at Wikipedia | See Appendix M | See the “Seeking Additional Support” section (p. 105-106) |
| **Metacognitive**| • Help learners reflect their learning goals, monitor their own learning processes, assess what they have done, and become aware of their strength and weakness of learning. | • Selecting a WebQuest Project | See Appendix M | See the “Seeking Additional Support” section (p. 105-106) |
| **Strategic**| • Suggest alternative ways of conducting a task that helps learners to think from different perspectives.  
• Help learners choose and implement the best suited tactics. | • WebQuest design patterns  
• A Taxonomy of WebQuest Tasks (Abbreviated) | See Appendix M | See the “Seeking Additional Support” section (p. 105-106) |
**Procedural Scaffolding**

Procedural scaffolds, such as a manual for using a software package and step-by-step instruction for building a website, provide operational steps for finishing a task and orient to system functions and features. In this study, procedural scaffolds were provided to guide preservice teachers through the steps involved in designing and improving their WebQuests. Specifically, a WebQuest template (Appendix A) provided a structure and description for each WebQuest component, along with useful tips and space for content. In the “WebQuest Design Process” webpage (Appendix B), a flowchart and explicit instructions were provided for designing WebQuests. Procedural scaffolds were also provided by the instructor via step-by-step instructions for creating a WebQuest as well as technical support (e.g., downloading templates, changing fonts and styles).

**Conceptual Scaffolding**

Conceptual scaffolds are designed to guide and induce student understanding, for example, by providing conceptual structures (e.g., outlines, semantic maps) or identifying key conceptual knowledge, rather than explicit directions. In this study, the instructor provided the WebQuest Definitions on Wikipedia (Appendix C) as a supplementary reading of the WebQuest model, helping preservice teachers develop their initial understandings of key WebQuest concepts. A webpage was also provided to help preservice teachers understand the general process of designing a WebQuest (Appendix D). A course grading rubric was provided to guide preservice teachers in understanding both specific WebQuest requirements and grading criteria (Appendix E). In addition, students were introduced to a website where WebQuest classroom implementation examples and possible implementation difficulties were introduced via text and video (Appendix F). Moreover, I provided a handout (Appendix G) to help in selecting a suitable
topic before starting individual WebQuest designs. The instructor also provided conceptual scaffolds, by discussing important WebQuest concepts, demonstrating WebQuest examples, and reminding them of the availability of multiple resources, for instance.

**Metacognitive Scaffolding**

Metacognitive scaffolds help learners to reflect on their learning goals, monitor their learning processes, assess what they have done, and increase awareness of their strengths and weaknesses. In this study, I designed two sets of hints; one (Appendix H) was to help preservice teachers evaluate their initial topic selection and the other (Appendix I) was to help them promote problem solving with WebQuests. I also provided guiding questions (Appendix J) to evaluate peers’ draft WebQuests and to give feedback accordingly. The instructor also prompted preservice teachers to review their WebQuest drafts en route.

**Strategic Scaffolding**

Strategic scaffolds suggest alternative approaches to a task and help to choose and implement tactics. In this study, preservice teachers were asked to review different ways of designing WebQuests as listed in a webpage called the WebQuest Design Patterns (Appendix K). The instructor provided suggestions on how to choose a design pattern suitable to their individual topics. The instructor also introduced a webpage listing different types of WebQuest tasks (Appendix L) and provided suggestions on how to choose the right type of task for their individual WebQuests.

**Nature of Scaffolds**

Consistent with the WebQuest scaffolding framework, scaffolds were further categorized as either *Fixed* (static, not adaptive to individual learning needs) or *Dynamic* (initiated or created during learning and adaptive to individual learning needs).
Fixed Scaffolds

Adapted/Adopted. A range of resources or designing WebQuests were available at various websites. I selected or adapted existing materials designed to scaffold different aspects of WebQuest design. Fixed strategic scaffolds were provided to help preservice teachers identify different ways to design WebQuests and to select those most suitable to their individual topics. According to the WebQuest creators, patterns and templates can be used to address different content with the same structure (e.g., Introduction, Process, Task). Thus, I identified design patterns supplied by the creators and derived from WebQuest designers (see Appendix K). Templates were provided for each design pattern to help preservice teachers start their designs. Together, patterns and templates are designed to scaffold inquiry into teaching practice and to develop a quality WebQuest lesson (Lim, 2001).

Design templates were adopted or adapted as procedural scaffolds to facilitate WebQuest design. For example, after preservice teachers choose a design pattern, they were advised to start their WebQuest designs with an appropriate template. Several conceptual scaffolding resources were also adapted or adopted for their WebQuest design. The Wikipedia scaffold (Appendix C) was adopted to help preservice teachers understand the concepts that were considered fundamental to the WebQuest model. A webpage depicting the general process of WebQuest design was provided along with a brief description and related examples for each WebQuest section (Appendix D). The course grading rubric for the WebQuest assignment (Appendix E) was provided to help preservice teachers understand specific requirements and grading criteria. Another conceptual scaffold was a WebQuest workshop website which explained WebQuest characteristics and presented examples of its classroom implementations (Appendix F). In addition, I adopted another WebQuest strategic scaffold taxonomy created by Dodge (2002),
providing detailed explanations, examples, and specific design tips for each design task. This
taxonomy helped to engage and focus students on meaningful learning via WebQuest tasks
(Appendix L).

Researcher-designed. A set of guiding questions for peer review, keyed to the scaffolding
framework employed in this research, provided metacognitive scaffolding. Since choosing a
suitable topic is critical to a successful WebQuest design, preservice teachers were asked to
respond to several questions regarding the suitability of their individual topics before starting
their design (e.g., Why do you choose this topic? How will your WebQuest require high-level
thinking?). Prompting questions were provided since some preservice teachers might ignore or
gloss over instructions from the instructor about how to select a suitable topic. When they
finished their initial WebQuest drafts, another set of prompting questions were provided to help
them reexamine whether their prospective WebQuests promoted deep thinking, such as: Is your
WebQuest task challenging and doable? Do your students need to think independently and
critically during the WebQuest activity? Although preservice teachers were not required to
submit their answers, these questions helped to avoid shallow or impractical WebQuests that fail
to promote meaningful learning. After they finished their draft WebQuests, a set of guiding
questions (Appendix J) focused on important aspects of WebQuest design (e.g., usability, quality
of resources) helped them review peer’s WebQuests, reflect on and refine their own WebQuests.

Dynamic Scaffolds

During my pilot studies and this study, unplanned, dynamic instructor scaffolds directly
influenced preservice teachers’ WebQuest designs. Interactions such as providing step-by-step
instruction, demonstrating and discussing examples and availability of resources, and
spontaneously suggesting how to choose a design pattern and task type, provided emergent
support for preservice teachers as they designed their WebQuests. I captured these and other instances of emergent instructor scaffolding by analyzing WebQuest class videos (Appendix M). During student interviews, I showed video clips of these instances and asked preservice teachers how (or if) they followed the instructor guidance and perceived the utility for their design. In addition, I asked preservice teachers how (or if) peer support influenced their WebQuest design. All data related to dynamic scaffolds were further classified and validated by member-checking with the instructor. Since this was not a strictly controlled study of scaffolding, and some preservice teachers used scaffolds that were not be readily classifiable, variations in use were documented.

**Instruments & Data Sources**

Data sources included interviews with preservice teachers and the instructor, surveys on preservice teachers’ background and opinions about scaffolding materials and procedures, videotaped classroom activities, students’ assignments submitted to the instructor, and handouts and course website postings provided by the instructor. Table 3.2 illustrated the different types of collected data and how they were aligned with research questions of this study.

Table 3.2

_Algination of data sources to research questions_

<table>
<thead>
<tr>
<th>Data Collection Phases</th>
<th>Observation</th>
<th>Interview</th>
<th>Survey</th>
<th>Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. To what extent do preservice teachers access and follow scaffolds when designing their WebQuests?</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Q2. How do preservice teachers perceive the effectiveness of scaffolds in designing their WebQuests?</td>
<td>+</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
</tr>
</tbody>
</table>

+++: Major data sources  
++: Secondary data sources  
+: Supplementary data sources
Interviews

I interviewed 5 participating preservice teachers and the instructor after all WebQuest activities were completed, selected purposefully per the following criteria: 1) education majors, since this research was focused on preservice teachers; 2) varied technology familiarity in order to examine the influence of technological skills on their use of WebQuest scaffolds; 3) maximum variation in lesson planning skills, major, years in the university, and reason for taking this course in order to reflect varied backgrounds. The student interview (Appendix N), roughly 1-hour in duration, was developed to address three goals: 1) explore preservice teachers’ background information related to this study; 2) identify preservice teachers’ use of WebQuest scaffolds; 3) identify preservice teachers’ assessment of the utility of the scaffolds. During the interview, I asked follow-up questions in response to information from their information sheets, course assignments, and class videos. Then, I showed each interviewee handouts/webpages of fixed scaffolds and videos of instructor scaffolding, and asked whether the interviewee used other scaffolds during the design. Questions about their use and perception of all these scaffolds followed accordingly. The instructor interview was conducted to document the instructor’s interpretations of her WebQuest class activities (see Appendix M for specific interpretations).

Survey

All preservice teachers in EDIT2000 were invited to participate in two surveys. The first survey (Appendix O), collected during the first class meeting, provided background information about participants’ major, grade, prior education courses, reason for taking this course, teaching experience, lesson planning skills, and technology skills. Information from this survey was used to purposefully recruit interviewees and to identify the impact of prior experiences on use of WebQuest scaffolds. The second survey (Appendix P), administered after completion of the
WebQuest units, assessed preservice teachers’ perceived effectiveness of fixed WebQuest scaffolds, strengthening assertions from qualitative results. I distributed and collected paper-based questionnaires for the second survey but also provided a hypermedia version with links to the scaffolds as reminders.

**Artifacts**

Archival data produced by students included final WebQuest products, written responses to questions posed by me asking for explanations about the suitability of their individual WebQuest topics, peer review forms, and reflections on use and perceptions of scaffolds. Appendix Q contained the handout for preservice teachers’ final statements on WebQuest design. Artifacts were collected to document available course materials accessible to preservice teachers during their WebQuest classes.

**Observation**

I videotaped all WebQuest classes to capture activities of preservice teachers and the instructor, including instructor lecture and demonstration, preservice teachers’ design activities during class, and interactions between and among the instructor and peers.

**Procedures**

*Validation of Scaffold Classifications*

Four external reviewers were recruited to start validation of the proposed scaffolds using the following criteria: 1) Familiarity with the scaffolding framework; and 2) Experience in scaffolding research or applications. Procedures included training, initial validation, and post-hoc validation.

*Training and initial validation.* I trained the external reviewers to develop a shared, operational knowledge of the scaffolding framework. During the training, I first introduced the
framework, demonstrated examples for each type of scaffolds, and answered questions. Then, I presented two examples per scaffolding function type (i.e., procedural, conceptual, metacognitive, strategic) and asked the reviewers to classify the scaffolds. The reviewers were not expected to reach 100% consensus for each example initially, but to engage in debating and discussion. During review, they went back and forth between definitions of scaffold types and the examples in order to refine shared definitions of different scaffolds, thus increasing the consistency with which they differentiated functional attributes of each scaffold type. WebQuest scaffolds were not used as examples in this training in order to avoid imposing my subjectivity on the reviewers.

After the training, I asked the reviewers to classify the fixed WebQuest scaffolds. I briefly introduced each fixed scaffold in the context of its use in the course and allotted the reviewers approximately two minutes for review. Each reviewer used a review form (Appendix R) to mark a single scaffold type or multiple types and to note explanations for each fixed scaffold. After reviewing each scaffold, the reviewers spent roughly five minutes in discussing the results; they did not have to revise their individual results after the discussion. I independently reviewed each scaffold and participated in the discussion in the same way as the external reviewers. At the end of the review session, I collected, compiled, and analyzed all the review forms. A scaffold type was classified as procedural, conceptual, metacognitive, or strategic scaffold if a minimum four of the five reviewers, including me, reached agreement (see Table 3.3). The detailed independent review comments for each scaffold are listed in Appendix S.

As previously noted, scaffolds could serve multiple functions depending on the context of their use. This was expected rather than anomalous and was accounted for in data collection,
analysis, and interpretation. The purpose of the external review was not to seek maximum consensus but to document varied perspectives. A scaffold was considered as serving two functions when each function was supported by three or more reviewers. As shown in Table 3.3, scaffolds were considered by the reviewers as serving two functions, and none was considered as serving more than two scaffold functions. All these validated, fixed scaffolds were used in the WebQuest classes and included in the second questionnaire as well as in the interviews.

Table 3.3

**Independent Review Results of Fixed Scaffolds**

<table>
<thead>
<tr>
<th>Types of Fixed Scaffolds</th>
<th>Study Scaffolds</th>
<th>Procedural</th>
<th>Conceptual</th>
<th>Metacognitive</th>
<th>Strategic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapted/Adopted</td>
<td>Course Grading Rubric for the WebQuest Assignment</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WebQuest Templates</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Web Quest Workshop Website at thirteen.org</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selecting a WebQuest Project</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A Taxonomy of WebQuest Tasks</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Building Blocks of a WebQuest</td>
<td>1</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The WebQuest Design Process</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WebQuest Design Patterns</td>
<td>2</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Researcher-Designed</td>
<td>Guiding Questions for Peer Review</td>
<td>2</td>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Hints for Selecting a WebQuest Topic</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hints for Promoting Problem Solving</td>
<td></td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Note: The numbers represent the votes from the reviewers.

*Post-hoc validation.* Post-hoc review was designed to validate dynamic scaffolds, that is, those that emerged during WebQuest design processes. Before this validation, I used a software package (Transana) to analyze the videotaped WebQuest class sessions (Figure 3.1) to mark specific points or durations in the video, and I added explanations and/or transcripts to important demonstrations and modeling. At the end of the analysis, 21 instances were identified; 3 were
excluded from validation and further analysis because the instructor reiterated an existing fixed scaffold. During the validation, I interviewed the instructor to document her interpretation of each instance (see Appendix M). The post-hoc validation ensured that dynamic scaffolds were categorized consistently with the instructor’s intent during WebQuest class activities. In addition, I identified 3 instances (out of 18) involving instructor discussions of general WebQuest concepts that were excluded since they were not consistent with the operational definition of scaffolding employed in this study.

Figure 3.1. The Transana Interface

*WebQuest Implementation*

Before the start of WebQuest classes, preservice teachers had completed classes and assignments featuring other technological tools. Part of their individual assignments included designing a newsletter and a business card with MS Word, evaluating curriculum software per
LoTi standards, and developing an Inspiration flowchart. During classes on these topics, the instructor provided step-by-step instruction on how to use these tools and demonstrated examples developed by previous students or retrieved from other websites. Class time was available for preservice teachers to design and develop their products, ask questions, and seek assistance from the instructor. Readings were assigned related to various aspects of technology integration, such as ways of using Excel for student learning, the roles of educational technology, and ways to integrate educational technology into teaching.

These classes were important for WebQuest design so that preservice teachers could acquire basic skills with technological tools and overcome anxieties of expecting technical problems. Assignments helped preservice teachers to develop an initial understanding of integrating teaching, learning, and technology. This understanding was useful for WebQuest design which required a higher-level of skills and of technology integration than other course assignments. A set of resources and readings was provided on the course website for each WebQuest class.

Introduction/Orientation (Preparation & Day 1). The first class was designed to help preservice teachers understand the basic WebQuest structures and concepts, underlying learning theories, and characteristics or rules of good topics. The goal of this class was to help preservice teachers understand WebQuest attributes and begin to consider potential WebQuest topics. Prior to this session, preservice teachers were assigned to read articles about the history and basic concepts of WebQuests. During the class, preservice teachers engaged in or were introduced to a set of fixed, conceptual or metacognitive scaffolds, including the Wikipedia (Appendix C), Grading Rubric (Appendix E), thirteen.org (Appendix F), and WebQuest project (Appendix G). Using a set of instructor-designed questions, each student was given 10 minutes to review 2-3
WebQuest examples in his/her individual content area (i.e., “Does the introduction "hook" the students? Is the WebQuest task authentic? What kinds of tasks are the students asked to complete? How are students evaluated? What are the advantages and disadvantages?”). The instructor then discussed the examples reviewed and further reified WebQuest concepts per the previous questions. Finally, the instructor asked preservice teachers to identify their individual WebQuest topics and submit their responses to prompting questions (Appendix H) before the second class; this assignment—essential to the success of their designs—helped preservice teachers to assess the suitability of their WebQuest topics.

*Design (Day 2).* The goal of this day 2 was to help preservice teachers grasp the fundamentals of WebQuest design. At the beginning of the session, the instructor reviewed how to select a suitable WebQuest topic. A set of procedural, conceptual, and strategic scaffolds was then provided, including templates (Appendix A), *Design Process* (Appendix B), *Building Blocks* (Appendix D), *Taskonomy* (Appendix L), and *Design Patterns* (Appendix K). The instructor also displayed examples of each WebQuest component, demonstrated the steps involved in designing a WebQuest, introduced alternative design approaches, suggested how to select a suitable WebQuest template, and demonstrated the steps used to edit a template with Microsoft Word. A set of metacognitive scaffolds (i.e., hints on how to promote problem solving, Appendix J) were also provided to encourage preservice teachers to focus more on WebQuest contents (e.g., teaching strategies, resources) than on styles (e.g., visual appeal).

*Development/Refinement (Day 3, 4).* During the third class, preservice teachers used class time to explain and share their WebQuest ideas with peers, to develop and refine their WebQuests, and to ask questions. Per student requests, the instructor also demonstrated how to create and link webpages. The final WebQuest class on day 4 focused on refining WebQuests
through peer review. Preservice teachers were divided into groups of two members. Each briefly introduced his/her WebQuest. A set of guiding questions was provided as metacognitive scaffolds for improving final WebQuests (Appendix J); peers reviewed each other’s designs according to these guiding questions and provided feedback for improvement. After the peer-review activity, the instructor again demonstrated technical steps (e.g., using clip art in a webpage, inserting hyperlinks) and discussed how to design a WebQuest evaluation rubric.

Participants revised their WebQuests based on peer feedback provided during or after class. In accordance with instructions and questions shown in Appendix Q, preservice teachers submitted their final WebQuest products and final statement with supporting examples. This statement was designed 1) to help preservice teachers reflect upon their WebQuest design processes and 2) to report their use and perceptions of scaffold materials or class activities for their WebQuest design.

**Data Collection & Analysis**

At the beginning of the first WebQuest class, I introduced the study and collected consent forms. Then, I collected and analyzed research participant information sheets. Sixteen preservice teachers who had signed consent forms completed a survey during the last WebQuest class. Based on participant selection criteria, five preservice teachers were selected for interview soon after they finished their WebQuest projects. I also interviewed the instructor after the last WebQuest class for confirmation and validation purposes. During all WebQuest classes, I videotaped classroom activities. Collected artifacts included participants’ final WebQuest products, responses on the suitability of their WebQuest topics, peer review forms, and final reflection statements.
Data from interviews, surveys, videotapes of class activities, student artifacts, and other data that emerged from the research process were analyzed. The interviews were transcribed and compiled together with collected artifacts. These data were analyzed using the data analysis process proposed by Miles and Huberman (1994), consisting of data reduction, data display, conclusion drawing and verification. Results from the first survey were used to document preservice teachers’ previous experience with technology and teaching, while results from the second survey were used to strengthen assertions regarding the utility of fixed scaffolds.

**Data Reduction**

Data reduction involves the coding and categorizing of data (Miles & Huberman, 1994). According to Patton (2002), the first step of qualitative analysis is to develop “some manageable classification or coding scheme” (p. 463). I created a starting list of codes (see Table 3.4) based on key scaffolding variables of this study: provided fixed scaffolds and dynamic scaffolds (Appendix M). Data reduction processes, described in this section and illustrated in Figure 3.2, included chunking, coding, grouping, and pattern identification.

**Chunking.** I created a document for each interviewee, comprising interview transcripts and final reflection statements. I read each document a minimum of two times to develop a general understanding of each interviewee. Then, I divided the document into three parts—one for the participant profile, one for fixed scaffolds, and one for dynamic scaffolds—based on the questions posed during the interview and in the final reflection statement. Contents related to fixed or dynamic scaffolds were copied and pasted accordingly in the latter two documents of each interviewee.
Figure 3.2. The Process of Data Reduction

Table 3.4

Provisional Codes prior to Data Analysis

<table>
<thead>
<tr>
<th>Codes for Fixed Scaffolding</th>
<th>Codes for Dynamic Scaffolding</th>
</tr>
</thead>
</table>

Coding. Two documents, one for fixed scaffolds and the other for dynamic scaffolds, were coded for each interviewee. I broke down the data into the smallest information units that could stand by themselves (Merriam, 1998) (i.e., words, phrases, sentences, or paragraphs) and labeled them according to the aforementioned starting list codes. Data on emerging scaffolds that were not readily classifiable were temporarily assigned an “Others” or “Emerging” code for
further analysis. In some instances, data for fixed scaffolds were identified as dynamic scaffolding and coded accordingly; similarly, some data in the dynamic scaffold documents were coded as “fixed” where warranted.

I used HyperRESEARCH (see Figure 3.3) to assist my coding, which allowed me to assign a single code or multiple codes to each unit, annotate units, and generate and sort reports of coded units by code names. HyperRESEARCH also enabled the automatic tagging of coded units with identifiers (see Figure 3.4), with which I identified the source and revisited the context if needed.

Figure 3.3. The Interface of HyperRESEARCH
Figure 3.4. An Example of HyperRESEARCH Reports

Grouping. After the coding was completed, the coded units for the five interviewees were included in the two final reports: one for fixed scaffolds and one for dynamic scaffolds. The coded units, sorted according to code name, were further grouped according to scaffold type (i.e., procedural, conceptual, metacognitive, strategic). To assist my categorization of codes by scaffold type, I added descriptive identifiers of validated functions to the code names in the reports. Units coded as “fixed” or “dynamic” were grouped under appropriate scaffold types or moved to a document created for “emerging” or “others” scaffolds. In effect, the majority of coded units were grouped using conceptual themes as the ordering principle.

Pattern Identification. All units in each group were further analyzed using open-coding procedures. I used interviewees’ words, my own words, or theoretical constructs of this study to capture the patterns across different scaffolds in each group. Some units were moved to other groups where they fit better. For example, preservice teachers’ discussions about the instructor’s feedback on their topics, originally grouped under the fixed metacognitive scaffolding group,
were moved to the dynamic metacognitive scaffolding group during this process. Units in the “emerging” scaffold group were the last to be analyzed since some units in the fixed and dynamic groups were moved during this phase. I revised, added, and deleted patterns until they covered as much data as possible. Finally, I created the master list of patterns shown in Table 3.5. Roughly 1.5 of the 70 pages of units were discarded as redundant or unrelated to this study.

Data Display

Data display involves assembling organized data into visual representations (e.g., graphs, matrices, charts), and helps the researcher to both understand what is happening and to decide whether to draw conclusions or continue analysis (Miles & Huberman, 1994). All patterns identified during the Pattern Identification phase were inserted into the thematic matrix (Table 3.5). This enabled me to draw inferences such as themes, sub-themes, and patterns directly from the displayed data, and to trace coded, chunked entries in each cell back to the original data. I constantly compared categories in the matrix with codes and made additions and corrections accordingly until themes were constructed that captured recurring patterns across the data (Merriam, 1998).
Table 3.5

The Thematic Matrix for Coding

<table>
<thead>
<tr>
<th>Scaffold Type</th>
<th>Fixed Scaffolds</th>
<th>Dynamic Scaffolds</th>
</tr>
</thead>
</table>
| Procedural    | - Partial Uses/Follow  
                 - Brief Uses  
                 - Procedural uses  
                 - Metacognitive uses  
                 - Scaffold Combination/Interactions with the Instructor or Peer  
                 - Unhelpful due to Bad Visual Effects/Usability | - Procedural Guidance  
                 - Metacognitive Guidance  
                 - Interaction with Fixed Scaffolds  
                 - Ignore |
| Conceptual    | - Conceptual Uses  
                 - Metacognitive Uses  
                 - Procedural Uses  
                 - Ignored/Little Uses  
                 - Extremely Helpful Building Blocks  
                 - Specific Guidance/Divided Sections  
                 - Good VS. Bad Usability/Examples/Contents  
                 - Not Helpful due to Other Scaffolds  
                 - No Prerequisite Knowledge/Understanding | - Conceptual Guidance  
                 - Procedural Guidance  
                 - Metacognitive Guidance  
                 - No Examples/Prerequisite Understandings  
                 - Ignore  
                 - Interaction with Fixed Scaffolds |
| Metacognitive | - Conceptual Uses  
                 - Metacognitive Guidance  
                 - Scaffold Combination/Interactions with the Instructor or Peer  
                 - Lacking in Examples  
                 - Redundant/Not Useful | - Metacognitive Guidance  
                 - Irrelevant  
                 - Need more Constructive Feedback |
| Strategic      | - Strategic Uses  
                 - Metacognitive Uses  
                 - Scaffold Combination/Interactions with the Instructor or Peer  
                 - Decision Making Considerations for Strategic Uses  
                 - Poor Usability  
                 - Irrelevance  
                 - Not Helpful due to Other Scaffolds | - Strategic Guidance  
                 - Interaction with Fixed Scaffolds |
| Emerging      | - Seeking other examples | - Seeking Peer Support  
                 - Seeking Instructor Support  
                 - Other Helpful Instructor Support  
                 - Wish for Additional Support |

Conclusion Drawing and Verifying

Miles and Huberman suggest that conclusion drawing, during which the researcher initially interprets data and verifies conclusions as the analysis proceeds, involves the following:

1) scanning the matrix quickly across rows and columns in order to “verify, revise, or disconfirm
that impression through a more careful review” (p. 243); 2) using multiple tactics, such as making comparisons/contrasts, noting patterns/themes, and counting; 3) recording initial conclusions and explanations, checking them with written transcripts or notes, and supporting final conclusions with representative examples from the data; and 4) documenting the conclusion-drawing procedures and seeking occasional review from colleagues.

I continued to compare and contrast patterns in order to identify themes and regularities, and began to develop explanations for the themes. Writing about the themes and explanations helped to verify emergent themes, identify gaps and irrelevant data, and revise accordingly. I moved back and forth among the original data sources, coded units, patterns, themes, interpretations, and conclusions. I also re-introduced a few initially discarded coded units and added them to the analysis.

Validity and Reliability

Validity refers to the consistency between research findings and the phenomena which they refer (Hammersley, 1990; Merriam, 1998). Triangulation can be used to minimize the intrinsic bias and increase validity of a study by combining multiple methods, data sources, analysts, and theories (Patton, 2002). In this study, multiple data sources included interviews, surveys, artifacts, and observations. Qualitative analysis and descriptive statistics analysis were integrated to compare and interpret data from different sources. I also conducted member check with the instructor in order to reduce errors in interpreting classroom observations.

According to Merriam (1998), reliability refers to the extent to which one study can be replicated by another, but cautioned that replicating a qualitative study will not yield the same results due to different interpretations of reality. In order to promote reliability, qualitative researchers document their research procedures and demonstrate the consistency of assigning
instances to categories (Silverman, 2000). In this study, I provided a detailed description of the research process and methods. Another strategy for enhancing reliability is to demonstrate the credibility of the researcher (Patton, 2002), who is “the primary instrument of data collection and analysis” (Merriam, 1998, p. 212). I documented, analyzed, and reported my biases, influences of my presence in the research setting, and experiences that might affect my data collection, analysis, and interpretation. Moreover, all research instruments and procedures were tested in two pilot studies and revisions were made to ensure their reliability and ability to extract salient data.

**Researcher’s Perspective**

Both epistemological beliefs and professional experiences influenced my approach to this study. I spent 9 years in the instructional technology field prior to this study, including 6 years of undergraduate and graduate study in China as well as 3 years of doctoral study in the USA. I developed strong beliefs through my experiences in both countries that 1) technology had not been sufficiently utilized to improve learning and instruction, and 2) teachers were not well prepared or supported to integrate technology in their classrooms. Thus, while my theoretical framework was influenced by literature in fields of instructional technology, teacher education, learning sciences, and educational psychology, I was also influenced by my professional experience as a graduate research assistant on projects and research activities related to preservice and inservice teachers’ technology uses. These beliefs and experiences have shaped or “colored” my views of preservice teacher technology integration as well as potentially effective supports.

Based on personal experience in learning with technology scaffolding in K-12 student learning, I believe that scaffolding can help preservice teachers in their design of WebQuests. I consciously addressed this bias during my data analysis by being sensitive to contradictory evidence
on the scaffolding effectiveness. I relied heavily on the Hannafin et al. (1999) scaffolding theoretical framework and other related scaffolding literature to both classify available scaffolds and organize findings regarding their use. To guard against unduly narrowing my perspective, I developed an “open” category for emergent scaffolds to ensure that unanticipated support could be identified and subsequently analyzed. Independent review and member check strategies were used to reduce the influence of my subjectivity when coding and categorizing scaffolds.

Since I had previously conducted pilot studies in the same course with the same instructor, I was familiar with the course and grading procedures for the WebQuest project and other course projects. I empathized with preservice teachers and could have provided “tips” to help improve their performance. However, since I defined my role as an observer, I offered advice about neither WebQuests nor other course projects.
CHAPTER 4

PARTICIPANT PROFILES

Overview of All Participants

Preservice teachers who signed consent forms participated in this study (N=16). The first survey (Appendix O), administered at the beginning of the course, provided background information on the participants, such as technical skills, lesson planning experience, major, years in the university, and reasons for taking this course. As shown in Appendix T, none of the participants had prior teaching experience, and 13 participants had low or average technical skill scores, which were 36 points or less for the sum of the points from item 1 to item 12 in the first survey (Appendix O); 14 participants reported limited or average lesson planning experience. Ten participants were majoring in early childhood education, five were majoring in middle school education, and the other was majoring in science education. They included 14 sophomores, one freshman, one junior, and one who had spent five years in the university. Only one preservice teacher reported an additional reason for taking this course besides being required by a teacher education program.

Interviewees

Purposeful sampling was employed to select the five interviewees. According to Patton (2002), purposeful sampling is to “select information-rich cases whose study will illuminate the questions under study” (p. 230). Specifically, I used maximum variation sampling methods (Patton, 2002) in order to get as diverse information as possible from a small sample size. Prior teaching experience, inapplicable to the 16 participants, was not included in the criteria for selecting interviewees. Three participants were not considered for interviews because they were
unable to provide information about instructor– or peer– scaffolding during missed WebQuest classes. Five interviewees (Table 4.1) were finally selected from the 16 preservice teachers, based on the following criteria: 1) Varied technology familiarity in order to examine the influence of technical skills on their use of WebQuest scaffolds, and 2) maximum variation in lesson planning experience, major, years in the university, and reasons for taking this course in order to reflect varied backgrounds. Individual interviews were conducted immediately after completion of his/her WebQuest design activities. Notably, none of the interviewees expressed concerns with the 15% WebQuest project credit toward the course grade.

Table 4.1

*Background Information of Interviewees*

<table>
<thead>
<tr>
<th>Name</th>
<th>Overall technical skill score (max=60)*</th>
<th>Lesson planning experience b</th>
<th>Major</th>
<th>Year in college</th>
<th>Reasons for taking course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harrah</td>
<td>24</td>
<td>0</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required; useful for future teaching</td>
</tr>
<tr>
<td>Jack</td>
<td>29</td>
<td>1</td>
<td>Biology; Science Education</td>
<td>5th year biology major; 1st year science education</td>
<td>Required</td>
</tr>
<tr>
<td>Kate</td>
<td>29</td>
<td>0</td>
<td>Middle School Education</td>
<td>Freshman</td>
<td>Required</td>
</tr>
<tr>
<td>Leslie</td>
<td>33</td>
<td>2</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Stephanie</td>
<td>27</td>
<td>4</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
</tbody>
</table>

Note:  
*Course Mean=31.38; Range 24 - 47.  
bCourse Mean=2.06; Range 0 – 4.

This section provides a profile for each interviewee, including background, an overview of his/her WebQuest, the design process, and perceptions of the WebQuest project. Participant quotes or excerpts are also provided in support of their profile analysis. Information in such categories can help explain how the interviewees used or perceived scaffolds when designing
their WebQuests. Preservice teacher’s motivation for taking the course and selection of WebQuest topics emerged as important variables in their decision-making and use of scaffolding.

Harrah

“The most helpful thing was looking at examples that other people had done.... Hearing others’ ideas and getting their input [were] very helpful.”

Harrah, a 20-years old Caucasian female, was a sophomore majoring in early childhood education. She had observed classroom teaching and volunteered in schools, such as grading papers and assisting with student learning activities. Harrah enrolled in this course because it was deemed useful for future teaching and was required for early childhood education program majors. Her initial goal for this course was to learn ways to use technology and computer programs in her future teaching. Harrah had no prior lesson-planning experience, and her overall technical skills were the lowest among the five interviewees.

WebQuest Description

Harrah’s WebQuest was designed for 3rd grade math students and addressed measurement, multiplication, estimation, and addition. In her WebQuest scenario, students would be assigned to groups, each of which would design a park using $100,000. Each group would have at least four members, including a playground designer, landscape designer, food stand designer, and sports area designer. A role-appropriate worksheet would be provided to each group member containing information of the items (e.g., bricks, tables) that he/she might purchase. Several websites were identified for students to do calculations and research. Each group would present to the class a single, final plan including their individual drawings and cost sheets.
**Design Process**

According to Harrah, the most difficult task during her WebQuest design was finding a topic that was new, exciting, and helpful for “kids” to learn. She initially intended to design a WebQuest related to math and budgeting but did not know how to do so. After discussions with her classmates, she decided to design a WebQuest that required students to design a park. Harrah also mentioned that it was difficult to identify interesting and appropriate student resources for her WebQuest.

In her final statement, Harrah noted that the instructor’s suggestions, instructions in WebQuest templates, and class activities were helpful for her design. She also noted how others’ WebQuest examples helped in her design:

If I got stuck or did not know exactly what to do for one of the components, I looked at several examples and got a better idea of what I needed to do. For example, reading introductions of other WebQuests allowed me to realize the difference between an engaging introduction and one that is not appealing. I used this information to try to make my introduction exciting.

Harrah also described how the peer review activity helped her WebQuest design:

After working on my WebQuest for some time, it was hard to tell what exactly was working and what was not. My partner helped me realize that some aspects could be improved. For instance, some of my font was not easily readable due to the color. I changed it so it would be reader-friendly. My partner also suggested that I keep the focus on math, so my project would not get too complicated.

Harrah reported that the “Selecting a WebQuest Project” webpage (Appendix G) was least useful because it did not provide examples and failed to inform her topic selection. During
the interview, Harrah stated that some basic WebQuest concepts were not useful because they reiterated what she already knew, and in her final statement suggested that additional instructor feedback for her WebQuest would have been helpful in keeping her design “on the right track.”

Perceptions of the WebQuest Project

Harrah appeared unconcerned with her WebQuest project’s impact on her course grade, stating that she worked carefully “on every project no matter what the weight is on the grade.” During her interview, she stated that while the WebQuest project was the most time-consuming among her course projects, she considered it beneficial:

I enjoyed it….The idea was hard to come up with but, you know, I think it was a good project, and I am glad I learned how to do it, in case I wanted to do it again, or use this in my classroom one day, or come up with another idea and do another one.

However, Harrah seemed to lack confidence in her WebQuest, as she reported in the interview: “It (her WebQuest) may not be… in the best shape or the best project....It probably could use a few more weeks of work tweaking little things.” In addition, Harrah noted that she was not sure whether her WebQuest task was sufficiently authentic or met the instructor’s requirements. She also was not sure about its feasibility in everyday classrooms:

I’ve never taught in an actual classroom, so I don’t even know if this lesson (her WebQuest) would be suitable for the classroom. I hope it is. But I don’t know if it would help the teacher out or not. It may be too hard or it may be not quite what the teacher would be looking for…

Jack

“It didn’t take me long to understand the general principle of what WebQuests are... the resources [related to] understanding a WebQuest [were]...least helpful to me.”
Jack, a 24-years old Caucasian male, was a 5th year biology major in his first year in science education. He had worked as a camp counselor during three previous summers but had not taught in a K-12 classroom. Jack enrolled in this course because it was required by his science education program. His initial goal for this course was to learn web-based instruction. Jack had very limited prior lesson planning experience, and his overall technical skills were the second highest among the five interviewees.

**WebQuest Description**

Jack’s WebQuest, designed for 9th grade science/biology classes, involved city planning for a power plant nearby a local school. The class would be broken into groups; each group would be required to present and defend its power plant suggestion (e.g., nuclear, coal, solar) before a city council that would decide the type of power plant to be built. When implementing his WebQuest, Jack suggested instructors invite interested teachers, school administrators, and parents to participate in the city council meeting.

**Design Process**

The WebQuest topic was initially suggested by a classmate in his science education methods course, which Jack adapted and developed into a WebQuest. Jack indicated that the course grading rubric (Appendix E) and a template he downloaded from the WebQuest Design Patterns website (Appendix K) were the most helpful because they provided tips and a structure for his design. Jack also reported that the WebQuest concept websites helped to develop his understandings, and class discussions provided useful directions for designing specific WebQuest sections.

Having previously read articles about WebQuest history and background before the first WebQuest class, Jack reported that concept resources provided during classes were not useful.
He also stated that the instructor’s discussion of WebQuest concepts and examples were not helpful because he had already explored those materials prior to the classes. Thus, he worked on his own WebQuest rather than listened to the instructor’s discussions:

I sort of spent that whole class period going ahead and starting on mine because I knew what I wanted to do…The whole discussion…did not benefit me because I sort of knew what a WebQuest was. I knew sort of what the assignment was asking for. I was able to do that ahead of time.

Jack indicated difficulty locating ability-appropriate websites about power sources for 9th grade students. He also reported some technical difficulties (e.g., problems with editing a template) that he solved by himself. In addition, he mentioned that he continually modified his WebQuest rather than write different drafts during the course of his design. He continued making modifications even though he thought his WebQuest had already met the course requirements.

Perceptions of the WebQuest Project

Jack enjoyed his WebQuest project, but he also said that it was difficult to develop a WebQuest without prior classroom-teaching experience:

I enjoy the idea of a WebQuest. I think it’s a useful tool. I think that being able to develop a tool is, um…, a good experience for the class…. [But] it’s hard to develop almost a program without knowing your intended audience. And if…another teacher who has been teaching [this WebQuest] with [her] class, you know, for most of the year [the teacher] would probably be able to better adapt…some of the program knowledge or some of the sites in order to better meet the needs of her classroom…. WebQuests are always evolving and that what we’ve designed may have the best intentions; however, [they] may not meet the needs of a class at all.
Jack stated that the WebQuest project was more difficult and time-consuming than other course projects. In his final statement, he wrote that designing a WebQuest as a team project would help to speed up the design process, receive peer immediate feedback, and assist others’ learning.

Kate

“I am a more visual learner. So I liked to be able to see the examples.”

Kate, a 19-years old Caucasian female, was a freshman majoring in middle school education, with emphases in social studies and language arts. She volunteered to tutor children and to teach mini health lessons through the Red Cross at local elementary schools. Kate enrolled in the course because it was required by her middle school education program; her initial goal was to learn technological tools for her future teaching. Kate had no prior lesson planning experience, and her overall technical skills were in the middle range among the five interviewees.

WebQuest Description

Kate’s WebQuest, designed for 8th grade social studies classes, was a reenactment of a 1959 Atlanta school desegregation court case. Students would be assigned to 3 groups, including a jury, a group advocating desegregation, and a group against desegregation. The latter two groups would defend their respective positions, and the jury then would lead a debate for the class to render a judgment. Students were expected to conduct research and make judgments using unbiased information from multiple sources including but not limited to published textbooks which, as she learned from another course, can present biased information.
Design Process

In her final statement, Kate recalled that she went to the state’s performance standards website to identify challenging standards that she would least enjoy teaching via her WebQuest. She chose the Civil Rights Movement because it was complex, sensitive, and controversial:

I really thought this would be really a tough topic to teach because it is so sensitive and controversial....So I thought this would be a way to get kids to interact more because reenacting a court case, they are going have to debate, [and] they are going have to use the integration of technology.

Kate reported difficulty selecting a WebQuest template, eventually picking the court case template because “the hints that were provided [for the template] gave me more insight and help than the other templates would.” She also consulted with the instructor to ensure the suitability of her WebQuest topic, since it was “touchy between the different races in the classroom” but should be addressed “in order for history not to repeat itself.” After finishing several initial drafts, she increased the difficulty level of her WebQuest tasks which might otherwise be perceived as too easy. Kate experienced, and asked the instructor to help solve, some technical problems (e.g., changing colors, inserting clip art). She also reported difficulties specifying WebQuest tasks appropriate for independent work by 8th graders: “Because … it's hard to make a lesson plan. It's hard to …really lay out everything and figure out exactly what they are going to do.”

In her final statement, Kate indicated that the Building Blocks website (Appendix D) was most useful for her design because it provided both clear descriptions and examples for each WebQuest component:
The Building Blocks (website) was so appealing to me because it was simple, easy to get through and read, and had many examples to look at and refer to….I used that website every single time that I began working on my WebQuest at home or in the classroom. I referred to the website for everything and looked at the examples for every question and step that I went through.

Kate expressed appreciation of the instructor’s explanations of basic WebQuest concepts, introduction of different WebQuest examples, and demonstration on how to insert hyperlinks. She reported that she used the flowchart on the WebQuest Design Process webpage (Appendix B) to ensure she included required elements. She also indicated that peer feedback was helpful to improve her WebQuest:

I liked the peer review. I thought that getting someone else’s input on my WebQuest helped out a lot because I was able to see what other people were seeing, or actually not seeing, but should have been seeing.

Kate noted that text-intensive but visually unfriendly websites are not useful, such as the WebQuest Definition on Wikipedia (Appendix C) and the WebQuest Workshop on Thirteen.org (Appendix F). She also characterized the “Selecting a WebQuest Project” webpage (Appendix G) as confusing and unhelpful because it neither described essential WebQuest concepts nor provided examples. In her final statement, Kate suggested that the instructor introduce the model before asking students to read articles about the WebQuest history and background and to write down their understandings at the beginning of the first WebQuest class.

Perceptions of the WebQuest Project

Kate seemed enthusiastic with WebQuests that could help children engage in self-directed learning activities:
I liked it (the WebQuest project). I never knew that this was something that kids could do. And, um..., I think it’s really good. I really plan on using this, and knowing that they are out there and available for teachers is really nice to know. I think it takes a lot of pressure off the teacher in leading the kids really doing a lot of the work. But also gets them more involved….If there were assessment at the end of this (her WebQuest)...like a child-run [learning activity], I think they (kids) would learn better from this (her WebQuest) than two weeks on a textbook.

Kate stated that the WebQuest project required more creative thinking than other course projects. She also indicated that it was difficult because she did not know what children were capable of doing and whether her WebQuest could be effectively implemented in real classrooms. Kate said that she was very nervous or “most scared” about the WebQuest assignment because her topic was sensitive and students in previous course offerings lost points on similar WebQuest projects. Thus, she sought feedback often, referring to other projects and reviewing her own to incorporate all required elements.

Leslie

“I never felt like reading through all of the information…I wanted something...made more attention grabbing.... If it looks boring I’d just move on.”

Leslie, a 20-years old Caucasian female, was a sophomore majoring in early childhood education. Previously, she had volunteered to help students with math and reading for 1 hour each day for two years in an elementary school. Leslie enrolled in this course because it was required by early childhood education program majors. Her initial goal for this course was to “know more about computer programs.” Leslie had limited lesson planning experience, but her overall technical skill score was the highest among the interviewees.
**WebQuest Description**

In Leslie’s WebQuest, designed for 4\textsuperscript{th} grade math classes, students would be assigned to groups and allotted $100 to plan a party. Each group would have four members, including a food organizer, accountant, time keeper, and guest-list manager. A role-appropriate worksheet containing information of specific job requirements would be provided to each group member. Each group would present their final party plan with a poster or a PowerPoint to the whole class, who would vote based on the proposed food, budget, time, and guest list. The plan receiving the most votes would be implemented during a weekend.

**Design Process**

According to Leslie, she intended to design a WebQuest for elementary school math students, keyed to the state’s 4\textsuperscript{th} grade teaching standards, involving time and money. In her final statement, she recalled first reviewing descriptions and examples on the Building Blocks website (Appendix D) in order to understand basic WebQuest concepts and set up her WebQuest sections. Referring to a trip-planning design pattern on the Design Patterns website (Appendix K), Leslie decided to design a WebQuest that would require students to plan a party:

One [pattern] was where they had to plan a trip to the grocery store. And I thought that was interesting, but… not very exciting. So, then I was like: “Well, they could go to the grocery store but they’ll do it because they’re planning a party.” Leslie said she did not use some scaffolds because “there were so many different sites…to look at.” But she judged that the design patterns website to be useful because they provided specific directions:

I used the page for a travel plan. Even though my WebQuest wasn’t exactly a trip to another country or such, I was still able to follow along with the pattern that was already
created. Without this material I would have been so lost. I liked how this page showed you exactly what you needed to add to your WebQuest.

Leslie rewrote her WebQuest several times. During the process, she experienced some technical difficulties (e.g., linking a webpage to a Word document), but the instructor helped by demonstrating technical skills during the WebQuest classes. Leslie noted that she did not use materials that were full of text and links but were visually unfriendly.

There are two design materials that I would pull up to use, and as soon as I would pull up the page I would X out…The reason I never used the first one (the WebQuest Design Process) was because the page was not colorful or not appealing to the eyes at all. All I would see when I would pull up this page was a lot of links to click on. I did not feel like going though and clicking on all of the links until I could find something I would need, so I would just click out of it. When I would pull up WebQuest Taskonomy, all I noticed was that there was a TON of reading. I’m sure a lot of it [was] very helpful; however, I never felt like reading through all of the information. That is why I would just click out of that page.

Leslie also stated that peer feedback improved her confidence. Although her peer reviewer provided suggestions for improvement, Leslie noted that the feedback might have been “too nice” to be constructive and informative. Thus, she suggested that it might be more helpful for a WebQuest to be reviewed by multiple peer-reviewers:

I felt like mine was too nice and could have been more constructive. If two people filled one (the peer review form) out, then maybe one person would see something that the other person did not see.
Perceptions of the WebQuest Project

Leslie described the WebQuest project as “interesting” and “neat.” She indicated that while all course projects had been beneficial, the WebQuest project might be more helpful for the future: “If I had to make a WebQuest or something, I would not know how to do it at all if it were not for this project.” She also considered the WebQuest project more difficult because it required “more thinking to think of getting everything to flow together.”

Stephanie

“I really just looked at examples and just kind of used [them] as a guide to construct my own [WebQuest].”

Stephanie, a 20-years old Caucasian sophomore majoring in early childhood education and minoring in child development, had previous experience working with children in a Boys and Girls Club and teaching during a church mission. Stephanie enrolled in this course because it was required by her early childhood education program. Her initial goal for this course was to “learn more about technology in the classroom, have a new positive attitude towards technology, and…not be afraid of it.” Stephanie had good lesson planning experience, and her overall technical skills were the second lowest among the five interviewees.

WebQuest Description

In Stephanie’s WebQuest designed for 2\(^{nd}\) grade science classes, students would be assigned to groups to explore and research locations (e.g., countries, islands) to which they would virtually travel. Each group would have 3 members responsible for collecting information in geography, history, and culture; a role-appropriate worksheet, containing specific job requirements and URLs of related websites, would be provided to each group member. Each group would bring special local clothes/food or create a movie, PowerPoint, or poster, when presenting their location to the rest of the class. Their classmates would then guess the group’s
location based on information provided in the presentation. Stephanie hoped that this WebQuest would help students to understand and respect “the differences between the vast areas of the world.”

**Design Process**

Stephanie focused her WebQuest on 2nd grade science because science was “hard for kids to be interested in.” She further explained her topic selection:

I thought math would be easier for me. But I focused on something else that wasn't easy for me…Even though I am not that interested in [science] myself, I figure…to change that…[I would] pick a subject that could really help kids… Science is not something that they like, so I am just looking for ways to make it fun.

According to Stephanie, she decided to design a “guessing game” because it would involve the whole class and would differ from the examples she had reviewed. In addition, she indicated that it was difficult to develop a concept that would be feasible and productive in real classrooms:

Coming up with a concept that will actually work in your classroom is hard because even though I think I did a good job on it, I also created it. So I don't think I'll ever know how, how great it is unless I brought it into the classroom and the students gave me feedback on it. Even with the peer review, it was good but they're also my age and the level is directed toward second graders….. So if I could get a second grader to play it or do the lesson, then I would realize, “Ok, I need to fix this or redo that.” But until that happens…that’s the only downfall of it (her WebQuest) I think.

Since this was Stephanie’s first course with technology, she experienced a few technical difficulties such as saving a document and inserting a hyperlink. The Taxonomy of WebQuest Tasks website (Appendix L) was the only one she considered not useful because “it’s just very
wordy and just didn’t break down the task and the process.” Stephanie assessed her WebQuest design process positively because the instructor “gave great examples on the process and the building of it.” Stephanie reported that both the instructor’s guidance and WebQuests from previous course offerings helped her to understand project concepts and requirements. In addition, the Building Blocks website (Appendix D) guided her design of WebQuest sections:

I just really used it step by step to compare, like, what they said it should have, and what I had…I looked at that and then I went through and did it all. And then at the end I went back and looked at it and made sure I had everything.

**Perceptions of the WebQuest Project**

Stephanie reported that she enjoyed the project because WebQuest enabled “independent thinking and not so much spoon-fed learning where [students] actually have to go find the information.” She also indicated that she would use WebQuests for her future teaching. Stephanie said that the WebQuest project was both the most difficult and the most useful among the course projects:

I think it was the hardest thing we’ve done so far but I think it’s the most useful thing of the things that we’ve done so far because we can actually use it in a classroom. Now we know how to build our own for later…when we want to implement it, you know, when we’re older and teaching on our own.
CHAPTER 5
FINDINGS & DISCUSSION

Several major themes, sub-themes, and patterns emerged through analysis of the data across the participants (see Table 5.1). Theme One and Theme Two emerged as I compared preservice teachers’ actual uses of scaffolds with the validated functions of these scaffolds. I assumed that preservice teachers could either follow the guidance of scaffolds or adapt them for other purposes. I verified my assumptions through comparisons, and further analyzed how they actually followed or adapted scaffolds of different types (i.e., fixed or dynamic) and functions (i.e., procedural, conceptual, metacognitive, strategic). For example, WebQuest templates were validated as serving two functions: procedural and conceptual. Preservice teachers followed the templates for procedural or conceptual purposes and also adapted the templates for metacognitive purposes; differentiated template uses were compiled under the two themes accordingly. Using similar procedures, I analyzed the validated scaffolds and compiled related units under appropriate themes and sub-themes.

Theme Three and Theme Four emerged when I compared the remaining patterns in each scaffold group. This process resulted in higher-level categories across the data. During the analysis, I identified instances where preservice teachers sought additional scaffolds or simultaneously used multiple scaffolds, and classified them into two tentative themes: interplay among provided scaffolds and seeking additional supports. Further comparisons enabled me to find that both themes were about relationships among different scaffolds, provided or emerging. Therefore, I merged them into a new theme—Interplay among Scaffolds. Using similar comparing, contrasting, and verifying methods, I identified Theme Four, the Unhelpful
Scaffolds, adding, revising, deleting, and merging sub-themes in order to reflect patterns across the remaining data.

Table 5.1

Hierarchy of Themes, Sub-Themes, and Codes

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sub-Themes</th>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme One: Following Scaffold Guidance</strong></td>
<td>1.1. Procedural Guidance</td>
<td>Fixed procedural guidance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dynamic procedural guidance</td>
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<tr>
<td></td>
<td>1.2. Conceptual Guidance</td>
<td>Fixed conceptual guidance</td>
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<tr>
<td></td>
<td></td>
<td>Dynamic conceptual guidance</td>
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<tr>
<td></td>
<td>1.3. Metacognitive Guidance</td>
<td>Fixed metacognitive guidance</td>
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<tr>
<td></td>
<td></td>
<td>Dynamic metacognitive guidance</td>
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<tr>
<td></td>
<td>1.4. Strategic Guidance</td>
<td>Fixed strategic guidance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dynamic strategic guidance</td>
</tr>
<tr>
<td><strong>Theme Two: Adapting Scaffolds</strong></td>
<td>2.1. For Metacognitive Purposes</td>
<td>Procedural scaffolds</td>
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<tr>
<td></td>
<td></td>
<td>Conceptual scaffolds</td>
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<td></td>
<td></td>
<td>Strategic scaffolds</td>
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<tr>
<td></td>
<td>2.2. For Procedural Purposes</td>
<td>Conceptual scaffolds</td>
</tr>
<tr>
<td></td>
<td>2.3. For Conceptual Purposes</td>
<td>Metacognitive scaffolds</td>
</tr>
<tr>
<td><strong>Theme Three: Interplay among Scaffolds</strong></td>
<td>3.1. Among fixed Scaffolds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2. Between fixed and dynamic scaffolds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.3. Seeking Additional Support</td>
<td>Materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peer/instructor support</td>
</tr>
<tr>
<td><strong>Theme Four: Little Used and Unhelpful Scaffolds</strong></td>
<td>4.1: Limited Uses</td>
<td>Limited usability/visual effects</td>
</tr>
<tr>
<td></td>
<td>4.2: Perceptions of Low Rated Scaffolds</td>
<td>Lack of examples</td>
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<tr>
<td></td>
<td></td>
<td>Lack of relevance</td>
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<td></td>
<td></td>
<td>Redundancy</td>
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</tbody>
</table>

**Theme One: Following Scaffold Guidance**

This theme is characterized by preservice teachers’ uses of scaffolds in ways consistent with their functions (i.e., procedural, conceptual, metacognitive, strategic). Fixed and dynamic scaffolds will be discussed respectively in each section below.
Procedural Guidance

Procedural scaffolds helped preservice teachers through the steps of designing a WebQuest. In this study, preservice teachers followed the procedural guidance in a manner consistent with the intent of the WebQuest developers and the instructor.

Fixed Scaffolds

*WebQuest Templates* were rated by all participants (N=16) as “good” or “very good” and were tied for the second most useful fixed scaffold in the end-of-study survey. Harrah stated during the interview that the templates were “the most helpful” and guided her through the steps of designing her WebQuest:

I basically just went from there (her WebQuest templates) and wrote my ideas down…step by step through the sections, reading the instructions and…starting [the design]…

Jack also noted that the templates helped him to organize the presentation of his WebQuest. Leslie relied on the templates, stating she “liked how [the templates] just had everything written out [about] what to do” and made the design easy to complete because “everything is right there” and it was “hard to get confused.” Similarly, Kate reported that the template helped her to speed up her design:

[If] you don't really have time to make a WebQuest, so, having a template really helped…I just went straight...started at the top and went in…Delete the information (instructions) and put in what you are saying… and cut more stuff out and add stuff in.

In addition, Stephanie reported that she relied mainly on, and followed the step-by-step instructions of, the templates to design her WebQuest. However, she also used the flowchart from the *WebQuest Design Process* webpage before starting her design to “see what steps I
should take in designing it.” She stated that this flowchart helped her to see “the pieces” all together because it was “broken down” by different WebQuest sections.

**Dynamic Scaffolds**

All interviewees reported that it was helpful when the instructor demonstrated technical skills related to WebQuest design. For instance, Harrah considered herself not “a very good computer literate person” but “didn’t have any trouble with the technical skills because [the instructor] explained all of it.” Specifically, Kate said that the instructor’s step-by-step guidance on downloading a WebQuest template eliminated the confusion about how to download a template, and Stephanie followed the guidance of the demonstration closely:

I remembered how she pulled it up and how she downloaded it and how she edited it in Word. And then I could go home and do the same thing.

Not surprisingly, preservice teachers valued and followed the instructor’s demonstration for editing a WebQuest template with MS Word. Jack described this demonstration as being the most useful from that class. Harrah added that this demonstration “made the process of creating my WebQuest a lot easier” because the instructor “explained exactly what you needed to do to edit it.” She also said that she followed the instructor’s demonstrations when she worked on her own templates after class, such as inserting URLs into her WebQuest and designing a rubric for the evaluation section.

All preservice teachers also reported that it was helpful for the instructor to demonstrate how to link a WebQuest template to other documents and webpages. For instance, Kate noted in her final reflection that this lesson was her “favorite” because she used hyperlinks extensively in her WebQuest. They also followed demonstrations while working on their own WebQuests. For instance, Stephanie said, “I remember her doing…and I went back home and did that same thing
that she showed us in class.” Harrah also indicated that she followed the instructions when she was linking her Word documents to her webpages.

**Conceptual Guidance**

In this study, conceptual scaffolds helped preservice teachers to understand various WebQuest concepts and design strategies.

**Fixed Scaffolds**

The *Building Blocks* website was considered by participants to be the second most helpful fixed scaffold (along with the *Templates*), according to the end-of-study survey. Both Kate and Leslie, in particular, reported that they frequently revisited this website and it was extremely useful for their designs. For example, Kate said that she used “every single bit of” this website and read it “every single time” when she worked on her WebQuest. Specifically, she said that she reviewed the description and examples for each section on this website and stated in her final reflection: “The *Building Blocks* was so appealing to me because it was simple, easy to get through and read, and had many examples to look at and refer to.” Similarly, Leslie said that this website was “very well organized” and provided both specific instructions and multiple examples. She also said that she referred to specific sections of this website when she had questions, and claimed in her final reflection that it helped her to understand WebQuest concepts and to “set up” her WebQuest sections.

All interviewees indicated that WebQuest examples, available at the *Building Blocks* scaffold or at other fixed scaffolds, were very helpful for understanding WebQuest concepts and components. Harrah, for instance, wrote in her final reflection:
One of the most beneficial materials I looked at was the examples. If I got stuck or did not know exactly what to do for one of the components, I looked at several examples and got a better idea of what I needed to do.

Kate also said she referred to examples in order to “get different ideas,” particularly stating in her final reflection that the examples discussed by the instructor were helpful: “I went back after class and looked up the examples that she gave again and found them to be helpful references throughout my process.” Examples also helped Leslie to “decide where I wanted to go on my WebQuest” and enhanced Jack’s confidence with his topic: “There were a few other WebQuests that had been done sort of on energy [similar to his] and…[I] thought my topic might have been okay.”

The *Grading Rubric* scaffold, rated as the most helpful fixed scaffold in the end-of-study survey, was reported as very useful by all interviewees because it specified the requirements and points for each WebQuest project component. All interviewees reported that they read the rubric before starting their designs in order to understand what they needed to do for their WebQuests. For example, Kate said: “I always use her rubric; before I started, I read it and kind of getting an idea of what I need to do.” Additionally, Harrah specifically described how she used the rubric to help design her WebQuest sections:

As I was doing my introduction…I came to this website and it says draw students into the activity and students will be engaged in the project, and I tried to make sure that my introduction would do that, and I did that basically for each of the sections.

On the other hand, the *WebQuest Workshop on thirteen.org* website was rated by participants as the least useful fixed scaffold in the end-of-study survey. However, Harrah said that it was “pretty helpful” because it specifically described each WebQuest component and
related design goals. Therefore, she “read through it and learned what I was supposed to have in each of the WebQuest sections.” In addition, Harrah also considered the Wikipedia scaffold as helpful because it “did tell me what a WebQuest was and what it involved.” Likewise, Leslie indicated that the thirteen.org scaffold was useful because it “blocked off” each WebQuest component; for example, she quickly identified a related webpage on this website when she “was having trouble with” her introduction section. Additionally, Leslie also claimed that the Taskonomy website helped her with “an idea on how to make [the task] more authentic.”

**Dynamic Scaffolds**

All interviewees reported that it was helpful that the instructor both provided and discussed guiding questions with which they reviewed WebQuest examples in class, such as “Does the introduction ‘hook’ the students?” and “Is the WebQuest task authentic?” Harrah said such questions enabled her to examine specific aspects of WebQuest examples and helped her to understand how to design WebQuest sections. In addition, she indicated that she preferred the instructor’s discussion of WebQuest examples to “just being told what to do.” Kate also specifically described the usefulness of such discussions:

> [The instructor] started going through [an example] like a kid would. That really helped…. That's where I got my idea to split up jury, good desegregations, bad desegregations, and put them in different pages.

All interviewees reported that the instructor’s discussion of topic selection helped them to think about their topics as well as to develop specific WebQuest sections. For instance, Kate said that she started to think about and “add more to” her topic, and Jack noted such discussions helped him to understand WebQuest design goals. Harrah also added:
It helped me think about the task a lot. Make sure that I gave them something that would... be authentic and hopefully not be just answering questions.

Peers also helped preservice teachers to think about their WebQuests. For instance, Jack said that he had to think “a little more” when describing his WebQuest to peers, and Stephanie added:

Once you actually start talking about then you kind of get on this roll, and then I started typing what I wanted to do and started downloading the template. So like, I think by sharing your ideas with your partner, you’re kind of like already starting to really work on it.

Metacognitive Guidance

This study evidenced that preservice teachers used metacognitive scaffolds to help monitor their design processes and assess and reflect on their WebQuests.

Fixed Scaffolds

All interviewees but one used the Problem Solving scaffold to examine their WebQuest designs. Harrah and Leslie said that they quickly checked these hints in order to make sure they followed them, and Jack added:

[I] reviewed them in my mind and compared them to what I had done already.... Those questions helped me realize that I needed to be sort of a little more visual in my presentation [and] I need to have sort of more pictures from online that kind of thing.

Kate also indicated that she revisited and asked herself these questions, and she still had “questions in mind” regarding whether her WebQuest was “challenging enough and doable” as described in the hints. However, Stephanie said that she instead used the WebQuest Project scaffold to “keep going back and make sure I’m on the right track.”
Dynamic Scaffolds

All interviewees reported that the instructor’s feedback on their topics helped ensure that they started their designs in the right direction. For example, Harrah said:

I did find it helpful to get her feedback and say, you’re either on the right track or you’re on the wrong track and this is what you need to do to fix it...So I just kept proceeding and developing the ideas that I had.

The instructor’s feedback also helped Jack become confident with his WebQuest topic: “[I] thought my topic might have been okay… After I got feedback I realized my topic was okay.” Leslie added that such feedback prompted her to reflect upon her own topic and to make changes accordingly. In addition, Leslie also said that she compared her WebQuest with her peers’ in order to examine whether her WebQuest content and design progress were “on the right path.”

All interviewees noted that the peer review activity helped them to improve their WebQuests. Jack said that his peer’s feedback helped him “understand a little bit better of what works and what doesn’t work” despite the fact that some feedback was “unclear.” Likewise, Harrah said that she revised her WebQuest based on her peer’s feedback in order to better fulfill the instructor’s requirement, stating in her final reflection:

After working on my WebQuest for some time, it was hard to tell what exactly was working and what was not. My partner helped me realize that some aspects could be improved. For instance, some of my font was not easily read due to the color. I changed it so it would be reader friendly. My partner also suggested that I keep the focus on math, so my project would not get too complicated.
Kate also noted in her final reflection that her peer’s feedback helped her to see how others would use and think about her WebQuest, and Leslie added that peers helped confirm and revise aspects of her WebQuest:

The last thing that was helpful was when we did the peer evaluations. I felt like my WebQuest might not have made sense in some areas or it wasn’t that great and after I shared it with classmates they seemed to really like it. They also told me the areas which might not have been so clear.

Preservice teachers also reported that they thought about their own WebQuests when reviewing their peers’. For instance, Harrah said:

I tried to think about my WebQuest as I was reading hers and make sure that the things that I saw on hers were in mine or the things that I would change about hers were things that I should change in mine. So it just…helped me evaluate my own WebQuest at the same time that I was reviewing hers.

Likewise, Leslie also described some cosmetic problems in her peer’s WebQuest that reminded her to check whether similar problems existed in her own WebQuest. Similarly, Stephanie noted:

[My peer] was very specific, which is great. And then I was thinking, “Am I that specific in my own?” As I was typing I was like, “Well maybe I should think about that…

Strategic Guidance

In this study, strategic scaffolds helped preservice teachers to see alternative ways of designing their WebQuests and to choose and implement the best suited WebQuest design strategies.


**Fixed Scaffolds**

The *Taskonomy* scaffold received the fourth lowest rating among all 12 fixed scaffolds according to the end-of-study survey. But Jack and Stephanie both utilized it while designing their WebQuest tasks. Jack said that the *Taskonomy* website was helpful in structuring his WebQuest: he looked among different types of tasks on this website, read their descriptions, reviewed tips for two that he might use, and chose a task that best fit his topic. Similarly, Stephanie indicated that this website helped her to see different types of tasks that students could perform. But unlike Jack, she chose a task after reading only the headings and tips of these tasks rather than their descriptions. In addition, both Jack and Stephanie said they did not read any of the examples provided for each task on this website.

The *Design Patterns* website was rated as the fourth most helpful fixed scaffold according to the end-of-study survey. All interviewees reported that they reviewed different design patterns and downloaded individual templates that matched what they wanted to do. Harrah, for instance, reviewed some of the design patterns but skipped some because they “probably wouldn’t work” with her topic in mathematics. Both Kate and Leslie said that it was helpful to have different types of WebQuests to pick from. Specifically, Kate said that she quickly read through all of the tips before focusing on those patterns in her subject area. She noted in her final reflection that she decided on a design pattern of which the hints “gave me more insight and help than the other templates would.” Leslie added that she adopted her design pattern so that it could be more “interesting” and “exciting,” and she also kept another pattern “just in case” she needed it. Likewise, Jack noted in his final reflection that the *Design Patterns* website was the most helpful for his design, enabling him to find an “angle” for presenting his WebQuest. He further elaborated in his interview that he read the tips on the website to judge
whether to further review a pattern, but he decided on a pattern by reviewing the evaluation rubric in each template because it was unique and enabled him to quickly judge whether the design pattern matched his “idea” best.

**Dynamic Scaffolds**

Instructor’s discussions helped preservice teachers to choose suitable design strategies for their WebQuests. Stephanie said that she “would not have thought to” adapt the type of task, had the instructor not demonstrated the related examples of different WebQuest tasks in class. Harrah added that such discussion helped her to identify the type of WebQuest task that she wanted to design:

> We kind of just read through all of them and she (the instructor) kind of just explained some of them. And when I got to reading through the design task, I said, okay, this is kind of what I’m trying to do.

Moreover, both Harrah and Kate also reported that the instructor’s discussion of WebQuest design patterns helped them to decide on the ones best fitted to their individual topics. For instance, Harrah said:

> [The discussion] gave me an idea of…what each of the templates were designed for, and gave me an idea which one that I would need, and found one that would relate to my topic.

In addition, peers helped preservice teachers to see alternative ways of designing a WebQuest. For instance, Harrah said that peers provided very helpful “ideas” especially when she was stuck and did not know exactly what to do, and wrote in her final statement:
I did not know exactly what I wanted them to do. Someone in my group suggested I have them design a park. I loved the idea and used it for my project. Hearing others’ ideas and getting their input was very helpful.

**Theme Two: Adapting Scaffolds**

On several occasions, preservice teachers used scaffolds for purposes not intended by their designers. As shown in Figure 5.1, they adapted scaffolds for metacognitive, procedural, and conceptual purposes.

![Diagram of Scaffolding Types](image)

**Figure 5.1. The Emerging Process of Adapting Scaffolds (dashed arrow indicate limited supporting evidence)**

**For Metacognitive Purposes**

*Procedural Scaffolds*

*WebQuest templates*, validated as procedural or conceptual scaffolding based on location and function, were adapted to help preservice teachers review WebQuests. Harrah described how
she reviewed instructions in the templates to “make sure” what she had done was satisfactory.

Similarly, Leslie reported:

I’d read [an instruction in the template] and…just leave it at the bottom as I was typing it, and then when I was done go back and read it [again] and then exit all out.

Both Kate and Stephanie also reported that they used template instructions as references for future revisions. Moreover, Kate noted in her final reflection that she also used the flowchart from the WebQuest Design Process webpage—initially validated as a procedural scaffold—to “make sure that I was incorporating everything that the website mentioned to know that I was on the right track.”

The instructor’s procedural discussion on designing a WebQuest rubric also prompted Leslie and Stephanie to review and revise their individual rubrics. For instance, Leslie said that she changed her rubric “a lot” because of this discussion:

I didn’t know that we could change it and delete rows and change the names and stuff like that…And she was saying that…children…might not understand what each of those [names] mean. So, then I went and…changed the wording so…children might understand it better.

**Conceptual Scaffolds**

The Grading Rubric scaffold, initially validated as providing conceptual support, was adapted by all interviewees for metacognitive purposes. They frequently checked the rubric to examine whether their draft WebQuests or specific sections had fulfilled the instructor’s requirements. For example, Jack visited the rubric after finishing each WebQuest section to ensure that he was “on par with what the rubric suggests.” Harrah also reported that she used the rubric to review her WebQuest sections during the design, and revisited the rubric “pretty
extensively and make sure… I got every component that [the instructor] is looking for.” This was helpful, as Leslie added, because some overlooked components could be added and exiting ones changed accordingly. In addition, Kate, anxious about her WebQuest, used the rubric to “pinpoint where [her WebQuest sections] would fall in each [grading] category” in the rubric. However, Stephanie also reported using the *Building Blocks* website, initially validated as a conceptual scaffold, to create and review her WebQuest:

I looked at that and then I went through and did it all. And then at the end I went back and looked at it and made sure I had everything….I just really used it step by step to compare, like, what they said it should have, and what I had…

As the instructor discussed conceptual strategies for designing an engaging WebQuest introduction, Leslie realized that her introduction did not “really have anything … that exciting in it.” She also reported that the instructor’s discussion on concepts of topic selection helped improve her WebQuest:

Everything she said kind of made me think of well, how can I apply that to mine? And then if I can’t how can I make mine better?

Similarly, Jack also stated that this discussion enabled him to think about his topic from an alternate perspective:

I’d already decided on my topic and I knew sort of how I wanted to present it. And I knew sort of how I wanted to go about it. But this helped me understand that…students didn’t just sort of need to…give back information about their different energy sources but now students had to be more persuasive with it.
Strategic Scaffolds

Preservice teachers also used strategic scaffolds for metacognitive purposes, but less often than with other scaffolds. Leslie reported being prompted to “think about and make sure” that she was doing what she intended to do when the instructor discussed the strategies for selecting a suitable WebQuest template from the Design Patterns website. Similarly, Harrah noted that the Taskonomy website helped her to clarify the task that she intended to design but was unable to detail. Kate stated that the Taskonomy website enabled her to reconsider her topic:

It made me look at my topic more and say: what is my WebQuest really about? Is it really about the history? Is it really about social studies? It's really about a court case. And I decided that the lesson really is all about a court case. So it…helped me narrow down my topic even more...

For Procedural Purposes

Several conceptual scaffolds were adapted for procedural purposes. For instance, the Building Blocks website was used by Stephanie as a step-by-step guide for designing her WebQuest:

The Building Blocks really just broke it down specifically into steps. That’s how I really structured my WebQuest. I really just did it step by step, just like they showed in that website.

Harrah reported that the Building Blocks website gave her “an idea of what I needed to do to complete those five sections and what I needed to work on.”

Preservice teachers also sought specific procedural guidance when the instructor introduced positive or negative WebQuest examples. For instance, Stephanie noted that she avoided “scavenger hunts” because they were used by the instructor as negative examples in
class. Jack also indicated that this discussion helped him “[make] sure the introduction is not something too long.” In addition, the Building Blocks discussion also provided Harrah with clues to the instructor’s grading expectations:

I think it was helpful to learn what she thought about the different ideas that other people had um so that I could see what she wanted for when she graded my project.

For Conceptual Purposes

Two fixed metacognitive scaffolds were adapted for conceptual purposes: Hints for Topic Selection and Hints for Promoting Problem Solving. All preservice teachers reported that they started to think about their WebQuests when writing their responses to questions in the Topic Selection scaffold. For instance, Kate said:

It was nice to have to write them out. And just kind of thinking and pondering, and you know, getting in the class and just kind of having an idea…You need to know exactly what you need to do, and I liked that.

Leslie further noted that she “probably wouldn’t have actually sat down and thought about a topic” without this activity. According to Stephanie, the hints also helped to ensure the quality of her WebQuest:

By looking at the standards and answering her question about what standards are going to be met…helped me make a more useful WebQuest than just one that was just for fun or not really that helpful.

In addition, Leslie, Kate, and Jack reported that the Problem Solving scaffold helped them think about specific aspects of designing WebQuests. For instance, Kate said: “I made sure before I got started, that I was kept in my head, if it's authentic, if it's going to engage [students]...”
Theme Three: Interplay among Scaffolds

Interplay among fixed scaffolds, as well as between fixed and dynamic scaffolds, was also evident. Preservice teachers also sought additional support, such as WebQuest examples and peer/instructor support.

Among Fixed Scaffolds

Both Leslie and Kate reported that they referred to the Building Blocks website while using templates to design their WebQuests. Leslie stated that when she became confused by the template instructions, she often revisited the Building Blocks website because it had both instructions and examples for each WebQuest section. Similarly, Kate stated:

I read [the guidelines in the templates] first, and I would go to the building blocks webpage and read what they said the introduction should be, looked at a couple of different examples, and then came back [to the templates].

On several occasions, preservice teachers switched to newly introduced fixed scaffolds. For instance, Stephanie stopped accessing the Design Process scaffold because she considered it to be similar to, but less specific than, the Building Blocks website. The availability of multiple scaffolds also led preservice teachers to disregard those they judged unhelpful. For instance, Jack indicated that he did not use the thirteen.org scaffold after briefly reviewing it because he “wanted to just see what other resources were available and explore those.”

Between Fixed and Dynamic Scaffolds

Dynamic scaffolds complemented fixed scaffolds. Kate noted during her final reflection that the instructor’s explanations helped to reduce the confusion resulting from her independent uses of WebQuest scaffolds. In addition, both Kate and Harrah indicated that the instructor’s
introduction helped them to better use the Design Patterns website. Harrah reported that she closely followed the instructor on how to use this website:

I think she just said to go through and read through it and find one that relates to your topic…That’s exactly what I did.

In addition, all participants reported during their interviews that the instructor’s introduction of the Grading Rubric scaffold helped them to better understand the requirements for the assignment. Leslie stated that it was “a lot easier” to understand the rubric through the instructor’s discussion, and Kate suggested that the instructor’s reiteration of the rubric helped recall “some of the stuff that people would forget.” Jack and Stephanie added that discussion was useful because they could have interpreted the rubric from other perspectives. Jack said:

While you are given a rubric sometimes on the first assignment, a teacher may sort of interpret things a little differently than you do even though it’s mentioned clearly on the rubric.

All interviewees also reported that the instructor’s discussion of the Building Blocks website helped them understand WebQuest concepts. For instance, Jack noted that the discussion helped “reinforce particulars of the Building Blocks website” because the instructor had seen “a lot of” WebQuests, and the discussion also helped him to decide on and to better present his WebQuest contents. Similarly, Stephanie stated that the instructor’s discussion “stuck in my mind” when she revisited this website:

It’s kind of hard to just jump into it. So I definitely needed kind of examples and steps [from the instructor] to show me like what it should have.
On the other hand, fixed scaffolds could complement dynamic ones. For instance, Kate reported that she revisited the Building Blocks website when she could not remember the instructor’s discussion about it:

I mean I can’t remember word for word she was saying. So, I would go back to the webpage and just read what it said because it was really plain and simple.

At times, fixed and dynamic scaffolds did not complement each other. For instance, Jack said that the Taskonomy scaffold, rather than the instructor’s discussion of it, helped him because he had already chosen his task from this website and started his design. In contrast, Kate reported that she only followed the instructor’s introduction of the Taskonomy scaffold and did not use the scaffold on her own. Also, she did not read the WebQuest Project scaffold carefully but instead waited for the instructor to “reiterate everything.” She added that the instructor’s discussions were much more helpful than related scaffolding materials (e.g., the thirteen.org scaffold):

A lot of information was overwhelming and I did not know what a WebQuest was at all. So her talking about it made a lot more sense than reading three pages of webpage that had like a bunch of bogus writing that was hard to understand.

Seeking Additional Support

Materials

Preservice teachers actively sought additional WebQuest materials that could help their designs. Stephanie said she referred to WebQuests from previous course offerings because the instructor “might forget little things that they have on theirs.” Likewise, Jack, Kate, and Leslie reported that they voluntarily referred to the instructor’s grading rubrics for previous course projects when they were designing their own WebQuest rubrics. For instance, Kate said:
Her (the instructor’s) previous rubrics from projects helped. But she didn’t even mention that. That was something I pulled up by myself…I went back to two of the different projects that she wrote a rubric for and looked at what she looked at, and how she would make a rubric. Took a lot of ideas from her rubrics…

**Peer/Instructor Support**

Preservice teachers sought peer support when designing their WebQuests. Leslie asked a fellow preservice teacher to check the clarity of her WebQuest content and to remind her of technical skills demonstrated by the instructor. Jack noted in his final reflection that designing a WebQuest as a group activity would help him “become acquainted with the work load and grasp a better understanding.”

Preservice teachers also sought support from the instructor, who stated that she demonstrated the WebQuest rubric in class because it was requested by several preservice teachers. Kate reported that she spoke with the instructor several times after class when developing her topic and evaluation rubric. For example, she was concerned that her topic was controversial and could mislead or offend some children; the instructor suggested that she add a disclaimer in her WebQuest. In her final reflection, Kate requested even more design guidance from the instructor, such as class discussion before reading WebQuest materials. Similarly, Harrah also wrote that additional instructor feedback would have been helpful:

It would not need to be extensive, just a quick check to make sure we were headed in the right directions with our ideas…I would have liked to get more feedback from the instructor after starting and working on the project for some time.
Theme Four: Little Used and Unhelpful Scaffolds

Preservice teachers also reported negative experience with WebQuest scaffolds. Some were not used often, while others were described as being poorly organized, presented, or irrelevant.

Limited Use

On several occasions, fixed conceptual scaffolds were ignored or quickly disregarded by preservice teachers. For instance, the Building Blocks website, although rated as very helpful by the majority (68.8%) of participants, was not used by Harrah and Jack after they explored it in class with the instructor. No interviewees reported that they revisited the Wikipedia scaffold after introduction and only one interviewee (Stephanie) revisited the WebQuest Project scaffold after an initial brief review in class. In addition, the thirteen.org scaffold was rated by preservice teachers as the least helpful fixed scaffold in their end-of-study survey. In particular, videos of WebQuest classroom implementations, although initially considered important to their conceptual understandings of WebQuests, were not used by all interviewees during project design. For instance, both Kate and Leslie reported that they neither watched the videos in class, where state-of-the-art computers and high-speed Internet were readily available, nor watched them at home, where their own computers were too slow to stream video effectively.

In addition, some procedural and strategic scaffolds were not utilized. Harrah, Jack, and Leslie said they never used procedural guidance provided in the Design Process scaffold. Likewise, Kate, Leslie, and Stephanie stated they disregarded the Taskonomy website, initially validated as a strategic/conceptual scaffold, after quickly reviewing it during a class meeting. In addition, preservice teachers did not pay attention to some of the instructor’s dynamic scaffolding activities (e.g., demonstrations, discussions). Stephanie was unable to recall the
instructor’s class discussion of different WebQuest design patterns during the interview. Kate stated she did not attend to the instructor’s discussion but was “looking up different examples” on her own because she already understood the concepts. Similarly, Jack indicated that he did not follow the instructor on how to select and download a template since he had already decided upon one and downloaded it.

**Perceptions of Low Rated Scaffolds**

*Limited Usability/Visual Effects*

Concerns over scaffolds’ visual effects and/or usability were also reported by participants. Leslie indicated in her interview that both the *Design Process* and the *Wikipedia* webpages seemed “boring” so she did not use them. She elaborated in her final reflection:

The *[Design Process]* page was not colorful or not appealing to the eyes at all. All I would see when I would pull up this page was a lot of links to click on. I did not feel like going though and clicking on all of the links until I could find something I would need, so I would just click out of it.

She also wrote that she did not use the *Taskonomy* scaffold because she “never felt like reading through” text-intensive webpages. Similarly, Stephanie also noted that the *Taskonomy* scaffold as well as the *thirteen.org* scaffold was “just too wordy” and not useful. Jack added that he did not use the workshop website because it appeared too time-consuming to understand the plethora of texts.

*Lack of Examples*

Both Kate and Stephanie reported that the *Wikipedia* scaffold and the *thirteen.org* scaffold failed to improve their understanding of WebQuests because they provided no examples. Kate described herself as a “more visual” learner who needed examples to verify her
thinking: “Until there was really an example, I really didn't understand...what a WebQuest was.”

Similarly, Kate described confusion in using the *WebQuest Project* scaffold in her final reflection:

> It...had no visuals or any examples to refer to and it was difficult for me at least to fully understand how one (a WebQuest) should look like.

Harrah also wrote that she “would have rather seen more examples” than the detailed explanations or instructions available at this webpage. Kate and Harrah indicated that some instructor support was not helpful because examples were not discussed or provided when WebQuest definitions were covered during the first class.

**Lack of Relevance**

Stephanie reported that she was unable find a template suitable for her topic because most templates on the *Design Patterns* website were not in her subject area. Similarly, Leslie did not use the *Taskonomy* website because none of its tasks “fit into” what she was looking for. Selected dynamic scaffolds were also perceived as irrelevant to some WebQuest designs. Both Jack and Kate stated that some instructor or peer discussions were of limited use because they focused on other grade levels or subject areas. Leslie reinforced this theme, noting that the instructor’s discussion of a Civil War WebQuest was not useful because her subject was mathematics, and thus perceived the content to lack applicability to her design.

Some participants reported that feedback from peer reviews was not as useful as they expected. Leslie noted in her final statement that her peer provided positive but not necessarily constructive feedback. She desired reviews from two peers because “one person would see something that the other person did not see.” Peer feedback was least helpful when partners were in different design stages. Kate said in her interview that since her WebQuest design was further
along than her peer’s, some feedback she received was not helpful. Stephanie said that the peer review could be more effective if conducted later because her WebQuest was still at “the beginning stages.”

Redundancy

All but one interviewee reported that certain WebQuest scaffolds repeated contents or design purposes. Both Jack and Stephanie stated that they did not use the thirteen.org scaffold because it repeated what other scaffolds provided. Jack reported similar viewpoints toward the Wikipedia scaffold, indicating that the WebQuest Project scaffold repeated the instructor’s feedback on topic selection. Stephanie reported that she did not use the WebQuest Project scaffold because she independently found a similar, but more detailed, website. She also described repetition in the Problems Solving scaffold:

I think she (the instructor) probably pulled this information from the template and from a website just to make sure that we’re thinking about it. But I think it’s already addressed in the template and in other websites.

Summary of Findings by Research Question

Overall, findings suggested that preservice teachers followed, adapted, and combined scaffolds that they perceived as effective for their WebQuest designs; in addition, they sought additional scaffolding to support their design needs. They did not use scaffolds that they perceived as ineffective.

Research question 1: “How do preservice teachers report using scaffolds when designing their WebQuests?” Procedural scaffolds guided preservice teachers through the steps of designing a WebQuest. All interviewees, for instance, followed guidance from the templates scaffold as well as the instructor’s procedural demonstrations of technical skills when designing
their WebQuests. Conceptual scaffolds helped preservice teachers to understand WebQuest concepts and design strategies. For example, all interviewees read the Grading Rubric scaffold to identify the requirements of the WebQuest project before starting their designs; thus they better understood WebQuests when the instructor introduced definitions, basic concepts, and topic selection criteria. Metacognitive scaffolds helped preservice teachers to monitor their design processes and to assess and reflect on their WebQuests. All interviewees but one used the Problem Solving metacognitive scaffold to examine their WebQuest designs; the participant chose a different metacognitive scaffold (i.e., the WebQuest Project) to check her WebQuest. In addition, instructor feedback helped to ensure that the topics were appropriate for WebQuests, while peer feedback also helped improve WebQuests. Finally, strategic scaffolds enabled preservice teachers to identify design alternatives and to choose and implement appropriate WebQuest strategies. All interviewees reviewed different design patterns and downloaded individual templates related to their project, and used the Taskonomy scaffold to review and choose among different types of tasks. Both peers and the instructor provided alternative design strategies and helped them to choose strategies suitable for their individual WebQuests.

However, on many occasions preservice teachers did not follow the guidance of WebQuest scaffolds. Several scaffolds and certain instructor discussions and demonstrations were not utilized. For instance, no interviewee revisited the Wikipedia scaffold after introduction, and none studied videos of WebQuest classroom implementations on the thirteen.org scaffold. Most interviewees disregarded the Design Process and Taskonomy scaffolds; in addition, they did not attend to some instructor dynamic scaffolding activities (e.g., demonstrations, discussions).
Preservice teachers also adapted scaffolds for purposes not intended by their designers or the instructor, such as using procedural, conceptual, and strategic scaffolds for metacognitive purposes. All interviewees but one used the templates scaffold (initially validated as providing procedural or conceptual scaffolding) metacognitively to evaluate their WebQuests. The instructor’s procedural discussion on designing a WebQuest rubric also prompted preservice teachers to reflect metacognitively on their individual rubrics and revise them accordingly. Similarly, all interviewees checked the Grading Rubric scaffold (validated as providing conceptual support) to consider whether their draft WebQuests had fulfilled the project requirements; preservice teachers also reflected on their own WebQuests when the instructor discussed concepts and procedures for designing an engaging introduction. The Taskonomy scaffold (validated as providing strategic support) was employed to reconsider or clarify WebQuest topics and tasks.

In the same vein, preservice teachers used metacognitive scaffolds for conceptual purposes. Preservice teachers started thinking about their WebQuests when writing their responses to questions in the Topic Selection scaffold; the Problem Solving scaffold was used to think about related WebQuest design concepts. In addition, preservice teachers used conceptual scaffolds for procedural purposes. For instance, preservice teachers used the Building Blocks scaffold to guide them through the steps of WebQuest design, and sought design procedure guidance when the instructor introduced basic WebQuest concepts (e.g., characteristics, positive or negative examples).

As preservice teachers’ design needs emerged, they occasionally addressed them by combining fixed scaffolds and by seeking additional WebQuest design materials and peer/instructor scaffolding. For instance, they referred to the Building Blocks scaffold for
examples and descriptions while simultaneously following guidelines in the *templates* scaffold. They also referred to the instructor’s grading rubrics for previous course projects and sought peer assistance or instructor support after class.

Fixed and dynamic scaffolds were used in mutually beneficial ways. Dynamic scaffolds were reported as helpful in reinforcing the effectiveness of fixed scaffolds. For example, the instructor’s discussion of the *Grading Rubric* and *Building Blocks* scaffolds helped all interviewees to understand assignment requirements and WebQuest concepts. In addition, the instructor’s explanations reduced one preservice teacher’s confusion about the independent use of WebQuest scaffolding materials. Likewise, fixed scaffolding materials provided stable reminders of the instructor’s discussion; another preservice teacher revisited the *Building Blocks* scaffold when she was unable to remember the instructor’s discussion.

However, fixed and dynamic scaffolds did not complement each other when preservice teachers chose to use one or the other, rather than both. For example, some preservice teachers used the *Taskonomy* scaffold but did not attend to the instructor’s discussion of it, while others only followed the discussion and did not use the scaffold. One participant did not read the *WebQuest Project* scaffold, and instead waited for the instructor to introduce and explain it.

*Research question 2*: “How do preservice teachers perceive the effectiveness of scaffolds in designing their WebQuests?” Overall, most fixed scaffolds were rated as “good” or “very good” by preservice teachers. They particularly valued fixed scaffolds that explicitly directed their designs; the *templates* and *Grading Rubric* scaffolds, integral to the WebQuest project, were rated among the most helpful fixed scaffolds. Preservice teachers also valued fixed scaffolds they could model. For example, the *Building Blocks* scaffold was rated as the second most helpful fixed scaffold, and all interviewees indicated that examples available via this and
other fixed scaffolds were very helpful for understanding WebQuest concepts and components. Likewise, dynamic scaffolds such as peer or instructor feedback and discussion were also perceived as helpful. All interviewees reported that instructor demonstrations of relevant technical skills, introductions of WebQuest concepts and design strategies, and feedback on topics were helpful. Preservice teachers also indicated that peer feedback was effective in improving their WebQuests.

On the other hand, preservice teachers perceived certain scaffolds as ineffective. Some scaffolds were cited as having limited usability (e.g., excessive text, technical issues) or visual effects (e.g., color, style). For instance, the Taskonomy scaffold was reported as text-intensive and difficult to read, and the Design Process scaffold was described as lacking color and visual appeal. Other scaffolds provided few or no examples and were characterized as not comprehensible. For example, preservice teachers noted that the WebQuest Project scaffold and some instructor support were of limited value because examples were not provided; in other instances, the examples were not discussed. Still other scaffolds, such as the Design Patterns scaffold and some discussions, were characterized as irrelevant because they focused on narrow subject areas, grade-levels, and/or design stages that differed from those of interest to the individual preservice teachers. Finally, preservice teachers perceived certain WebQuest scaffolds (e.g., WebQuest Project, Problems Solving) as redundant because they repeated contents or design processes already available elsewhere.
CHAPTER 6

GENERAL DISCUSSION

Previous research has documented the impact of fixed and dynamic scaffolds designed to support different functions (e.g., Greene & Land, 2000). The present study operationalized WebQuest scaffolds of different types and functions to support preservice teachers’ design of WebQuests. The results supported reports related to designing and implementing WebQuest scaffolds, but contradicted others.

Use of Available Scaffolds

Overall, preservice teachers used available WebQuest scaffolds in ways consistent with previous research (e.g., Lim, 2001; MacGregor & Lou, 2004). They used procedural scaffolds to improve their design performance, conceptual scaffolds to develop their understandings of WebQuest concepts, and strategic scaffolds to examine alternative design strategies. However, in contrast to existing studies (e.g., Greene & Land, 2000; Oliver & Hannafin, 2000), preservice teachers neither extensively relied on nor dogmatically followed procedural guidance. They both used metacognitive scaffolding extensively and adapted other scaffolds for metacognitive purposes. Despite assertions of effectiveness (e.g., Dodge, 2001b, 2004), several procedural and strategic scaffolds were not utilized often or at all by preservice teachers.

Consistent with previous reports (MacGregor & Lou, 2004; Saye & Brush, 2002), preservice teachers used procedural scaffolds to both reduce cognitive load and improve designs. Lim (2001) noted that procedural scaffolds can support low-level production activities that enable teacher-designers to focus on the pedagogical aspects of their WebQuests. According to Lim, WebQuest templates allow teachers from various fields to initiate designs easily and
quickly. In the present study, *template* procedural scaffolds were valued and used by all of the preservice teachers, as they simplified and accelerated design completion. Additionally, the flowchart scaffold, recommended by Dodge (2004) to illustrate the steps involved in creating a WebQuest, was used before initiating design activities. However, the flowchart scaffold was not used by some preservice teachers, suggesting that WebQuest designers may need alternative procedural scaffolds to support preservice teachers who lack the practical experience and knowledge related to everyday students and classroom teaching.

Oliver and Hannafin (2000) reported that middle school students used procedural scaffolds most frequently in their study, speculating that students assumed that procedural guidance specified “explicitly what to do” (p. 87). In the present study, however, participants typically used a single procedural scaffold (i.e., the *templates*); only one used a different procedural scaffold (i.e., the *Design Process*). Nevertheless, preservice teachers did not simply follow procedural guidance dogmatically, but also referenced other types of scaffolds. All interviewees but one accessed WebQuest conceptual scaffolds (e.g., examples, *Building Blocks*) while following guidelines in the *template* scaffold. In contrast to middle school students’ rigid adherence to procedural scaffolds, preservice teachers may be better able to independently assess and use procedural guidance. Thus, they may explore, assess, and adapt multiple scaffolds to address their individual design needs and purposes.

Conceptual scaffolds helped preservice teachers understand WebQuest concepts, design processes, project requirements, and expectations. In the present study, several conceptual scaffolds were provided, including *Building Blocks*, *Grading Rubric*, *thirteen.org*, and WebQuest examples. Previously, Yoder (1999) indicated that the *Building Blocks* scaffold provides purposes, explanations, and examples for each WebQuest design section. The present
study confirmed the perceived utility of the *Building Blocks* scaffold, which was rated as the second most useful fixed scaffold by preservice teachers and was described as being helpful to understanding various WebQuest concepts and design goals. In addition, all interviewees read the *Grading Rubric* scaffold before starting their WebQuest designs in order to determine what was required, and rated it as the most helpful fixed scaffold. The fact that both the *Building Blocks* and *Grading Rubric* scaffolds explicitly directed preservice teachers’ designs indicates that conceptual scaffolds need to connect closely to preservice teachers’ project completion.

Conceptual scaffolding may also help preservice teachers to consider possible topics and assess their appropriateness prior to initiating WebQuest designs. Choosing a suitable topic requires knowledge of the curriculum and related standards that preservice teachers often lack (Lim, 2001). In this study, WebQuest examples helped preservice teachers to decide on, or become more confident with, their individual topics. Examples relevant to preservice teachers’ content and grade areas could help to both clarify the relationships among WebQuests, curriculum, and standards and thus to identify appropriate topics for their own projects.

Gillingham and Topper (1999) suggested that examples provided by seasoned teachers may assist preservice teachers in developing technology integration conceptual awareness and knowledge. In the present study, WebQuest examples helped all interviewees understand WebQuest concepts and components. These examples, if provided earlier in this study, might have better supported preservice teachers’ design due to additional time to internalize and apply newly acquired, WebQuest-relevant knowledge and skills. In addition, the *thirteen.org* scaffold was provided to introduce, via text and video, critical WebQuest perspectives, classroom implementation examples, and possible implementation difficulties. However, this scaffold was rated as the least helpful fixed scaffold; no interviewees accessed it during project design. The
text and video examples may have been perceived as irrelevant to the project requirements since preservice teachers were not required to implement their WebQuests in real classrooms.

According to Lin (2001), metacognitive scaffolds can help learners detect errors, question and explain ideas, activate prior knowledge, and refine their own understandings. Thus, prompt questions or hints (see Hmelo-Silver, 2004) may improve the quality of preservice teachers’ WebQuests by encouraging or prompting them to monitor, assess, and reflect on their design processes. All participants but one accessed problem solving hints during their WebQuest design to identify and resolve design problems or to verify they addressed design requirements.

In previous studies, metacognitive scaffolds were not used by young children or adult learners. Middle school students failed to use metacognitive scaffolds to evaluate their learning and reasoning (Oliver & Hannafin, 2000). Among college students, metacognitive scaffolds (sets of guiding questions intended to prompt intentional reflection) were sometimes omitted or used superficially, and they believed such scaffolds actually restricted rather than stimulated higher-order thinking (Greene & Land, 2000). In contrast, in the present study preservice teachers used metacognitive scaffolds frequently and adapted others for metacognitive purposes. All but one interviewee used procedural and conceptual support templates to review WebQuest drafts, and all re-checked whether their draft had fulfilled the project requirements using the conceptual support rubric. A few even reconsidered and revised their WebQuest topics and contents based on metacognitive use of strategic scaffolds (i.e., Taskonomy, Design Patterns).

Two factors might contribute to preservice teachers’ frequent use of metacognitive scaffolding in this study. First, in the present study, procedural, conceptual, and strategic scaffolds may have reminded preservice teachers of, or prompted them to consider, WebQuest design issues. Thus, adapting scaffolds for metacognitive purposes may have allowed them to
identify potential WebQuest design problems otherwise overlooked. Next, since the instructor introduced and discussed these scaffolds thoroughly in class, perhaps preservice teachers better understood and related them to their designs. For instance, the instructor’s discussion on the topic selection and patterns scaffolds augmented preservice teachers’ consideration of both topics and design strategies. Metacognitive scaffolds may be especially effective and versatile when relevant to projects and explained prior to design or implementation.

Dodge (2001b) suggested that preservice teachers should be supported in developing tasks that engage students in meaningful learning, design, creativity, and judgment. For example, he described the Taskonomy scaffold as “useful in helping [teachers] see alternative ways to frame what they ask of their students.” In the present study, however, this scaffold received the fourth lowest rating among the 12 fixed scaffolds: Some preservice teachers utilized it to choose and design their WebQuest tasks, but others never used it. The mixed results indicate both limitations and usefulness of the Taskonomy scaffold, underscoring the need to empirically evaluate and refine scaffolds and validate claims of their potentials.

Emergent Scaffolding

Consistent with previous research, the instructor scaffolded dynamically by introducing WebQuest design concepts and strategies (e.g., Lim, 2001; Stohr-Hunt & Joyce, 2003) as well as by demonstrating related technical skills (e.g., Summerville, 2000). Peers dynamically scaffolded each other in identifying design problems and considering alternative strategies (e.g., Ge & Land, 2004; Sluijsmans, Dochy, & Moerkerke, 1999).

Dynamic procedural scaffolding helped preservice teachers to address individual “how to” problems and concerns that emerged during design. All interviewees sought support from the instructor and their peers when facing technical difficulties. For instance, they requested that the
instructor demonstrate the design of a rubric, and asked for peer support to solve technical problems and to review skills demonstrated by the instructor. Moreover, preservice teachers extracted specific procedural guidance from the instructor’s conceptual scaffolding. Preservice teachers reported that instructor conceptual discussions helped ensure that WebQuests were consistent with expectations.

In previous studies, teacher scaffolding has proven important for high school students to complete conceptual tasks (e.g., synthesizing information) (Saye & Brush, 2002) and improved undergraduate students’ conceptual understanding (Azevedo et al., 2004). Likewise, preservice teachers may benefit from dynamic instructor scaffolding in understanding key WebQuest concepts, such as discussion of history, explanation of critical concepts, and demonstration of various examples (Stohr-Hunt & Joyce, 2003; Summerville, 2000). In the present study, instructor discussion and demonstration helped preservice teachers to grasp WebQuest concepts and goals and to evaluate their topic options and selection. Since preservice teachers usually lack practical knowledge about students and teaching, instructor scaffolding may help them to relate WebQuest principles and concepts to everyday classroom teaching.

Saye and Brush (2002) also reported previously that strategic scaffolding (expert guidance) improved high school students’ decision-making with regard to their learning. Similarly, strategic instructor guidance may help preservice teachers to assess the relevance of various design patterns or task types as well as to choose and implement suitable WebQuest tactic suitable for their individual purposes. In the present study, all interviewees used the Design Patterns scaffold to review alternative approaches, and the instructor’s discussion of WebQuest patterns and tasks helped them to decide which best fit their individual topics.
Peers appear to provide dynamic strategic support differently from instructors. Peers may prompt learners to justify their individual positions and to acknowledge alternative points of view (Ge & Land, 2004). In the present study, one preservice teacher implemented a type of WebQuest task suggested by her peers after experiencing difficulty designing a task suitable to her topic. WebQuest literature also suggests that peer interactions motivated high-school student-designers to seek designs potentially valued by their peers (Peterson & Koeck, 2001). However, these results were not supported by the present study. Unlike high school students, perhaps preservice teachers were concerned more with learning potentially significant teaching skills and fulfilling design requirements than with impressing peers.

Sluijsmans, Dochy, and Moerkerke (1999) argued that peer evaluation can enable peers to engage in both the evaluation and the learning processes. Peers may help preservice teachers to identify and to address problems they may otherwise overlook. In this study, all interviewees reported that peer review helped to improve their designs. A set of questions scaffolded the peer review activity, enabling preservice teachers to focus on important WebQuest design aspects. Consistent with the Sluijsmans et al. proposition, in the present study preservice teachers considered their individual projects when reviewing their peers’, re-checking to ensure that their WebQuests included favorable features and did not have similar problems.

**Relationship between Fixed and Dynamic Scaffolding**

Fixed scaffolds and dynamic scaffolds can be mutually beneficial. According to Saye and Brush (2002), fixed scaffolds supply an intermediate structure, which provide teachers additional opportunities to think about the task before seeking assistance. They further suggested that fixed scaffolds can be especially useful for teachers who experience difficulty spontaneously supporting student effort. While in the present study the instructor intertwined discussion of
WebQuest concepts and design strategies with her introduction of fixed scaffolds, the results neither supported nor refuted the usefulness of fixed with spontaneous scaffolding. However, fixed scaffolding served as a reminder of instructor scaffolding not recallable by preservice teachers. Instructors may also provide class discussion materials (e.g., handouts, outlines) that preservice teachers can refer to when working independently.

Conversely, dynamic scaffolds may improve the effectiveness of fixed scaffolds that may otherwise fail to support learning (Saye & Brush, 2002). Greene and Land (2000) reported that college students used fixed scaffolds (e.g., Internet resources, static guiding questions) to expand their thinking when dynamic scaffolds (e.g., instructor and peer interaction) were not provided. However, fixed scaffolds *per se* may not be sufficient to support preservice teachers as they initiate and develop their designs (Lim, 2001). Preservice teachers may become overwhelmed or confused by fixed WebQuest scaffolds, or may simply require additional assistance to address needs “in the moment.”

In the present study, dynamic scaffolds complemented fixed scaffolds in various ways. First, dynamic scaffolding help some preservice teachers address problems experienced in using fixed WebQuest scaffolds. The instructor’s explanation helped reduce confusion evident in preservice teachers’ independent uses of WebQuest scaffolds. Dynamic scaffolds also reinforce the effectiveness of fixed scaffolds. The instructor’s introduction of the rubric scaffold helped preservice teachers to understand the assignment, and discussion of the building blocks scaffold supported their understanding of WebQuest concepts and use of the design patterns.

Next, dynamic scaffolds helped preservice teachers become aware of various design issues that they might otherwise gloss over. For instance, one participant reported that she would not have adapted a type of task in the *Taskonomy* scaffold without the instructor’s demonstration
of different examples. Greene and Land (2000) reported that instructors diagnosed the strengths and limitations in college students’ thinking more effectively than did fixed scaffolds. Therefore, instructors should not only provide scaffolding materials, but should help preservice teachers to learn how, when, and why to use them effectively in their individual WebQuests.

The present study also suggests that fixed and dynamic scaffolds do not routinely complement each other during WebQuest design. On several occasions, preservice teachers focused only on a fixed scaffold or on the instructor’s discussion of it, rather than both, even though the scaffold and discussion were designed to be complementary. The availability of dynamic scaffolding may have caused preservice teachers to gloss over related fixed scaffolding. For instance, one participant reported that she did not read a scaffold carefully because she expected the instructor to present it.

**Implications for Research**

Four areas for future research are indicated. First, empirical research results on preservice teachers’ design and implementation of WebQuests have yielded equivocal findings (e.g., King, 2003; Roberts, 2005). Lacking first-hand teaching experience, preservice teachers may design shallow or impractical WebQuests, or fail to understand or implement essential WebQuest principles (Dodge, 2001b). While the present study generated empirical evidence for preservice teachers reported use and perceptions of WebQuest scaffolds, their WebQuests were not implemented in classrooms by either participants or practicing teachers. Therefore, preservice teachers were unable to verify the effectiveness and practicality of their WebQuests. Research is needed to establish the effectiveness of preservice teachers’ WebQuests in everyday classroom settings and students.
Next, since the present study data provided evidence on preservice teachers’ self-report and perceptions, it is unknown how or if scaffolds influenced the quality of their WebQuest designs. Scaffolds described as effective and employed by preservice teachers may or may not influence the quality of WebQuest designs, while scaffolds not used and perceived as ineffective may ultimately have improved their designs. Research is needed to empirically validate methods and instruments for evaluating WebQuest quality, such as Dodge’s (2001a) grading rubric, and to identify the conditions of effective scaffolding for preservice teachers’ design of WebQuests.

Third, while existing reports provide guidelines and anecdotal support for WebQuest design (e.g., Dodge, 2001b; Yoder, 1999), few scaffolding strategies have been examined empirically. The present study revealed preservice teachers’ limited use of both supplied and emergent WebQuest scaffolds, and identified perceptions of low rated scaffolds, such as limited usability or visual effects, redundancy, and lack of relevance or examples. Research is needed to examine the extent to which the present preservice teachers’ judgments of scaffold quality or utility are applicable to practicing teachers and different preservice teachers’ design contexts. This research would help designers both to refine existing WebQuest scaffolding for preservice teachers and to design better scaffolding in the future.

Finally, the present study suggested that emergent peer/instructor scaffolding helped preservice teachers to use provided scaffolds and design WebQuests. Despite prior evidence that emergent WebQuest scaffolds provided by teacher educators and peers have helped practicing teachers’ in their designs (Lim, 2001), preservice teachers did not use some scaffolds designed to complement each other in the present study. Research is needed to investigate how provided and emergent scaffolds autonomously support, and can be effectively integrated, to support preservice teachers’ WebQuest designs.
Limitations

Several limitations in the current study should be considered. First, this study relied heavily on participants’ self-reports which may or may not correspond with actual perceptions or scaffolding use. Self-reports related to dynamic scaffolds were spontaneous and momentary and could not be revisited. In some instances, written perceptions contradicted oral self-reports during individual interviews. To address this issue, I recorded all the WebQuest classes and played the videos to stimulate recall during the interviews. In addition, triangulation with data from different sources was employed to identify conflicting self-report instances which were further analyzed in situ.

Next, although both the instructor and I stressed that participation (or lack thereof) would not affect course grades, participants may have avoided making comments they believed might negatively affect the instructor or their grade. Although some participants expressed strong negative views toward certain scaffolds during their interviews or final reflections, they sometimes rated such scaffolds as average or better in their questionnaires. In addition, virtually all comments, final reflections submitted to the instructor, and questionnaire responses were positive. This could reflect naturally occurring changes in perceptions over time due to deeper reflection compared with spontaneous reaction, but since the possibility for halo effects exist the differences have been noted and interpreted accordingly.

Third, although independent review and member check strategies were employed to improve validity, data coding and pattern identification proved complex. To minimize confusion, I constantly referred to scaffolding and WebQuest literature as well as to the theoretical framework of this study. Still, the reliability of coding and trustworthiness of the findings might have been improved had multiple analysts and coders participated in the data analysis.
Finally, preservice teachers might have used the WebQuest scaffolds in different ways or sought different support had they been given an entire semester rather than three weeks to design their WebQuests. In addition, despite initial validation, some scaffolds provided in this study were considered to be poorly designed or lacking utility, thus influencing the results regarding different types of scaffolds. Emergent scaffolding, such as instructor discussion and peer feedback, is also likely to vary across courses, instructors, course context, and project demands.

Conclusion

The results of this study indicated that scaffolding influences preservice teachers’ WebQuest design. Designing and implementing scaffolds to support preservice teachers’ WebQuest design involves multiple, sometimes interdependent strategies that accomplish different purposes. Further exploration of the interactions among WebQuests, scaffolding, and preservice teachers will help improve both research and practice in related areas, with the ultimate goal to preservice teacher technology integration.
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Appendix A. A WebQuest Template (Procedural/Conceptual Scaffolding)

Put the Title of the Lesson Here

Put some interesting graphic representing the content here

A WebQuest for xth Grade (Put Subject Here)
Designed by Put Your Name Here
Put Your E-mail Address Here

Introduction | Task | Process | Evaluation | Conclusion | Credits | Teacher Page

Introduction

[This document should be written with the student as the intended audience. Write a short paragraph here to introduce the activity or lesson to the students using the following as a guide.]

Present the problem to be solved by the students; show that there is a need for this important information and that they are responsible for finding and compiling quality resources to be used by others. Write the BIG QUESTION here...that the students are responsible for deciding what information should be put in the compilation.

Task

[Describe the task as being in two stages: First, the students (whether individually or in partners) will define what caliber of information is wanted and will research it. Second, with the information found in the research process, students will compile the necessary information into a nicely formatted product. It might be helpful in this step to give a bulleted list of the general items to be rounded up and/or created (e.g. intro, summary, picture, bibliography). Remember to be general; do not bog students down with the process yet.]

Process

Part 1 Researching

1. The class as a whole must brainstorm the elements needed; list some topics which must be decided upon before the research is begun (What information
should be included? How will the students know it when they find it? How will the final product be formatted?)

2. Once these questions are answered, go through one entry with the students so they all see the process.

3. If students are to work in partners/groups, have them assigned at this time. Have the specific responsibilities of each of the roles laid out clearly (researcher, secretary, illustrator, editor).

4. Assign sections of the compilation to each team (e.g. A-D, 1970-1980, specific authors, specific cultures).

5. Have students begin their research by going through the resources the teacher has listed. Scaffold this with a handout/table/chart of questions to answer and ideas to keep in mind while researching (these may be the ideas the class came up with in step 1). Remind students to keep track of their sources for documentation later.

**Part 2 Compiling**

6. Have students review their information according to the criteria established. If they are to rewrite the information in their own words (recommended in order to reach the higher-order thinking skills), at this time they should use their scaffold charts, put away their research, and begin writing the summaries. Scaffold this step with another handout/table/chart with space for the student to input all required information in the desired format. All research must be cited.

7. Explain in detail what the final product will look like (e.g. a brochure, anthology, annotated bibliography, cookbook, a field guide to a particular set of wildlife, a dictionary of terms used in a specific realm; a Who's Who; a "Best of..." collection). The final draft must be a professional-looking, properly formatted product. Scaffold this step with the sample entry (from step 2) formatted properly.

8. Students turn in and/or present the final product. The teacher may wish to use a simple form created at http://www.response-o-matic.com/. The students would then submit the required information to the teacher by email.

**Evaluation**

Describe to the learners how their performance will be evaluated. Specify whether there will be a common grade for group work vs. individual grades. You may want to have separate rubrics for individual and group work.

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Score</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Stated</strong></td>
<td>Description of identifiable performance</td>
<td>Description of identifiable performance</td>
<td>Description of identifiable performance</td>
<td>Description of identifiable performance</td>
</tr>
<tr>
<td>Objective or Performance</td>
<td>characteristics reflecting a beginning level of performance.</td>
<td>characteristics reflecting development and movement toward mastery of performance.</td>
<td>characteristics reflecting mastery of performance.</td>
<td>characteristics reflecting the highest level of performance.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Stated Objective or Performance</td>
<td>Description of identifiable performance characteristics reflecting a beginning level of performance.</td>
<td>Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting the highest level of performance.</td>
</tr>
<tr>
<td>Stated Objective or Performance</td>
<td>Description of identifiable performance characteristics reflecting a beginning level of performance.</td>
<td>Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting the highest level of performance.</td>
</tr>
<tr>
<td>Stated Objective or Performance</td>
<td>Description of identifiable performance characteristics reflecting a beginning level of performance.</td>
<td>Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting the highest level of performance.</td>
</tr>
<tr>
<td>Stated Objective or Performance</td>
<td>Description of identifiable performance characteristics reflecting a beginning level of performance.</td>
<td>Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting the highest level of performance.</td>
</tr>
<tr>
<td>Stated Objective or Performance</td>
<td>Description of identifiable performance characteristics reflecting a beginning level of performance.</td>
<td>Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting mastery of performance.</td>
<td>Description of identifiable performance characteristics reflecting the highest level of performance.</td>
</tr>
</tbody>
</table>

- 141 -
### Conclusion

Put a few sentences here that summarize what they will have accomplished or learned by completing this activity or lesson.

You might also include some rhetorical questions or additional links to encourage them to extend their thinking into other content beyond this lesson. To foster the habit of lifelong learning, give them links to additional information here that they can pursue on their own.

### Credits & References

List here the sources of any images, music or text that you're using (with permission, of
resources, help or inspiration.

Don't relist all the links you've already included. They're self-documenting.

As a matter of style and to keep ownership clear, all pages that you call up that are external to this site should appear in a new window outside of this frame. Add "TARGET=_BLANK" to the link to bring this about.

List any books and other analog media that you used as information sources as well.

Include a link back to The WebQuest Page and the Design Patterns page so that others can acquire the latest version of this template and training materials.

You might want to include the following statement:

We all benefit by being generous with our work. Permission is hereby granted for other educators to copy this WebQuest, update or otherwise modify it, and post it elsewhere provided that the original author's name is retained along with a link back to the original URL of this WebQuest. On the line after the original author's name, you may add Modified by (your name) on (date). If you do modify it, please let me know and provide the new URL.

Last updated 10/26/2005 10:40:24. Based on a template from The WebQuest Page
Appendix B. The WebQuest Design Process (Procedural Scaffolding)

The WebQuest Design Process

0. Do you really need to create a WebQuest from scratch?
   Read [http://webquest.sdsu.edu/adapting/index.html](http://webquest.sdsu.edu/adapting/index.html) to learn about adapting existing WebQuests.

1. Read:
   [http://webquest.sdsu.edu/project-selection.html](http://webquest.sdsu.edu/project-selection.html)
   Pick a topic that requires understanding, uses the web well, fits curriculum standards, and has been difficult to teach well.

2. Study:
   [http://webquest.sdsu.edu/designpatterns/all.htm](http://webquest.sdsu.edu/designpatterns/all.htm)
   Select a design that will fit your topic. Download the student and teacher templates for the design you chose. Open them up in your favorite web editor (Dreamweaver, Composer, FrontPage, etc.).

3. Write up the **Task** in the student template and the **Standards** and **Learners** in the teacher template.

4. Read:
   [http://webquest.sdsu.edu/rubrics/weblessons.htm](http://webquest.sdsu.edu/rubrics/weblessons.htm) and [http://webquest.sdsu.edu/rubrics/rubrics.html](http://webquest.sdsu.edu/rubrics/rubrics.html)
   Complete the **Evaluation** section in the student template. Duplicate it in the teacher template and add any extra information needed by teachers.

5. Read:
   [http://webquest.sdsu.edu/searching/fournets.htm](http://webquest.sdsu.edu/searching/fournets.htm) and [http://webquest.sdsu.edu/searching/specialized.html](http://webquest.sdsu.edu/searching/specialized.html)
   Flesh out the **Process** section by finding a focused set of resources to provide the information needed by learners.

   If you have any doubts about the legitimacy of a site, check it out with Fagan’s URLInfo tool.

   Scaffold where needed with Process Guides.
   [http://webquest.sdsu.edu/processguides/](http://webquest.sdsu.edu/processguides/)

   Check yourself:
   [http://webquest.sdsu.edu/processchecker.html](http://webquest.sdsu.edu/processchecker.html)

6. Complete the **Introduction**, **Conclusion** and **Credits** section and all other parts of the teacher template.
   Add graphics where appropriate.

   Read:
   [http://webquest.sdsu.edu/finepoints/](http://webquest.sdsu.edu/finepoints/)

   Have someone else evaluate your draft:
The process isn't always as linear as this, of course. As you work your way through the steps, you may need to go back and modify the work done in previous steps. By the time you get to the bottom, you're done! The most difficult part is choosing a design and task. The most time-consuming part is designing the process.

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Appendix C. The WebQuest Definition at Wikipedia (Conceptual Scaffolding)

WebQuest

From Wikipedia, the free encyclopedia
(Redirected from Webquest)
Jump to: navigation, search

In education, **WebQuest** is a research activity in which students collect information, where most of the information comes from the **World Wide Web**. It was first invented by **Bernie Dodge** in 1995.

According to the original paper by Dodge [1], a WebQuest is "an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet, optionally supplemented with videoconferencing."

Usually, the quest is divided in the following sections:

- Introduction
- Task
- Process
- Evaluation
- Conclusion
- Teacher Page

Students typically complete WebQuests in groups. Each student in each group typically has a "role," or specific area to research. WebQuests often take the form of role-playing scenarios, where students take on the personas of professional researchers or historical figures.

The WebQuest is valued as a highly **constructivist** teaching method, meaning that students are "turned loose" to find, synthesize, and analyze information in a hands-on fashion, actively constructing their own understanding of the material. WebQuests' focus on group work also makes them popular examples of **cooperative learning**.

[edit]

**External links**

- [WebQuest.org](http://www.webquest.org), Bernie Dodge's WebQuest site.
- [BestWebQuests.com](http://www.bestwebquests.com), a collection of WebQuests by Tom March.
- [InstantWebQuest](http://www.instantwebquest.com), Free WebQuest Design & Hosting tool.
Appendix D. Building Blocks of a WebQuest

Introduction

The purpose of this section is to both prepare and hook the reader. The student is the intended audience.

From the WebQuest template:

Write a short paragraph here to introduce the activity or lesson to the students. If there is a role or scenario involved (e.g., "You are a detective trying to identify the mysterious poet.") then here is where you'll set the stage. It is also in this section that you'll communicate the Big Question (Essential Question, Guiding Question) that the whole WebQuest is centered around.

Examples:

- **Westward Ho!** (Literacy/Soc. Sci. 3)
- **The Ocean's in Trouble!** (Science 4-6)

This page is developed by the San Diego Unified School District's Educational Technology Department, accessible at: [http://projects.edtech.sandi.net/staffdev/buildingblocks/p-index.htm](http://projects.edtech.sandi.net/staffdev/buildingblocks/p-index.htm)
Appendix E. Course Grading Rubric for the WebQuest Assignment (Conceptual Scaffolding)

<table>
<thead>
<tr>
<th>Purpose</th>
<th>To develop an awareness of inquiry-oriented activities that use web-based resources for teaching and learning, to develop a cooperative activity that uses web-based resources to assist students in accomplishing an authentic task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due Date</td>
<td>Thursday, November 17 at the beginning of class</td>
</tr>
<tr>
<td>Percent</td>
<td>15%</td>
</tr>
<tr>
<td>Submittal</td>
<td>Link to webquest.htm page on website</td>
</tr>
<tr>
<td>Details</td>
<td>Using the WebQuest template, develop an original WebQuest for your grade level and subject area. The WebQuest should have an authentic and engaging task for students to complete. In addition, students are expected to have guidance in working in groups through the development of specific roles. A minimum of 5 annotated web resources should be provided for students - appropriate for the topic and grade level. Your audience is students in your chosen grade level and subject area.</td>
</tr>
<tr>
<td>Rubric</td>
<td>Reflections and Peer Review</td>
</tr>
<tr>
<td></td>
<td>Engaging Introduction</td>
</tr>
<tr>
<td></td>
<td>Task is not authentic, provides little challenge, will be difficult to complete</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Authentic Task</td>
<td>No opportunity or need to work collaboratively, all work can be completed independently</td>
</tr>
<tr>
<td>Student Collaboration</td>
<td>Less than 5 web resources are provided for students. Resources are not age appropriate. Students will not be able to use resources to complete the task.</td>
</tr>
<tr>
<td>Appropriate Resources</td>
<td>There is no link between the required task and the evaluation.</td>
</tr>
<tr>
<td>Relevant Evaluation</td>
<td>Does not give suggestions for teacher use, shows no link to content and technology integration standards</td>
</tr>
<tr>
<td>Teacher Page</td>
<td>Standard WebQuest idea, no new technical skills learned.</td>
</tr>
<tr>
<td>Creativity and Effort</td>
<td>/100</td>
</tr>
</tbody>
</table>
What is a WebQuest?
What are the benefits of WebQuests?
How did WebQuests start, and how have they developed since they became popular?
What are the essential parts of a WebQuest?
What kinds of topics lend themselves to WebQuests?
What do I need to create a WebQuest?
What are some critical perspectives?
How can I use WebQuests in conjunction with other educational techniques?

What are the benefits of WebQuests?
When predictions are made about life and work for the coming decades, there are a few points on which there is nearly universal agreement:

- Tomorrow's workers will need to be able to work in teams.
- Individuals will move through several careers in the course of a lifetime.
- The issues facing citizens will become more and more complex, and societal problems will resist easy fixes or black-and-white categorization.
- The amount of information available to everyone will grow at an accelerating pace; much of it will come directly from a growing number of sources without filtering or verification.

What this means is that tomorrow's workers and citizens will need to be able to grapple with ambiguity. They will need to commit themselves to a lifelong process of learning, honoring multiple perspectives and evaluating information before acting on it. Tomorrow's workers and citizens are sitting in our classrooms today.

Using WebQuests in our classrooms can help build a solid foundation that prepares them for the future.
Appendix G. Selecting a WebQuest Topic (Conceptual/Metacognitive Scaffolding)

Introduction

Writing a WebQuest is time-consuming and challenging, at least the first time. To make the most of your efforts and to maximize your chances for satisfaction and success, you should choose your WebQuest projects well. There are four filters that your idea must pass through.

The WebQuest should:

1. be tied to local, state or national curriculum standards;
2. replace a lesson that you're not totally satisfied with;
3. make good use of the Web;
4. require a degree of understanding that goes beyond mere comprehension.

There are great lesson ideas that will not pass through all of these filters. They might make for terrific classroom activities, but they won't make terrific WebQuests. Your task now is to juggle possible ideas until they meet all four criteria.

We'll discuss each of the four in more detail below.

1. Curriculum Standards

One temptation that technology-using teachers often succumb to is to do things just because they are cool. We've all seen labs filled with kids creating animations or comic strips or games or HyperStudio stacks that sang and danced and used every feature of the software. Once you get past the novelty, you might ask yourself what children learn from such things. Sometimes the glitz has an instructional goal that is well thought out, other times not.

The movement towards definable standards in all content areas is apparent everywhere and is unstoppable. Nowhere are they perfect. Even where the standards are disorganized or unclear, though, it is wise to spend your time creating lessons that can be tied to definable goals that others recognize as important. Don't let the technology tail wag the curricular dog.

We'll assume that you have access to the standards that apply to your location, grade level and content, and that you'll consult them as you juggle possible ideas. For inspiration, see the awesome list of state and national standards maintained by Education World.

2. Creative Discontent
Creating your first WebQuest is going to take a fair amount of time. (Your second will go more quickly and will be of higher quality, but let's get through the first one first.) Since that's so, you should choose as your project something that you've taught before and have never been fully satisfied with. The WebQuest you design should replace something and improve upon it rather than being yet another add-on in an already crowded year. When the going gets rough, you'll draw energy from the fact that your newborn WebQuest will make a part of your teaching more effective and enjoyable.

3. Using the Web Well

The Web adds a unique dimension to teaching. It brings in primary sources that would not ordinarily be available to schools. It brings in timely information that is fresher than tomorrow's newspaper. It allows for colorful pictures, sound and animation. The basic structure of a WebQuest could be done with a pile of books and magazines. You should choose a project that could not be done solely with print materials. Using print alongside the web is a great idea... but let's pick something that couldn't be done as well without web access.

4. Understanding

Not everything we teach requires deep understanding. Some things are best taught with direct instruction because there's no room for creativity and no need for synthesis, analysis or judgement. Irregular verbs in Spanish, the list of NATO member states, the eleven-times table, the definitions of parts of speech... these are not good material for WebQuests. Choose content and standards that invite creativity, that have multiple layers, can have multiple interpretations or be seen from multiple perspectives. In short, pick material that requires students to transform what they seen into something different.

The Process

How do you deal with these four filters? Set aside some quiet time to think about your teaching, the curriculum standards, and the kinds of things you've found on the web so far. Then go through the process as outlined here. You may need to use your newly honed web searching skills to see what's out there on your topic. When you can't answer YES, either modify your idea or pick another one. When you can answer YES to all four questions, you're ready to go on to the next stage.
Appendix H. Hints for Selecting a WebQuest Topic (Metacognitive Scaffolding)

Generally, a good WebQuest topic should have some inherent complexity, such as controversial issues, multiple perspectives, unknowns, etc. The topic needs to have your students take information in and transform it, using their own judgment and creative problem-solving techniques.

Please write your response to the following questions regarding your WebQuest project in 1-2 pages.

**Briefly describe your topic.**

**Why do you choose this topic?**

**How will your WebQuest be tied to Georgia or national curriculum standards?**

**How will web play an important role in your WebQuest?**

**How will your WebQuest require students’ deep understanding or higher-level thinking (e.g., creativity, synthesis, analysis, judgment) instead of mere comprehension?**
Appendix I. Hints for Promoting Problem Solving (Metacognitive Scaffolding)

*Is your WebQuest topic authentic in order to engage your students?
*Is your WebQuest task challenging and doable?
*Do your learners need to think independently and critically during the WebQuest activity?
*Is collaboration between your students important for the successful completion of the WebQuest?
*What scaffolds (visual organizers, software tools, prompting questions and suggestions) are provided in your WebQuest?
## Appendix J. Guiding Questions for Peer Review (Metacognitive Scaffolding)

Name of the WebQuest Designer: __________________

Name of the Evaluator: ________________________

*Instead of just answering “Yes” or “No”, please try your best to provide specific suggestions for improvement for each question.*

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the WebQuest visual appealing and navigation friendly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the introduction engaging enough to draw students into the activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the task authentic, challenging, and doable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the task require students’ deep thinking instead of mere comprehension?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the task require student collaboration?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Is the process clear enough so that most students would know exactly where they are at each step of the process and know what to do next?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there strategies, organizational tools, examples, and/or guidance provided in the process to help learners conduct the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the provided web resources sufficient and relevant for the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the task, process, and resources appropriate for the age and grade level?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the evaluation instrument clearly measure what students must know and be able to do to accomplish the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there suggestions for teacher use and direct link to content and technology integration standards in the teacher page?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# WebQuest Design Patterns

This is a list of patterns derived from existing WebQuests that are instructionally solid. To qualify as a design pattern, the lesson should be easily modified to cover different content while using the same basic structure. Each pattern is distinct from the others in terms of the kinds of content it can be used for, and the organization of the Introduction, Task, Process and Evaluation sections. With templates that are specific to each design pattern, it should be easier to hit the ground running when starting to create a new WebQuest.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Instructional Purpose</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Alternative History</td>
<td>Hypothesize about fictional realities in which historical events turn out different from our own. Extrapolate a chain of cause and effect which that one difference would create.</td>
<td>To develop understanding of a historical event; and predict how events would be transformed</td>
<td>Civil War Revisited&lt;br&gt;The Salem Witch Trials: Rewrite History&lt;br&gt;Decisions</td>
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<td><strong>Templates:</strong></td>
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<td>• Student 1-Page&lt;br&gt;Teacher 1-Page</td>
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<td>Analyzing for Bias</td>
<td>Analyze sources of information for bias and use that analysis to articulate a point of view and demonstrate its impact.</td>
<td>To teach the structure and variations of various forms of expression such as editorials, editorial or political cartoons, and propaganda in advertising. To teach a general approach to analyzing messages and developing a point of view in one of the above modes of expression.</td>
<td>Political Cartoons&lt;br&gt;Advertising Propaganda Webquest&lt;br&gt;Cyberganda Advertising</td>
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<td><strong>Templates:</strong></td>
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<td>• Student 1-Page&lt;br&gt;Teacher 1-Page</td>
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<tr>
<td>Critical Thinking Skills:</td>
<td>Students distinguish valid arguments from fallacious arguments in</td>
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historical interpretations.

- Students identify bias and prejudice in historical interpretations.
- Students collect, evaluate and employ information from primary and secondary sources, and apply it in written and oral presentations.

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<tr>
<th>Ballot</th>
<th>Take on the role of a voter in a specific time and place, decide how you'll vote and explain your reasoning.</th>
<th>Understand a specific time and place by focusing on a set of candidates or issues and the desires of those casting a vote.</th>
<th>South Carolina Election 2002</th>
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<td><strong>Templates:</strong></td>
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<tr>
<th>Behind the Book</th>
<th>Use the web to learn more about the time and place in which a work of literature is set.</th>
<th>Deepening ones understanding of a work of literature by studying its setting.</th>
<th>The Real Johnny Tremain Scrooge for Mayor F. Scott Fitzgerald and the 1920s</th>
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<tbody>
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<td><strong>Templates:</strong></td>
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The full list of design patterns is available at: http://webquest.sdsu.edu
Appendix L. A Taxonomy of WebQuest Tasks (Abbreviated) (Conceptual/Strategic Scaffolding)

WebQuest Taskonomy: A Taxonomy of Tasks

The task is the single most important part of a WebQuest. It provides a goal and focus for student energies and it makes concrete the curricular intentions of the designer. A well designed task is doable and engaging, and elicits thinking in learners that goes beyond rote comprehension.

There must be fifty ways to task your learner. Since 1995, teachers have been adapting the WebQuest model to their own needs and settings, and from their collective wisdom and experience some common task formats have emerged. This taxonomy describes those formats and suggests ways to optimize their use. It provides a language for discussing WebQuest tasks that should enhance our ability to design them well. It's likely that the task in a given WebQuest will combine elements of two or more of these task categories.

The categories below are in no particular order other than the placement of Retelling tasks first because of their simplicity and borderline status as the foundation of a good WebQuest. With eleven other task types to choose from, it's time to go beyond mere retelling!

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Tips</th>
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</thead>
<tbody>
<tr>
<td><strong>Retelling Tasks</strong></td>
<td>Are activities based on retelling really WebQuests? It's not a matter of black and white, and it depends on the degree of transformation required of the learner. If the task requires looking for simple, sure answers to pre-determined questions, then the activity is clearly not a WebQuest even if the answers are found on the Web. These are just worksheets with URLs. A modest WebQuest could be based on retelling if:</td>
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</table>

Sometimes all you're asking of students is to absorb some information and then demonstrate that they've understood it. Research reports like these are bread-and-butter activities that don't break much new ground in educational practice, but they can provide an easy introduction to the use of the Web as an information source.

Students can report on what they've learned by way of PowerPoint or
HyperStudio presentations, posters, or short reports. These are the most commonly found WebQuests, and the least challenging (or interesting), but they can serve a purpose.

For example, see:

- Will That Volcano Spoil Our Party
- Kia Ora
- Deserts of the World
- Tropical Travelers

More importantly, a retelling task could be used as an interim step to develop background understanding of a topic in combination with one of the other task types.

Compilation Tasks

A simple task for students is to take information from a number of sources and put it into a common format. The resulting compilation might be published on the Web, or it might be some tangible non-digital product. Some example formats:

- a cookbook compiled from recipes solicited from relatives, as in Cooking with your Three Sisters;
- a deck of cards to aid field trips as in Identifying Leaves of Pennsylvania;
- a selection of web resources to build a virtual exhibition, as in Kathy Schrock's 1960's Museum.
- A time capsule, as in A Separate Peace.

Ideally, a compilation task familiarizes students with a body of content and

To make a compilation task qualify as a true WebQuest, there needs to be some transformation of the information compiled. Simply putting a hotlist of web sites or a collection of web images together arbitrarily isn't enough.

To ramp up the thinking skills required for a compilation task:

- use information resources that are in different formats, and require that they be rewritten or reformatted to create the compilation;
- set standards for the organization of the compilation, but don't make all the organization and formatting decisions for the students. Leave some of that job for them, and evaluate their product based on the consistency and reasonableness of the organization they come up

- the format and wording of their report is significantly different than what they read (i.e., the report wasn't produced by cutting and pasting);
- students are given latitude about what to report and how to organize their findings;
- skills of summarizing, distilling, and elaborating are required and supported.
provides them with practice in making selection choices and explaining them, as well as organizing, chunking, and paraphrasing information drawn from a variety of sources in a variety of forms. with;
• require students to develop their own criteria for selecting the items they put together and to articulate their criteria.

Mystery Tasks

Everyone loves a mystery. Sometimes a good way to lure your students into a topic is to wrap it in a puzzle or detective story. This works well at the elementary school level, but can also be extended all the way up to adult learners.

The Aztec Adventure WebQuest, for example, begins with a mysterious package being delivered to your door. At the end of a sequence of information-seeking activities, your task is to explain the significance of the package and how it portrays the essence of Aztec civilization. Another example is King Tutankhamun: Was It Murder? in which learners examine the same evidence that scholars are debating about.

A well designed mystery task requires synthesis of information from a variety of sources. Create a puzzle that cannot be solved simply by finding the answer on a particular page. Instead, design a mystery that requires one to:

• absorb information from multiple sources;
• put information together by making inferences or generalizations across several information sources;
• eliminate false trails that might seem to be likely answers at first but which fall apart under closer examination.

Mystery tasks can seem somewhat inauthentic because of the fictionalizing they require, though the tradeoff in increased learner interest can make it worthwhile.

If there are careers related to your topic which involve genuine puzzle-solving (as in what historians, scholars, archaeologists and other scientists do) then wrap the mystery around such people and the bogosity will be minimized.

Appendix M. Analysis and Interpretation of WebQuest Class Activities

Number of Instances: 15

**Code:** Ori-2.5  
**Type:** Conceptual Scaffolding  
**Instructor Interpretation:** Become more familiar with the WebQuest format and to see various examples – explore WebQuests on topics that were of interest to them  
**Description/Transcripts:** The instructor gave students 10 minutes to find WebQuest examples and to think about the following questions:  
- Does the introduction "hook" the students?  
- Is the WebQuest task authentic?  
- What kinds of tasks are the students asked to complete?  
- How are students evaluated?  
- What are the advantages and disadvantages?"

**Code:** Ori-2.6  
**Type:** Conceptual Scaffolding  
**Instructor Interpretation:** Emphasize areas of the WebQuest (introduction/task/K-12 student roles) that make them a unique teaching/learning format – so students do not just create a standard lesson plan (or scavenger hunt) and I wanted to types of WebQuest topics that interested them (students). For them (students) to hear other students thoughts/opinions on the examples that they saw.  
**Description/Transcripts:** After students reviewed WebQuest examples, the instructor said, "Let's talk about what you found. So, in the examples that you looked at, hopefully you were able to find 3 or more...Are you starting to get a clearer picture of what they are a little bit? It's a very doable project. The sooner you come up with your idea, the faster it really goes...."  
Then, the instructor asked questions regarding the examples students reviewed per each WebQuest component (e.g., introduction, process).  
The instructor: "What kinds of introductions were used to hook the students?"  
Student A: "I found one that said using one million dollars to design a restaurant."  
...  
The instructor: "So if you are a fifth-grader, you are coming and you teacher says, you just want a million dollars. You are going to listen to just at least a second sentence. That's always your goal. It's to get them to at least listen to the second sentence, and then, with that, you can get them to the third, and the fourth, and so on. So you got to have something that hooks them in instead of 'We are going to learn how to multiply fractions today'..."  
The instructor: "What are some other hooks you saw?"  
Student B: "Mine was, hmm, you are going to create a fascinate pizza party and...the instruction says, when you all the groups have finished with the project, we will have a real pizza party. So I think it's sort of unlike other things that are imaginary..."  
The instructor: "What are the other examples of roles that students play?"  
Student A: "... [Unclear words]"  
The instructor: "Does any people see examples with students playing the role of journalists? No? Those are usually pretty common. So you probably come across some of those where they are..."
working on a newspaper. So in a group of four, you got an editor; you got an artist, photographer, reporter, and so on."

The instructor: "What kinds of things are student creating as they are accommodating tasks for these WebQuests?" "A plan for a party, as one of the examples."

Student X: "A PowerPoint presentation"

The instructor: "A presentation, which you can kind of making it more interesting. A lot of examples you found are with PowerPoint presentations, because what they are trying to do is if you can introduce it in an interesting way, your hope is that something in product would be interesting. But there is no guarantee of that. So in the process section, you have to scaffold it so that they are in PowerPoint presentation."

Student X: "A speech, like gathering and somebody talking to the class as a group."

The instructor: "And in a lot of times, they are some kind of like persuasive, almost like a debate or something like that."

The instructor: "How are students evaluated? What is used in most of the WebQuests you looked at? What form of evaluation?" "A rubric. "A big table like what we are using in our classes. Pretty much anytime you do a project-based activity with K-12 students or the adults; you are going to give them a rubric. The difference with a WebQuest is that they are given the rubric at the beginning. So they know exactly what is expected of them and their tasks, and usually there are multiple tasks for them to do, and they know how they are going to be graded on. So there are no surprises."

The instructor: "What do you see as advantages...of student WebQuests?"

Student X: "Learning about..."

The instructor: "Because you learn...You can't memorize something to complete a WebQuest task. It's something like you are going to have to construct as a child or an adult that hasn't existed before. So students enjoyed that much. It's harder and takes longer. But they enjoy that much more than writing for somebody else that has already done..."

The instructor: "What advantage that I saw as a teacher when I used WebQuests to my six-grade classroom. I used them in my science ed. and my social studies class. My class was hot. It took a lot up-front. It took me a long time to get the idea together to do it...It was great, and they learned that particular lesson plan way better than I would have [without the WebQuest]."

The instructor: "Any disadvantages that you see with a WebQuest? Any that you saw didn't seem really good?"

Student X: "Sometimes the connection was very wordy and I guess people don't want to read it. So I just went to a different one."

The instructor: "And fifth-graders won't read it either. When I was writing the blogs sometime, I was laughing at...who are going to read this? But it reminds me for the next semester what I did today. So that's the bonus. But, yeah, being too wordy can be bad."

The instructor: "Did anybody see topics being taught that...[took 5 weeks for a 2 days of classes.] So you want to really consider the topic or the standard you've chosen, and make sure that is something that lends itself to spending a week or so, or six weeks, or whatever...Any WebQuest you decide to do is going to be a couple of weeks or so. But you want to be really careful that you are not choosing a real simple task that really does not mean to be way more exciting or the learning needs to be more authentic..."

The instructor: "Also remember that WebQuests are inquiry-oriented activities. There are some kinds of questions or problems that students are solving by completing this WebQuest. And the
problem is not the task you can work with. The problem is a larger problem in the world and in
the community or whatever."

**Code**: Ori-2.7  
**Type**: Procedural/Conceptual Scaffolding  
**Instructor Interpretation**: Explain how teachers can use the ideas of others – but how to make
sure that you are not plagiarizing. To talk about how you (students) can use other existing
WebQuests to enhance their own, i.e. using resources from another resource section, etc.

**Researcher's Note**: The instructor also provided very specific requirements for designing
WebQuests (e.g., providing at least 5 websites in the resources section.).

**Description/Transcripts**: The instructor introduced the WebQuest assignment and grading
rubric.

The instructor: "So, you are not the first person to think of it. So think of your idea, and then go
out to see what other people have already done it. Use that to your advantage. But be very careful
that you are not copying and pasting whole components of WebQuest or a whole
WebQuest....You need to have at least 5 annotated web resources...That' what I am going to look
at...I will be looking at your introduction, your task..."

**Code**: Ori-2.8  
**Type**: Conceptual Scaffolding  
**Instructor Interpretation**: Help them (students) choose an authentic topic – to consider
controversial topics within their subject area – but, I think some of this is too redundant and was
explained in 2.4

**Description/Transcripts**: The instructor discussed how to choose a suitable WebQuest topic:
“Controversial issues, environment, health issues and these kinds of things really lend
themselves to WebQuest format. Multiple perspectives like the example of the Civil
War...Students need to find the information to do something authentic. Something more original
with it, not just be [repeating] facts. So you WebQuest should not require students to answer a
series of questions as the entire task. That might be a step for completing a task. But certainly
should not be the whole thing. I would say that for those of you who are interested in grades K-1
and 2, WebQuest aren't, in my opinion, appropriate for the general K-1, 2 audiences. Because
WebQuests really work best when students can work in their collaborative groups independently
where the teacher is a guide. So issues of reading level, ability to read text online, and glean
information that they need, that is [not appropriate] for a five-year-old....If you are still
struggling with what you might do, this link here goes back to the thirteen.org website, and it's
talking about what are some particular topics that really tend to lend themselves to WebQuests”.

**Code**: Ori-3.1  
**Type**: Conceptual/Metacognitive Scaffolding  
**Instructor Interpretation**: To give students the “big picture” of where their ideas stood within
the larger scheme of the class as a whole. To reiterate the need for an authentic task and distinct
roles for K-12 students.

**Description/Transcripts**: The instructor commented on students’ responses to the questions
regarding how to choose a suitable WebQuest topic:
“What I found was that most of you have really good idea, or at least you are starting to get on
there...I did make similar comments on a lot of people's. One comment that I made frequently
was about making sure you have an authentic task. In my mind, there is a difference between authentic and realistic....Authentic means to me is something that people might do in the real world or at least something that makes it seem like it's real work or big people's work. Realistic may not be that...., you know, NASA has come to our class and I want to design a space station and the student group who has the best design gets to live there for a month. Authentic? Yeah. Realistic? Quite not. So that's the difference. So, don't worry it sounds like a little far fetch. Far fetch is OK. But you are going to make this poster to show our class at the end of our unit. Not Ok. That's boring....So that' one thing that I saw. But most of you have real good authentic ideas. Other thing I commented on was making sure you found a way to have students working in groups with individual roles assigned to each student in order to do that. And, that's not to say that you have already planned on that. Because those five questions wasn't really anything that talked about that too much. But it just, hmm, I want you to keep considering that because that's a huge portion of your grade. It's that students are not working independently. And it's not just a class that, you know, the teacher divides the class into five groups or four and finish the project. That's not cooperative....”

**Code:** Ori-3.2  
**Type:** Conceptual/Strategic Scaffolding  
**Instructor Interpretation:** To help students select a format (or taskonomy) for their Webquest based on the topic they chose (and emailed to me).  
**Description/Transcripts:** The instructor introduced the Taxonomy of WebQuest Tasks:  
“What happens sometime is about the authenticity of your task. So what seems to help people is to look at this taxonomy of tasks. There are lots of different kinds. So, retelling tasks might be something that some of you do. That's a pretty low-level WebQuest. But I don't mean that is a bad WebQuest. It just means that students aren't doing a lot of higher-order thinking. They are summarizing information; maybe you are giving them websites to go to collect information about insects or volcanoes or whatever. So that might be the kind of task or research report you are having them do. You might having them compiling something. Maybe they are putting together a alphabetic book, or a set of menus for a healthy-living restaurant because you are teaching about nutrition. Or let people to do mystery tasks--students are solving a mystery in order to complete a WebQuest. Like here is an example....Journalistic tasks....So you want to look at this taxonomy of tasks really before you get start really into yours.”

**Code:** Ori-3.3  
**Type:** Conceptual/Strategic Scaffolding  
**Instructor Interpretation:** To show examples of each of the [WebQuest] sections, have students see models of how to write the different sections, have students begin to think about how they might word the text in their own WebQuests  
**Description/Transcripts:** The instructor introduced the Building Blocks of WebQuests website:  "Ok, what we want to look is the Building Blocks of WebQuests. This is the place we probably would go back to a little bit, because what this does breaks down all five components of a WebQuest--What its purpose is, what you do in it, and some of the examples. I am going to take about 10-15 minutes to walk through these components. So the first thing you have is the introduction. You first thing that you have is the introduction. You won't necessarily write the introduction first. Some people write the introduction last....The introduction is the hook that gets everybody involved....Let's look at some examples from different grade levels."
In the next 13 minutes or so, the instructor continued to introduce each WebQuest component and associated examples in the Building Blocks of WebQuests website.

**Code:** Ori-3.5  
**Type:** Procedural Scaffolding  
**Instructor Interpretation:** To provide them with a template/format to use for their WebQuests so they would know what the required components were  
**Description/Transcripts:** The instructor taught students how to download WebQuest templates: "You are downloading two separate templates, both of which make up your WebQuest assignment. One is the student page. That’ going to be different depending on what your design pattern is and one is going to be the teacher page. So what I am going to have to do first is download the teacher page that is the same for everybody." [The instructor continued to demonstrate how to download the teacher page step by step.]

**Code:** Ori-3.6  
**Type:** Procedural/Strategic Scaffolding  
**Instructor Interpretation:** To have access to scaffolding hints and suggestions from the student templates – rather than all using a generic template, provided time for students to locate an appropriate template based on WebQuest taxonomy discussed in 3.2  
**Description/Transcripts:** The instructor introduced the WebQuest Design Patterns page: “I want everybody now to go to the WebQuest Design Patterns page. That thing that I showed you about the taxonomy of tasks is related to this page. So what you are going to do--I want to give you, not a lot of time...but you are going to look and see if any of these describe what is you want your students to be doing. If you want them to do a compilation task or they have to design their bedroom or whatever. You will notice that it says templates, student page and teacher page. It's really important. You only want to download the student page for the one that relates to your topic. Don't download the teacher page from here because its' going to be more work... So you are going to look here and see if any of them seems to match, and if none of them do or your are not sure, you are going to choose the generic template. All the templates are exactly the same as far as what you have to do. But what is different is the template is full of pieces of advice for...just kind of help that scaffolds your situation a little more”. The instructor continued to demonstrate how to download a student page from the design patterns page step by step. Students were then given 5 minutes to review the patterns and download their student templates. The instructor walked around the classroom to answer their questions or to help them download their templates.

**Code:** Ori-3.7  
**Type:** Procedural Scaffolding  
**Instructor Interpretation:** To make sure students could work with the Word template independently – opening the file, editing it, and saving it to the proper location  
**Description/Transcripts:** The instructor demonstrated how to edit templates with MS Word: “What I want to do for the next two minutes is to spend some time talking with you about how to work on you templates so you can get a good start on this between now and next Tuesday....”

**Code:** Ori-4.1  
**Type:** Metacognitive/Conceptual Scaffolding
Instructor Interpretation: For students to begin to flesh out their ideas for their WebQuests with classmates, for students to begin to gauge the quality of their own WebQuests based on hearing and discussing the ideas of others. Helps students to revise their ideas based on how simple (or difficult) it is to explain to others – sometimes things sound great in our own minds, but when we share the idea with others we realize that it may not be a viable idea. For myself – to efficiently get an idea of what students are working on and their progress. It also lays the foundation for the peer review that will occur in the next class session.

Description/Transcripts: During the first 13 minutes of this class, students were divided into groups of 3 or 4 to share the ideas of their WebQuests. Then, each group shared good ideas of their group members to the whole class.

The instructor: "I would like you to get into groups of 3 or 4. I don't care the size or whatever. I would like you to share some ideas about your WebQuest. You may want to share the introduction; you may want to tell a little bit about what the task is that students are going to be doing. But just give people in your group of 3 or 4 ideas of what it is that you are planning on doing. Hearing those ideas will help you, and then, I am going to ask you to share some ideas out of your group.

So, you are going to be sharing someone's besides yours...Four or five good ideas in a small group and then 4 or 5 additional ideas from the class. Let's spend 5 minutes to get into group and talk about what you are planning to do for your WebQuest."

[Students started to share the ideas from their groups. The instructor made a few comments on these ideas.]

For example, a student said: "She [a member in my group] is doing math with 3-graders and she wants them to have double a recipe, and every group has their own recipe and they...given a recipe like four people and they have to make it to 8 people. Or for 6 people and they have to figure how to do that...."

The instructor: "If you see something, you are going to come across a lot of resources. If you see something that you know, that would be really useful but that doesn't really fit, have a word document open and copy and paste those in, because you may come up with a way to use it. Or, somebody else might...they are not the same, but they have similar and you might find something that she can use and vice versa."

[The instructor continued to ask for other ideas and made a few comments.]

Code: Ori-4.2
Type: Procedural Scaffolding

Instructor Interpretation: A response to student questions about how to create separate pages as they had seen in previous WebQuest examples. Several students choose to do this to separate job descriptions for different roles in the process section.

Description/Transcripts: The instructor spent a few minutes to demonstrate how to link a WebQuest template to other documents and webpages.

Code: Ori-5.1
Type: Metacognitive Scaffolding

Instructor Interpretation: Two-fold purpose – 1) To give immediate feedback to students on their progress so far and 2) to allow students the opportunity to gauge the quality of their own WebQuest based on reviewing a peer’s.
Description/Transcripts: The first part of this class was focused on peer review. Each student first introduced to his/her partner the basic ideas behind his/her WebQuest and then reviewed the partner’s WebQuest using the peer review form.

Code: Ori-5.2  
Type: Procedural Scaffolding  
Instructor Interpretation: To ensure students understood how to add to their webquest (clip art) and how to include a required component (links in the Process section) in a format that allows students to use the information more easily (linking to a title rather than a web address).

Description/Transcripts: The instructor spent a few minutes to demonstrate some technical skills, for example, using clip art in a webpage and inserting hyperlinks without showing URLs.

Code: Ori-5.3  
Type: Procedural/Conceptual Scaffolding  
Instructor Interpretation: [Teaching] how to create a rubric to evaluate the completion of the task – to ensure that all components of the task are included and to help students create 3 or 4 levels of quality for each component. A short-hand way of developing the evaluation since most students have not taken methods courses yet to learn how to do this.

Description/Transcripts: The instructor was demonstrating how to design an evaluation rubric. She also used the course grading rubric as an example of designing an evaluation rubric.
Appendix N. Interview Protocols for Preservice Teachers

Name: ________________ Interviewer: _______________ Date: __________

Tell me a little bit about yourself: your major, years in university, teaching experience.

Tell me about your WebQuest. How did you come up with this topic?

What were difficult to you when designing your WebQuests?

Overall, how do you feel about the WebQuest project? How would you compare the WebQuest project to other course activities? The WebQuest project is worth 15 percent of the final course grade; did this affect what you have done for this project?

What course materials or activities do you think were most useful for your WebQuest? Why?

What course materials or activities do you think were least useful for your WebQuest? Why?

Did you use the following WebQuest materials? If yes, how did you use it? If no, why didn’t you use it?
  o WebQuest Templates
  o Course Grading Rubric for the WebQuest Assignment
  o The WebQuest Workshop Website on thirteen.org
  o The webpage—Selecting a WebQuest topic
  o Questions on Selecting a WebQuest Topic
  o Taskonomy—A Taxonomy of WebQuest Tasks
  o Building Blocks of a WebQuest
  o The WebQuest Design Process
  o WebQuest Design Patterns
  o Hints for Promoting Problem Solving
  o Guiding Questions for Peer Review

[The researcher asking questions while watching class videos with the interviewee.] Can you remember this instruction/activity? Did you utilize any of the instructions or tips when designing your WebQuest? How/Why? What did you do during this activity?
  Was it useful to your WebQuest design? Why?

What other WebQuest class activities were helpful for your WebQuest design?

What other help/resources did you get/utilize for your WebQuest design? How did they help you?
Appendix O. Questionnaire #1

Participant Name: ____________________________   Date: ____________________

Major: _________________________________________________________

Year: (circle)  1st  2nd  3rd  4th  other

Primary E-mail Address: ____________________________________________

Why do you take this course?

What teaching experience do you have?

What education courses have your taken prior to this semester?

What courses are you taking this semester?

What are your expectations for this course?

What is something else you want the instructor know?

Please indicate your skills with the following applications and activities:
(Rate them on a 1 to 5 scale and circle your response to each item.)
1= I am very poor at conducting this activity or using this application
2= I am poor at conducting this activity or using this application
3= I am average at conducting this activity or using this application
4= I am good at conducting this activity or using this application
5= I am very good at conducting this activity or using this application

Item 1. Sending and receiving email attachments N/A 1 2 3 4 5
Item 2. Microsoft Word N/A 1 2 3 4 5
Item 3. Microsoft Excel N/A 1 2 3 4 5
Item 4. Microsoft PowerPoint N/A 1 2 3 4 5
Item 5. Web search engines N/A 1 2 3 4 5
Item 6. Working with digital photos N/A 1 2 3 4 5
Item 7. Working with digital video N/A 1 2 3 4 5
Item 8. Inspiration software N/A 1 2 3 4 5
Item 9. Creating web pages N/A 1 2 3 4 5
Item 10. Macromedia Dreamweaver N/A 1 2 3 4 5
Item 11. Macromedia Fireworks N/A 1 2 3 4 5
Item 12. Adobe Photoshop N/A 1 2 3 4 5
Item 13. Lesson Planning N/A 1 2 3 4 5
Appendix P. Questionnaire #2

Participant Name: __________________________ Date: ______________________

This survey is conducted by Feng Wang (706-542-4549; fwang@uga.edu) for his dissertation study under the direction of Dr. Michael Hannafin (706-542-3157) at The University of Georgia. All of the information collected from this questionnaire will be treated as completely confidential. Your feedback is sincerely appreciated and will help us to improve this course. Thank you.

Please rate, on a 1 to 5 scale, the usefulness of the following course materials and activities to your WebQuest design.

N/A=Not Applicable  1=Very Poor  2=Poor  3=Average  4=Good  5=Very Good

(Circle your response to each item.)

1. The WebQuest Definition at Wikipedia
   N/A  1  2  3  4  5

2. WebQuest Templates
   N/A  1  2  3  4  5

3. Course Grading Rubric for the WebQuest Assignment
   N/A  1  2  3  4  5

4. The WebQuest Workshop Website at Thirteen.org
   N/A  1  2  3  4  5

5. The webpage—Selecting a WebQuest topic
   N/A  1  2  3  4  5

6. Questions about selecting a WebQuest topic (You were required to email the instructor your responses to these questions last week.)
   N/A  1  2  3  4  5

7. Tasknomy—A Taxonomy of WebQuest Tasks
   N/A  1  2  3  4  5

8. Building Blocks of a WebQuest
   N/A  1  2  3  4  5

9. The WebQuest Design Process
   N/A  1  2  3  4  5

10. WebQuest Design Patterns
    N/A  1  2  3  4  5

11. Questions to consider as you are working on your WebQuest (posted on last Thursday’s class blog)
    N/A  1  2  3  4  5

12. The WebQuest Peer Review Document (used in today’s class)
    N/A  1  2  3  4  5

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Appendix Q. Final WebQuest Statement

In this statement, you need to reflect upon your WebQuest design processes and to report your use and perception of WebQuest class materials or activities for your WebQuest design. Please support your statement with concrete examples of your WebQuest design experience.

Respond to all of the questions or instructions in paragraph format and in the order in which they are provided. Please do NOT use the word "fun" or any of its synonyms which are not the goal of designing WebQuests.

1. Please describe in detail your WebQuest design processes: How did you go about putting together your WebQuest? How did you choose your topic? Did you have to write several drafts? How did you select the design template? How did you flesh out the specific sections of your WebQuest? How did you know when you were finished with your WebQuest?

2. We spent several class sessions discussing WebQuests and learning about various design materials that could be used in the development of your own WebQuest. Identify at least 3 WebQuest design materials and/or class activities that were helpful to you in the design of your own WebQuest. Give specific examples of when and how you utilized these materials and/or class activities, and how they were helpful to the development of your WebQuest.

3. You probably did not use all of the WebQuest design materials or benefit from all of the class sessions on WebQuest. Which specific design materials and/or class activities were of limited value in the development of your own WebQuest? Why do you think so?

4. What other WebQuest design materials, class activities, or other types of support would have been helpful during the design of your own WebQuest?
Appendix R. Independent Review Form

<table>
<thead>
<tr>
<th>Name of the Scaffold</th>
<th>The WebQuest Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scaffold Type</strong></td>
<td>Procedural</td>
</tr>
<tr>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

Notes:
It’s very prescriptive and the flow-chart makes me think I need to follow that order. It also tells me what to read.
## Appendix S. Detailed Independent Review Comments

<table>
<thead>
<tr>
<th>Name of the Scaffold</th>
<th>Scaffold Type &amp; Notes</th>
</tr>
</thead>
</table>
| WebQuest Templates   | Procedural:  
  - Do this and then do this and then do this.  
Procedural & Conceptual:  
  - It takes the teacher step-by-step through the process (Procedural). It also provides the overall concept of the lesson, how to grade it, etc.  
  - Procedural written out you need to do and then lists several steps. Conceptual as the overview and context of the website is layed out for us.  
  - Templates are procedural because they provide a step-by-step guide for preservice teachers to create their WebQuests. Templates are also conceptual because they help preservice teachers to understand what each section is about.  
Conceptual:  
  - Designed to help students understand what the webquest is and how to design it |
| Course Grading Rubric for the WebQuest Assignment | Conceptual:  
  - Because it provides help about what the task is about  
  - They clearly obtain this rubric before the due date it is used to help them design their website. I don’t think is a reflective tool. And I don’t think it takes them thru a step-by-step process like a user’s manual.  
Procedural & Conceptual:  
  - After [the researcher’s] explanation that this is the process students will go through, I gelt like this is as much of a step-by-step guide as that which could be expected of an open-ended process.  
  - Procedural written out you need to do and then lists several steps. Conceptual as the overview and context of the website is layed out for us.  
Metacognitive & Conceptual:  
  - It is metacognitive because preservice teachers can use it to assess their WebQuests. It is also conceptual because it helps preservice teachers to think about what their WebQuests should include. |
| The WebQuest Workshop Website on thirteen.org | Conceptual  
  - This has to be conceptual because it helps preservice teachers to understand general WebQuest concepts. |
### Selecting a WebQuest Topic

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Procedural:</strong></td>
<td>It provides help with a process that students need to go through.</td>
</tr>
<tr>
<td><strong>Conceptual:</strong></td>
<td>It tells you a process to go through but this process may differ for each individual (how many times they go around the loop).</td>
</tr>
<tr>
<td><strong>Metacognitive:</strong></td>
<td>The purpose of this website is to help people understand the purpose of their webquests and whether or not their webquest meets the vision of the originator (Bernie Dodge). As such, it is meant to evaluate your webquest and is therefore metacognitive.</td>
</tr>
</tbody>
</table>

### Hints on Selecting a WebQuest Topic

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metacognitive:</strong></td>
<td>It provides help with thinking about what the students need to do/think/solve problems. Although they look sequential, they are thinking-oriented questions. They all have to answer these questions and [the instructor] probably wanted them answered in the order given (somewhat procedural). However, the purpose of these questions is to help them think about and address how their potential WebQuest will meet standards.</td>
</tr>
<tr>
<td><strong>Metacognitive &amp; Procedural:</strong></td>
<td>[The researcher] is strongly suggesting that these are reflective questions and therefore it is a metacognitive scaffold. However, as a student, this is a task that is required and directs students to include answers to specific questions. I think it is therefore procedural. 5 questions to answer sequentially about their selection of this topic. Reflection and thinking about the topic that they choose.</td>
</tr>
<tr>
<td><strong>Metacognitive &amp; Conceptual:</strong></td>
<td>It is both conceptual and metacognitive because it helps PS to think about and evaluate their WebQuest topics.</td>
</tr>
</tbody>
</table>
| **A Taxonomy of WebQuest Tasks** | **Conceptual:**  
• Because this page is designed to help students understand what the taskonomy means.  
• This page is in no specific order, as stated in the page. It is provided to give teachers options of which task they would like to choose to do and tips on how to do it. Also, the entire page itself is a conceptual overview of tasks (a taxonomy).  
**Strategic:**  
• This page gives several alternative approaches to webquest themes and designs that are placed in no particular order as indicated in the website. If these alternatives were not given I would call this page conceptual.  
• Provides alternative ways to enhance or enrich or improve the webquest being created. There are suggestions for taking each type of webquest and making it “better.”  
**Conceptual & Strategic**  
• It is strategic because it help PT to see different types of tasks and provide tips for selection. It is also conceptual because it helps PT to think about understand what WebQuest tasks should be about. |
|---|---|
| **Building Blocks of a WebQuest** | **Conceptual:**  
• Designed to help students understand the concept of WebQuest by examining different components.  
• It’s a conceptual overview of how to build a web-page.  
• Tells you what a webquest includes without providing a prescriptive checklist for inclusion.  
• This is conceptual because it introduces concepts of each WebQuest section and provides examples.  
**Procedural & Conceptual:**  
• Gives procedural/explicit directions for what to include in the webquest that is being created. Also gives conceptual overview of the creation process. |
| **The WebQuest Design Process** | **Procedural:**  
• Provides steps students go through  
• It’s very prescriptive and the flow-chart makes me think I need to follow that order. It also tells me what to read.  
• Has to be procedural. It’s very explicit!!  
• This is procedural because it is really a step-by-step guide for designing WebQuests. |
| WebQuest Design Patterns | Conceptual:  
| | • Designed to help students understand webquest design by examining different patterns  
| Strategic:  
| | • This site provides alternative types of webquests to create.  
| | • lots of alternatives that we can use to base the look of our webquest off of  
| | • Provides alternative designs for the patterns there.  
| Conceptual & Strategic:  
| | • It is strategic because it lists different ways of designing WebQuests.  
| | • It is also conceptual because it helps PT to understand how to design a WebQuest. |

| Hints for Promoting Problem Solving | Conceptual:  
| | • This set of questions help students thinking about/self-assessing their activity.  
| Metacognitive:  
| | • These are after-the-fact questions designed to help students evaluate their webquests.  
| | • While these questions do not need to be answered, they are used to help students reflect on their current webquest and make revisions as necessary.  
| | • Provides prompting reflection questions that serve as a refinement/reflection tool for the students to go back and look at the webquest that they have created  
| | • This is metacognitive because it helps learners to assess their WebQuests. |

| Guiding Questions for Peer Review | Procedural:  
| | • Students go through each point to check. They are more straightforward and directed than metacognitive.  
| Metacognitive:  
| | • The overall purpose seems to help people reflect on and evaluate projects.  
| | • It is metacognitive because it helps learners to assess their peers’ and their own WebQuests.  
| Procedural & Metacognitive:  
| | • Step-by-step procedural way of looking at their peers’ webquests  
| | • Meta- looking at things in reflective point of view  
| Metacognitive & Strategic:  
| | • Based on an outside reviewer, they will be giving alternative approaches to work they don’t agree with. However, it also gets others to reflect on student work and provide insights about the given questions other than yes or no responses. |
### Appendix T. Background Information of Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Overall Technical Skill Score</th>
<th>Lesson Planning Skills</th>
<th>Major</th>
<th>Grade</th>
<th>Reason for Taking this Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student #1</td>
<td>24</td>
<td>0</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Harrah</strong></td>
<td>24</td>
<td>0</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required, useful for my future classrooms</td>
</tr>
<tr>
<td>Student #3</td>
<td>27</td>
<td>0</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #4</td>
<td>27</td>
<td>2</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Stephanie</strong></td>
<td>27</td>
<td>4</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #6</td>
<td>28</td>
<td>2</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #7</td>
<td>28</td>
<td>3</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #8</td>
<td>28</td>
<td>3</td>
<td>Middle School Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Kate</strong></td>
<td>29</td>
<td>0</td>
<td>Middle School Education</td>
<td>Freshman</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Jack</strong></td>
<td>29</td>
<td>1</td>
<td>Science Education</td>
<td>Other</td>
<td>Required</td>
</tr>
<tr>
<td><strong>Leslie</strong></td>
<td>33</td>
<td>2</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #12</td>
<td>33</td>
<td>3</td>
<td>Middle School Education</td>
<td>Junior</td>
<td>Required</td>
</tr>
<tr>
<td>Student #13</td>
<td>36</td>
<td>3</td>
<td>Early Childhood Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
<tr>
<td>Student #14</td>
<td>39</td>
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<td>Sophomore</td>
<td>Required</td>
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<tr>
<td>Student #15</td>
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<td>Required</td>
</tr>
<tr>
<td>Student #16</td>
<td>47</td>
<td>3</td>
<td>Middle School Education</td>
<td>Sophomore</td>
<td>Required</td>
</tr>
</tbody>
</table>

Note: Students #13, 14, 15 were not considered for interviews because each missed one WebQuest class. Students #12, 16 refused my interview invitation.
## Appendix U. Results of the Second Survey

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The WebQuest Definition at Wikipedia</td>
<td>16</td>
<td>4.06</td>
<td>0.85</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2. WebQuest Templates</td>
<td>16</td>
<td>4.63</td>
<td>0.5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Course Grading Rubric for the WebQuest Assignment</td>
<td>16</td>
<td>4.69</td>
<td>0.48</td>
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<td>5</td>
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<tr>
<td>4. The WebQuest Workshop Website at Thirteen.org</td>
<td>16</td>
<td>3.31</td>
<td>1.78</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>5. The webpage—Selecting a WebQuest topic</td>
<td>16</td>
<td>3.75</td>
<td>0.58</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>6. Questions about selecting a WebQuest topic</td>
<td>15</td>
<td>4.4</td>
<td>0.74</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>7. Taskonomy—A Taxonomy of WebQuest Tasks</td>
<td>16</td>
<td>4.06</td>
<td>1.34</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>8. Building Blocks of a WebQuest</td>
<td>16</td>
<td>4.63</td>
<td>0.62</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>9. The WebQuest Design Process</td>
<td>16</td>
<td>4.44</td>
<td>0.63</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>10. WebQuest Design Patterns</td>
<td>16</td>
<td>4.44</td>
<td>0.63</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>11. Questions to consider as you are working on your WebQuest</td>
<td>15</td>
<td>4.07</td>
<td>0.8</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>12. The WebQuest Peer Review Document</td>
<td>16</td>
<td>4.31</td>
<td>0.7</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>