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An Evaluation of Wiki Implementation in a Teacher Education Course

By Cynthia Gautreau & Cindy Edwards

Abstract

The use of web based collaborative technologies, such as wikis, in pre-service teacher education programs continues to evolve. As new technologies emerge, faculty design instruction to integrate technology resources to promote technology skills among new teachers through practical application strategies and concrete experiences. This paper provides insight to an assignment completed by pre-service educators who used wikis during their first semester of credential coursework. This paper reveals the integration process, and benefits and drawbacks of wiki implementation in a hybrid course. The authors make recommendations for faculty who are considering the integration of wikis into teaching education courses.

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Purpose and Importance of the Paper

This paper reports on an instructor's first attempt at integrating a wiki based assignment into a hybrid teacher education course. A wiki is a collaborative website that permits multiple authors to edit and submit content. The goals of the assignment were to determine the appropriate use of an emerging technology in pre-service education, provide students the opportunity to collaborate and contribute to a wiki, and evaluate the wiki implementation process. This paper focuses on the need to evaluate and establish specific guidelines when using wikis in teacher education courses to provide pre-service teachers with effective learning experiences. The findings of this paper are important because it investigates the use of wikis in teacher education, which technology, as Bates and Poole (2003) indicate, should be integrated into teaching in higher education to reinforce instruction. As technologies evolve and the integration of such emerging technologies is applied to teacher education programs, an evaluation in instructional design should be a part of the process.

Literature Review

This review of literature will include (a) teaching and learning processes, (b) wiki implementation strategies; and (c) student and faculty needs. The primary use of instructional technologies in education as described by Wang (2001) is to support the process of teaching by faculty, support the process of learning by students, and apply research methods to implement instructional techniques using available resources. There is a need for technology integration in higher education that models and teaches novice teachers important technology competencies.

Teaching and Learning Process

Instructional technologies can be applied to support the learning process. Technologies utilized by professors in university courses are simply a means to an end (Fink, 2003; McDonald,

Yanchar, & Osguthorpe, 2005; Prensky, 2005; Roblyer, 2006). The underlying goal is not technology use, but facilitating teaching through the use of technology resources. Educational technologies do not enhance teaching, rather they allow for functional, fluid delivery options that promote learning (McDonald et al., 2005, Riedinger & Rosenberg, 2006). Effective integration of any technology application relies on the competency and ability of the instructor, and the functions of the technology tools used by students and faculty. According to research at the Northwest Regional Educational Laboratory (1999) three factors are present when technology integration occurs in the classroom. First, the faculty members require training to become proficient in a wide range of hardware and software application. Second, professors apply the technology appropriately to support teaching strategies. Third, educators make appropriate choices based on technology knowledge and experience. These three conditions may be achieved through practice, collaborative approaches, and participation in professional development. Furthermore, research reveals those faculty members who are familiar with technologies in general tend to incorporate technology resources more often, and thereby continue to improve their abilities (Laurillard, 1993; Willis & Raines, 2001). The use of wikis are an innovative experience for faculty, and a learning curve is a part of the implementation process. Based on the literature review findings and experiences of this implementation, many factors need to be considered when integrating wikis into teacher education course. Two factors to consider are the needs of the pre-service teachers and their technology related expectations.

College students are accustomed to the use, engagement, and implementation of technology in other aspects of their lives (Prensky, 2005; Tapscott, 1998). According to Chickering and Ehrmann (1996), technology may be applied as a lever to support best practices in educating students. However, it is imperative to learn which technology will meet the students' needs in addition to the individual instructor's goals. In the present study, the use of wikis required additional student training and additional practical use to make the experience successful. Wilson (2003) suggests technology integration requires practice. The more frequently educators use technology as an instructional tool, the more likely they are to discover innovative means for incorporating the technology. Chickering and Ehrmann (1996) state that "any given instructional strategy can be supported by a number of contrasting technologies…just as any given technology might support different instructional strategies. But for any given instructional strategy, some technologies are better than others"(p. 3). A collaborative wiki fosters the

interaction between students in a course, and supports the teacher's observation of student work. Yet the hands-off nature of the instructor's role during wiki-based collaboration controlled by the learners challenges the instructor's ability to facilitate interaction among learners. Consequently, planning and preparation prior to wiki implementation should address the instructor's needs to facilitate teaching activities, and the student's needs to maximize the learners' motivation to participate.

Wiki Implementation

Teaching and modeling in teacher education should include a range of instructional approaches. A wiki is one Web 2.0 tool that may be used to foster collaboration among students. As noted by Marzano, Pickering, and Pollock (2001), applying a variety of teaching strategies may increase student technology achievement. Integrating a wide range of technology resources will provide students with access to teaching tools and experience in using the resources available. When new instructional strategies are integrated into teaching, it is critical to evaluate the implementation process. Web 2.0 technologies that encourage peer interaction, independent learning, and self-direction motivate learners to participate fully in the learning experience. Constructivist learning strategies that Giddens (2007) employed with an interactive social software interface encouraged double-loop learning because the interactions were realistic and relevant to the learners' immediate needs. Recent research in wiki implementation has shown the benefits of including wikis as a collaborative addition to learning (Butcher & Taylor, 2008; Moxley & Meehan, 2008). Engstrom and Jewett (2005) studied the use of wikis as collaborative learning spaces for inquiry-based problem solving activities. Observations revealed that the organic built-from-within nature of wikis echoed and supported the structure of information flow within the learner population. In a similar study, Nicol, Littlejohn, and Grierson (2005) investigated the influence of information structure in a wiki to assess the process and quantity of sharing and learning during problem solving. Maintaining the wiki as a shared workspace supported the learning and problem-solving processes. The wiki played a positive role in knowledge sharing and knowledge building. Although the participants in the two studies were middle school learners, similar principles apply to adult learners in a structured organization.

Student and Faculty Needs

Successful integration of emerging technologies into teaching and learning process requires the satisfaction of specific needs for students and faculty. For students to understand the

relevance of the experience, they must be motivated to engage in the learning process. Faculty members require professional development and training to understand the influence of social technologies on instructional strategies, and technology competence to ensure a fluid learner-technology interface.

Student needs. Engagement and motivation together create a cyclical process: engagement increases motivation, motivation translates to observable action, and action provides evidence of engagement. Sources of learning motivation for adults are intrinsic. Relevance encourages learner engagement (Lee, Chambers, & Ely, 2005; Wlodkowski, 2003), an observable behavior that demonstrates motivation to continue with the learning experience. When applied to a group, such as a cohort of teaching students, engagement relates to group effort (affect), creates purposeful meaning (relevancy), and contributes to knowledge building or reinforcement (Kearsley & Shneiderman, 1998).

For technology-based instruction, interactive elements must demonstrate relevance and flexibility in not only the content, but also the adult learners' interactions with the content. Motivating adult learners to engage in the learning process involves giving the learner some control over the experience. Engaging courses utilize tools that enable interaction and self-direction, characteristics of the work pre-service teaching students will experience on the job. In this current study, students ultimately chose how to use the wiki tool.

Implications of motivating adult learners using technology for instruction include designing learning experiences that engage the learners in co-construction and co-instruction. Benefits of web-based instruction include the ability for faculty to give students control over navigation of material related to completing web-based tasks (Lee et al., 2005). In addition, social software applications facilitate community building, information sharing, and networking as determined by the needs and actions of the users (Dickerson, 2004; Gordon, 2006). The self-directed, bottom-up, and organic nature of wiki applications facilitates formation of interdisciplinary relationships and cooperation among teaching and learning communities (Giddens, 2007).

Effective learning tools are contextual and fundamental (Giddens, 2007). Formal education provides a foundation upon which students build as they apply the principles to real-world work. Education program students compose a unique learner group in that their experiences as students provide additional insight to their future performance as teachers. Pre-

service teachers are able to conceive relevance by observing their professors demonstrating best practices in facilitating technology-mediated learning. Therefore, it is equally important for the pre-service teachers to succeed, and their instructors need to be fluent with the tools necessary to develop a solid learning foundation.

Faculty needs. Integrating new technology in education courses presents challenges for both teachers and students. Research in instructional design (Brown & Green, 2006; Mullinix & McCurry, 2003) emphasizes the need to evaluate and re-evaluate teaching and learning strategies to create a positive learning environment that evolves with the needs of students. To teach effectively in the 21st century, education for future elementary school teachers should integrate technology with teaching and learning strategies. Albion (2008) suggests, "…the best way for teachers to learn about Web 2.0 may be through learning with Web 2.0 as authentic practice that can inform their planning and implementation of learning activities" (p. 195). Furthermore, pre-service teachers have endorsed the practice of learning through doing (Norton & Hathaway, 2008). The use of wikis in pre-service teacher education has been shown to increase the teacher-learners' understanding of the logistics of integrating Web 2.0 applications in elementary curriculum.

While Web 2.0 technology encourages peer interaction, independent learning, and self-direction, it also introduces social interaction to the learning experience. Web 2.0 applications, such as wikis, used in education are naturally constructivist because users-cum-learners create their own experience and modify the content (Hsu, 2007). A wiki is, in essence, a conversation (Warlick, 2007). Through naturally emerging dialog, the learners build and arrange their own knowledge base (Kamel Boulos & Weeler, 2007), and reveal a network of relationships. Instructional design for teaching the use of Web 2.0 technology should employ the same technology to demonstrate the complexity of including social interaction in the learning experience.

As noted by Marzano et al. (2001), applying a variety of teaching strategies may increase student achievement. Integrating a wide range of technology resources will provide future teachers with access to teaching tools and experience in using the resources available when they are teaching in their own classrooms. A wiki is one of numerous Web 2.0 tools that professors may use to model best practices in the use of technology for teaching, and to foster collaboration among pre-service teachers.

Methodology

A case study methodology was applied to evaluate the use of wikis in a teacher education course. This research describes the findings of an instructor's first attempt at integrating a wiki assignment into a teacher education course to provide pre-service teachers with training, application, and practical wiki experiences.

Limitations

Several factors limit the findings of this study including sample size, single trial implementation, and wiki tool quality. The small sample size (N=31) limits the data response collected. The researcher implemented the wiki assignment in one teacher education course. Increased implementation attempts and additional data collection could improve the quality of the case study and alter the findings. The wiki tool had editing limitations that adversely affected the contribution process. The wiki tool permitted only individual editing of the wiki. Selecting a robust wiki tool that permits simultaneous editing by multiple participants could alter the findings.

Rationale

Pre-service teachers need opportunities to learn about new technologies during their educational experiences. Wikis are Web 2.0 tools that provide online collaboration. The instructor and participants had limited experiences with wikis. The wiki assignment was designed to provide pre-service teachers with access and practical application of a wiki in a teacher education class. The instructor evaluated the wiki assignment process to inform her teaching and improve her instruction.

Design

In order to evaluate the integration of a wiki assignment into a teacher education class, a simple design approach was applied. The goal was to record the instructor's first attempt at wiki implementation and provide pre-service teachers with wiki practice and practical experiences. The design included the following parts:

- Introduce wikis to pre-service teachers during face-to-face class sessions by providing direct instruction and guided practice time.
- Assign pre-service teachers a wiki based assignment to provide independent wiki practice and practical application.
- Monitor and evaluate the frequency of wiki access by pre-service teachers.

- Discuss the wiki implementation process with pre-service teachers to determine the benefits and drawbacks of the wiki based assignment.
- Evaluate findings to improve the quality of wiki implementation and future instructional practices.

Data Sources

Data was collected from two sources. The first data source was the record of wiki participation, including access and contributions. Qualitative data was retrieved from the wiki editing process to gather information about when the participants accessed the wiki. The second data source was qualitative and included oral and written feedback from the participants. After the wiki assignment implementation, the participants shared their personal experiences and discussed the benefits and drawbacks.

Analyses

Data from multiple sources was analyzed to improve credibility (Isaac & Michael, 1997; Rea & Parker, 1997). Quantitative data was interpreted using an SPSS version 12 spreadsheet. Participant access to the wiki was recorded and interpreted using SPSS. Qualitative data was coded and assessed by the researcher who used Ethnograph version 6 software.

Participants

A total of 31 pre-service teachers participated in this wiki implementation study. All participants were novice wiki users. Twenty-eight of the participants were female and three were male. The participants were ages 23 to 56. They were enrolled in the first semester of a two-semester credential program designed to provide instructional theory, methods, technology integration strategies, assessment, and knowledge about elementary teaching.

Research Questions

The researcher sought to investigate two questions. The first question was: What are the advantages of implementing a wiki as a teacher education assignment? The second research questions was: What conditions should be considered when implementing a wiki as a teacher education assignment?

Findings

The findings presented are based upon two sources. The first source is the wiki access and editing that was monitored by the researcher. The second source is the feedback received from participants based on their personal wiki experiences.

The researcher monitored the access and entries to the wiki for one week. The following table indicates the participant access. Note that 31 pre-service students were enrolled in the course.

Table 1

Wiki Participation Data

Access measures	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Number of participants	2	2	3	1	1	12	10
Percentage of participants	6.4%	6.4%	9.6%	3.2%	3.2%	38%	30%

Access to the wiki increased as the assignment deadline approached. Access problems arose during Days 6 and 7 when 22 students (68 percent) attempted to edit the wiki. During the face-to-face session, the instructor noted the wiki editing limitations. Specifically, the students were informed that one individual could edit the wiki at a time; therefore, it was necessary for students to plan ahead.

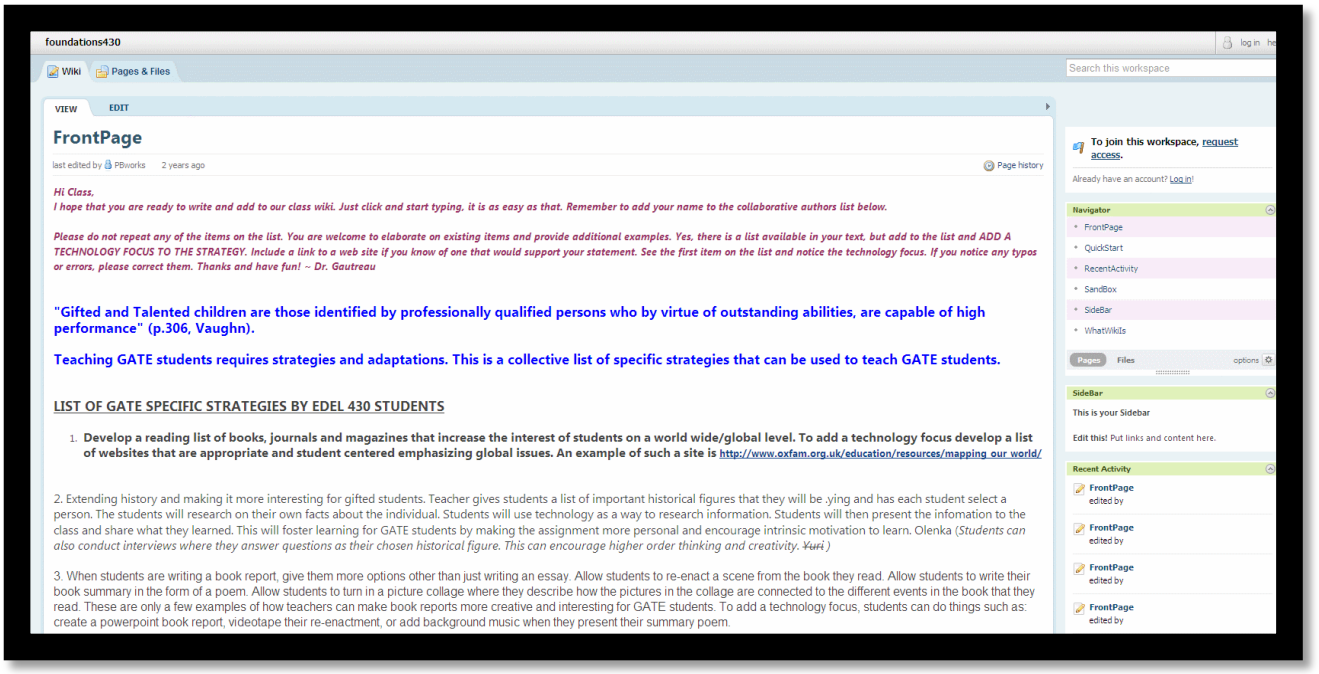
Participant Feedback

The instructor debriefed the participants about the wiki assignment and contrasting views were shared. The participants who used the wiki at the end of the week noted the following: "I wasn't able to log in to the wiki. I was so frustrated." Other participants offered similar feedback about their negative experiences with the wiki. However, in contrast, the participants who edited the wiki during the first part of the week offered positive feedback including: "The wiki was simple to use and edit. I went in without any problems. It worked just fine. Working from home was an advantage." The feedback was expected based on the editing limitations of the wiki (one editor at a time) and the increased access to the wiki during the end of the week.

Wiki advantages. The first research question addressed wiki advantages. As emphasized in the literature review and noted by Brown and Green (2006), the needs of the target audience are an essential part of designing instruction. The pre-service teachers were briefed on wiki use and understood that the wiki assignment was a new experience for the instructor and the participants. The pre-service teachers were assigned the task of creating a list of strategies that promote gifted and talented education among elementary students. They contributed their ideas to a wiki and created a web based resource for elementary teachers. The first advantage was that

the web based wiki format provided immediate access and did not pose a time restriction. The second benefit was that the wiki was cost-free to create and access. Due to budget restrictions, using open source products is an added incentive to seek out and implement wikis. The third noted advantage included the collaborative aspect of the wiki design. Participants were able to contribute to, edit, and modify the wiki. To view a copy of the wiki during the editing stage of development, see Figure 1.

Figure 1: Development Wiki



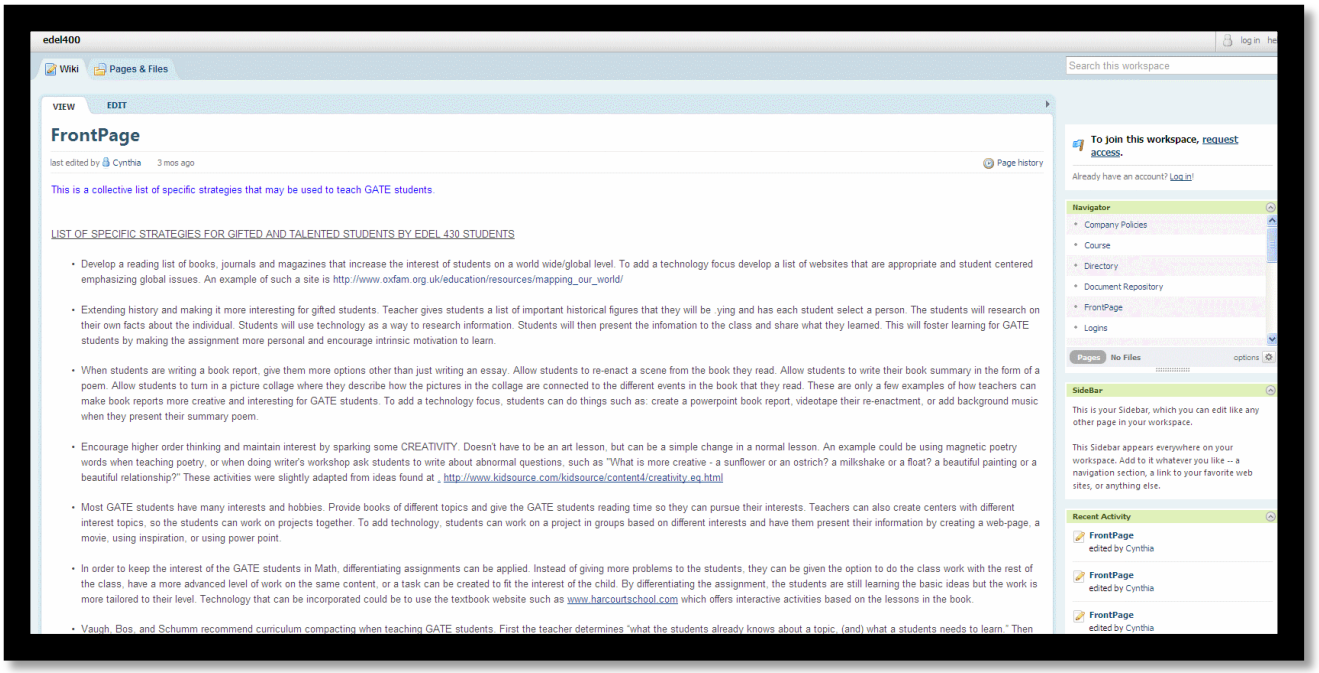
Can be found at: http://foundations430.pbworks.com/

The wiki provided a sense of community and group structure that was well received by the pre-service teachers. The last advantage of wiki use was that the participants were able to understand the basic structure of a wiki and made informed decisions about how to implement a wiki in their future instructional plans and in various content areas. The final version of the collaborative wiki can be seen in Figure 2. The completed wiki was edited by the professor and appears interconnected, in contrast to the previous incomplete versions.

Wiki disadvantages. Several disadvantages were noted in the implementation phase of this wiki study. Based on participant feedback, several drawbacks were observed: (a) multiple

users were not able to access the site simultaneously; (b) participants became frustrated with the wiki and did not attempt to troubleshoot the problems; and (c) because editing the wiki was not

Figure 2: Working Wiki



Can be found at: http://edel400.pbworks.com

instantaneous, participants entered the same content multiple times. Overall, the feedback received from the participants was negative in nature based on 70 percent of the responses. However, the 30 percent of participants who planned ahead and accessed the wiki in advance did not experience any of the noted problems. The participants who planned accordingly were able to access, contribute to, and modify the wiki as planned. As acknowledged by Fink (2003), the problems that participants encountered when accessing the wiki disrupted their flow experiences, the "activities that allow a person to focus on goals that are clear and compatible…they provide immediate feedback" (p. 152). Participants were unable to complete their assignment goals and did not receive immediate feedback from other participants because of the limited technology access.

The second research question sought to investigate the conditions under which wikis should be integrated into instruction. Based on the pre-service teachers' unfamiliarity with the use of a collaborative wiki, the wiki should have been used in a non-threatening environment. The first wiki attempt should have been structured to include a practice wiki session. Pre-service

teachers should have used the wiki remotely to post content and modify the wiki without the time constraints and the pressure of submitting an assignment. After the participants had gained a sense of understanding, they could have been required to use the wiki as a means to complete a required, time restricted and graded assignment.

Another condition that should be present when implementing a wiki is the integration of alternative means of communication. The instructor should set up a discussion board forum or a similar collaborative site that participants could access if the wiki does not function properly. In this case, the use of an alternative web site would have permitted participants the opportunity to complete the assignment. The stress that the participants experienced when they were unable to gain access to the wiki would have been minimized.

Furthermore, access to assistance from someone knowledgeable is important. The instructor or the Help Desk should be available to provide assistance. Finally, pre-service teachers need a support network when implementing new technologies such as wikis.

Recommendations

Based on the researcher's first experience of using a wiki in a hybrid course, and the literature review findings, the following four suggestions are recommended for future wiki implementation. The first recommendation is to provide pre-service teachers with additional wiki practice time. The wiki collaboration tool is a relatively new tool that participants had limited experience using outside of class. The pre-service teachers needed supplemental instruction and independent practice time to navigate and edit the wiki. This recommendation reflects the literature review finding. As noted by Brown and Green (2006), faculty should make changes to promote effective instruction based on the results of prior instruction. The participants expressed that 60 minutes of instruction was not sufficient time. Providing pre-service teachers with three 30-minute sessions over the course of three class meetings and increased practice time over an extended duration would have increased participants' familiarity with wiki use.

The second suggestion is to select a robust wiki tool that permits multiple editors. As reflected in the literature review and emphasized by Bates and Poole (2003), determining the appropriate technology to use in the teaching and learning process is challenging. Therefore, wikis should be selected with care and used only if they meet the pre-determined needs of the assignment and target populations.

The third recommendation is for faculty to consider small group collaboration. Current research suggests that by providing opportunities to cooperate and learn as a team, students will experience positive interactions (Fink, 2003). A hybrid course promotes a sense of community in an online forum. Small groups attempting to edit the wiki would have been a better option. A wiki should be provided for each group. In addition, each group should have a designated leader responsible for notifying the instructor of technical difficulties.

The final recommendation, based on this wiki experience, is small scale implementation. Instructors may experiment with a wiki based assignment with a set of student volunteers. Then based on their feedback, implement an instructional approach that satisfies the needs of pre-service teachers and reflects assignment goals. The small scale trial will help faculty to understand the limitations of the wiki tool and organize the instruction to provide preservice teachers with a positive, effective, and well planned learning experience.

References

Albion, P.R. (2008). Web 2.0 in Teacher Education: Two Imperatives for Action. *Computers in the Schools, 25*(3), 181-198.

Bates, A.W. & Poole, G. (2003). *Effective teaching with technology in higher education: Foundations for success.* San Francisco, CA: Jossey-Bass.

Brown, A., & Green, T. D. (2006). The essentials of instructional design: Connecting fundamental principles with process and practice. Upper Saddle River, NJ: Pearson.

Butcher, H. K., & Taylor, J. Y. (2008). Using a wiki to enhance knowing participation in change in the teaching-learning process. *Visions: The Journal of Rogerian Nursing Science, 15*(1) 30-44.

Chickering, A., & Ehrmann S.C. (1996). Implementing the seven principles: Technology as lever. *AAHE Bulletin*, October, 3-6.

Dickerson, C. (2004). Is wiki under your radar [Electronic version]? *InfoWorld, 26*(45), 26.

Engstrom, M. E., & Jewett, D. (2005). Collaborative learning the wiki way. *TechTrends, 9*(6), 12-15, 68.

Fink, D. (2003). *Creating significant learning experiences.* San Francisco, CA: Jossey-Bass.

Giddens, J. F. (2007). The neighborhood: A web-based platform to support conceptual teaching and learning. *Nursing Education Perspectives, 28*(5), 251-256.

Gordon, C. (2006). Wikis – a disruptive innovation. *KM World, 15*, 1, 26.

Hsu, J. (2007). Innovative technologies for education and learning. *International Journal of Information and Communication Technology Education, 3*(3), 70-89.

Isaac, S., & Michael, W. B. (1997). *Handbook in research and evaluation: For education and the behavioral sciences* (3rd ed.). San Diego, CA: Educational and Industrial Testing Services.

Kamel Boulos, M., & Wheeler, S. (2007) Web 2.0 in health and health care education. *Health Information and Libraries Journal, 24*(3), 2–23.

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology, 38*(5), 20-23.

Laurillard, D. (1993). *Rethinking university teaching: A framework for the effective use of educational technology.* New York: Routledge.

Lee, D., Chambers, T., & Ely, T. (2005). Web-based training in corporations: Design issues. *International Journal of Instructional Media, 32*(1), 27-35.

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research based strategies for increasing student achievement.* Alexandria, VA: Association for Supervision and Curriculum Development.

McDonald, J. K., Yanchar, S. C., & Osguthorpe, R. T. (2005). Learning from programmed instruction: Examining implications for modern instructional technology. *Education Technology Research and Development, 53*(2), 84-98.

Moxley, J., & Meehan, R. T. (2008). Collaboration, literacy, authorship: Using social networking tools to engage the wisdom of teachers. *Kairos: A Journal for Teachers of Writing in Webbed Environments, 12*(1).

Mullinix, B. B., & McCurry, D. (2003). Balancing the learning equation: Exploring effective mixtures of technology, teaching, and learning. Retrieved from http://technologysource. org/ xarticle/balancing_the_learning-equation/

Nicol, D., Littlejohn, A., & Grierson, H. (2005). The importance of structuring information and resources within shared workspaces during collaborative design learning. *Open Learning, 20*(1), 31-49.

Northwest Regional Educational Laboratory (1999). New directions in professional development. Retrieved from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/ content_storage_01/0000019b/80/17/8c/52.pdf

Norton, P., & Hathaway, D. (2008). On Its Way to K-12 Classrooms, Web 2.0 Goes to Graduate School. *Computers in the Schools, 25*(3), 163-180.

Prensky, M. (2005, September/October). Engage me or enrage me: What today's learners demand. *Educause*, 61-64.

Rea, L. M., & Parker, R. A. (1997). *Designing and conducting survey research: A comprehensive guide.* San Francisco, CA: Jossey-Bass.

Riedinger, B., & Rosenberg, P. (2006). Uniting technology and pedagogy: The evolution of an online teaching certification course. *Educause Quarterly, 29*(1), 32-41.

Roblyer, M. D. (2006). *Integrating educational technology into teaching* (5th ed.). Upper Saddle River, NJ: Pearson.

Tapscott, D. (1998). *Growing up digital: The rise of the Net Generation.* New York: McGraw-Hill.

Wang, C. Y. (2001). Walk a mile in students' shoes: An approach to faculty development on integrating web-based collaborative learning into instruction. Retrieved from http://newmedia.colorado.edu/cscl/155.html

Warlick, D. (2007). Executive wiki. *Technology & Learning, 27*(11), 36.

Wilson, W. (2003). Faculty perceptions and uses of instructional technology: A study at one university system revealed the current state of technology and some steps that could improve it. *Educause Quarterly, 2*, 60-62.

Willis, E., & Raines, P. (2001). Technology and the changing face of teacher preparation. *Contemporary Issues in Technology and Teacher Education, 1*(3), 12-18.

Wlodkowski, R. J. (2003). Fostering motivation in professional development programs. *New Directions for Adult and Continuing Education, 98,* 39-47.