

**Use of the Wiki: Encouraging Preservice Teachers' Construction of Knowledge in Reading
Methods Courses**

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Abstract

In consideration of how teaching and learning might be structured to address learning style preferences of preservice teachers and to make effective and efficient use of instructional and learning time in a constructivist setting, a wiki was used in a teacher education reading methods course. Increasing understanding of reading instructional approaches and modeling use of technology in reading instruction were central to the project. Results point to benefits of using wikis as tools to support students' construction of knowledge, but also indicate the importance of scaffolding students' wiki work in constructivist settings. (Keywords: preservice teacher preparation, technology use, wiki, learning styles, constructivist settings).

Introduction

Wikis are quick user-friendly web pages that allow users to create, edit, and save text collaboratively. The term “wiki” refers not only to the site of participation on the web but also to the document (the artifact) created by participants (Grant, 2006). Wikis has been around since 1995 when they were first introduced by Ward Cunningham (Forte & Bruckman, 2006). Cunningham coined the term wiki, borrowing the Hawaiian word for “quick.” There are a number of sites that host wikis and provide tools for creation of wiki sites such as Wikispaces, PBwiki, and Twiki.

Once created, the wiki acts as both a document and a webpage. An edit option allows for text entry on the document while the save option converts the document into a webpage which may be browsed and read by others (Educause, 2007; Lamb & Johnson, 2007). The wiki also serves as a record of contributions, edits, and changes that have been made to the document. The ability to revisit earlier versions of the document provides a bit of security if changes have been made or contributions have been deleted that are later determined to be significant. Similar to web pages, hyperlink options within the wiki allow users to connect pages to explain linked words in the context of related information.

Uses of the Wiki

Wikis are being used by business and education professionals for document management, collaborative writing, and communication purposes. The wiki is, however, still a relatively new application for use in instructional settings.

As instruction and learning tools, wikis are being used as social networking spaces for communication, sharing information in the form of reviews and reports, and note-taking

(Dearstyne, 2007; Lamb & Johnson, 2007; Luce-Kapler, 2007). Wikis may be used in yet other ways including using them as repositories for document collection. Preservice teachers may create a wiki to upload information and links related to topics for research and unit construction. Others may visit the site to add to the repository or to access posted resources.

Similar to a repository, the wiki may be used as an e-portfolio (Educause, 2007). In the creation of an e-portfolio, text may provide an introduction to work presented. Documents and other artifacts which serve as evidence of acquired knowledge, skills, and dispositions are uploaded to the wiki page. Links within the wiki document lead viewers to pages with additional artifacts sorted by standards or themes. The collaborative nature of wikis allows readers to provide feedback on the contents or organization of the e-portfolio.

Additionally, the wiki may be used as a message board. In this case the wiki serves as a collaboration tool in organizing the work of a group. For example, in place of organizing e-mail messages, group members add messages to one central location—the wiki document. The sequenced messages on the wiki provide a record of the group's thinking.

The online encyclopedia Wikipedia is a model of yet another use of the wiki. While all wikis are collaborative, the Wikipedia model represents a group authoring exercise for the creation of an integrated document. In this model a preservice teacher begins composition of a draft. As other preservice teachers read the text, they may choose to add further information anywhere within the document. They may also eliminate or replace text. In the Wikipedia model the document becomes ever more refined as readers/writers work collaboratively to shape it.

In addition to selecting the type of wiki to be used for instruction and learning in preservice teacher reading methods courses, other factors may play a role in effective use of the

wiki in this context. These include students' learning preferences and the knowledge and skills needed for effective literacy instruction and learning.

Review of the Related Literature

Learning style preferences

The learning style preferences represented in any group of students are multiple and varied. David A. Kolb's (2005) cognitive learning style model identifies four learning style preferences including Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). Concrete experience learners prefer to learn through hands-on type of activities. These learners also prefer authentic or real-life experiences such as being involved in interviews, engaging in practicum experiences, and viewing tasks in which professionals in the field would likely be engaged.

Reflective Observation involves thinking about one's own thinking or metacognition. Reflective Observation also involves considering subject matter from multiple perspectives and thinking about the interrelatedness of topics in information presented (Solvie & Kloek, 2007).

Abstract Conceptualization learners prefer to get information from authoritative sources. Listening to experts share information about the field and being involved in research are experiences Abstract Conceptualization learners prefer.

Active Experimentation describes learners who prefer to apply what they have learned. Learners with this preference enjoy tasks in which they are allowed to role-play, practice techniques, or work in the field in short and long term practicum or intern positions (Kolb, 1984).

In addition to identifying Concrete Experience, Reflective Observation, Abstract

Conceptualization, and Active Experimentation as learning style preferences, Kolb's research describes learning *styles* as combinations of preferences (Kolb, 1984, 2005). Kolb explains that learners prefer to grasp information through one particular preference and process it through another. Kolb identifies grasping and processing as continuums. When combined along two continuums of Concrete Experience/Abstract Conceptualization and Reflective Observation/Active Experimentation, four learning styles are identified—Assimilators, Divergers, Accomodators, and Converggers. Learners labeled Divergers like to grasp information through Concrete Experience and process it through Reflective Observation. Assimilators prefer to grasp information through Abstract Conceptualization and process it through Reflective Observation. Unlike Assimilators, however, Converggers wish to grasp information through Abstract Conceptualization and process it through Active Experimentation. The fourth group of learners labeled Accomodators prefers to grasp information through Concrete Experience and process it through Active Experimentation (Kolb, 1984, 2005). Figure 1 demonstrates two continuums and four styles which are made up of four learning preferences.

(Insert Figure 1 here.)

Students' learning styles are made up of different degrees of the four preferences. For example, some students may have a strong preference for one of the four and only a slight preference for the other three. While it is important to assist students in learning through Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation, students have preferences for how they wish to learn, or how they enjoy learning. Identifying learning preferences and selecting tools that target these preferences may support students' learning. This support can be described as making learning accessible (Kolb, 1984) or understandable when it is presented in a way that draws students into the learning

process, and once drawn in, allows them to process information and ideas easily.

Constructivism

As part of the learning process, students *construct* knowledge. Individual and social construction of knowledge is the result of acting on objects or experiences (Philips, 2000; Piaget, 1971; Vygotsky, 1978). As a coach or expert guide, an instructor uses readings, lectures, visuals and videos, field experiences, experiments and other work with materials, social interaction through discussion, and feedback to scaffold construction of knowledge. Scaffolds also take the form of questions, interactions with others, and experiences through which new and more difficult information is presented. Scaffolds serve as a bridge between what learners can do on their own and what they are able to do with assistance (Vygotsky, 1978). They support as well as prompt students' development. Students reflect, rearticulate, and recombine existing content as knowledge is constructed and ideas come to be understood as a result of scaffolding.

Actively constructing meaning in the learning process may also involve working in teams and within social networks as active inquirers. Experiences and interactions create disequilibrium, prompting the learner to consider how information and experiences relate to held beliefs and ideas. Assimilation, integrating ideas into existing concepts; and accommodation, adapting held beliefs as a result of newly acquired ideas, are part of constructivist learning (Gruber & Voneche, 1977; McCarty & Schwandt, 2000; Piaget, 1971). Students "redefine or discover new meanings for the objects with which they interact" (Bredo, 2000, p. 132). Through interaction with ideas, objects and others in authentic learning activities, learners' ideas and contributions also serve as springboards (challenges) for their classmates to reconsider their thinking and responses (Sorenson & Murchu, 2006), which in turn prompts further thought in other learners.

Writing serves an important role in constructing knowledge, supporting thinking, and making meaning. Writing supports reflection on and integration of new knowledge with existing knowledge (Forte & Bruckman, 2006). Understanding that “no act of writing takes place in a social vacuum” (Clark & Ivanic, 1997, p. 232), collaborative writing allows writers to build on the contributions of others and provides impetus for others’ reflection, integration, and construction of knowledge (Grant, 2006). However, collaborative writing in and of itself does not ensure that all participants are equally represented in the process or in the completed artifact, though all are given the opportunity (Shuman, 1993).

Reading Methods Instruction

Teaching preservice teachers how to teach reading continues to be a complex task. In reading methods courses there are both cognitive and social expectations associated with learning activities and assignments. Expanding notions of what it means to be literate, examining how people use literacy in their everyday lives (Barton, 1994) and considering effective practices for literacy instruction need to be addressed (Kruicer & Silva, 2006). As explained in new literacy studies (Barton, Hamilton, & Ivanic, 2000; Gee, 2000; Goodson, Knoebel, Lankshear, & Mangan, 2002; Kress, 1999; Lave & Wenger, 1991; Leu, Kinzer, Coiro, & Cammack, 2005; Pahl & Rowsell, 2006; Street, 1993, 1995), characteristics of literacy and the context in which it is learned apply both to K-12 students and to the preservice teachers who will be teaching them to read.

New literacies

New literacy studies (Barton, et al., 2000; Gee, 2000; Goodson, et al., 2002; Kress, 1999; Leu, et al., 2005; Luke, 2000; Pahl & Rowsell, 2006; Street, 1993, 1995) have focused attention on the situated nature of literacy, emphasizing that literacy is a social practice and that literacy

practices are what people *do* with literacy. Literacy is connected to use and is represented in ideologies and identities. Barton, et al. (2000) explain that literacies are a part of and help shape the social institutions and power relations which sustain them, they are shaped by social rules, and they exist in the relations between people, within groups and communities. Social networks are part of this.

Gee (2000) refers to the 'social turn' movement, of which new literacy studies are a part, and notes that "networks are a key metaphor: knowledge and meaning are seen as emerging from social practices or activities in which people, environments, tools, technologies, objects, words, acts, and symbols are all linked ('networked' with) each other and dynamically interact with and on each other" (pp. 183-4). Working in teams may involve project completion and may lead to understanding the whole work process while continually working to transform and improve that process through collaboration with others and with technology (Gee, 2000; Hargreaves, 2003; Lankshear & Synder, 2000; Sorenson & Marchu, 2006). This is important because preservice teachers will work in settings which involve social networks. They will teach students who will learn and work in the knowledge society, which involves social networks. Their work in schools will involve communities of practice, professional learning communities, and school district grade level teams.

Would a Wiki Work?

Preservice teachers are both students and teachers (Solvie & Kloek, 2007). As students continuing to develop content knowledge and pedagogical skills, their preferences for learning may affect how they grasp and process information. Similarly, learning style preferences may affect how they work collaboratively in social spaces in and outside the classroom to construct

knowledge.

To address the learning style preferences of students, the social nature of literacy, and to further develop preservice teachers' content and pedagogical skills, the wiki was selected as an instruction and learning tool in a reading methods course for elementary school preservice teachers. It was hoped the wiki would create an authentic learning context and connect social literacy practices with construction of knowledge around reading methods.

Though students in the reading methods course have in common college experiences and the goal of becoming elementary school teachers, they nonetheless represent a variety of diverse experiences, or multiple realities. Philips (2000) argues that social constructions of reality "even though unavoidably shared to a large degree *within* groups, are nonetheless relative to the norms and purposes that comprise this or that social/group's 'background of intentionality,' norms and purposes that vary *among* groups and that can only be properly understood with some reference to the insider's perspective" (p. 29). Students' diverse experiences would possibly serve as scaffolds to support construction of knowledge in wiki work as students "engage in processes of reflection, adaptation, articulation, and rearticulation, guided and supported by the teacher" (Sorenson & Murchu, 2006). Perhaps through wiki work students would be brought together in a social network during the process of reading and writing collaboratively. Along with this, the wiki could possibly assist preservice teachers in recognizing how diversity of thought and issues of power affect literacy development.

Research Questions

To examine the effectiveness of the wiki as an instruction and learning tool in reading methods instruction, four questions were identified to guide the study.

1. Did learning style preference have an effect on use of the wiki?
2. Did use of the wiki increase understanding of the social nature of literacy?
3. Did use of the wiki increase understanding of reading instructional methods for students with various learning style preferences?
4. Did use of the wiki support students' ability to construct knowledge in the context of the reading methods course?

Affordances of the Wiki

Several affordances of the wiki prompted its selection for this study including possible support for learning style preferences. Collaborative, asynchronous tasks that are a part of wiki work align with learning style characteristics of Reflective Observation (RO), including careful observation prior to forming judgments, viewing issues from multiple perspectives, and analyzing for meaning. Characteristics of Abstract Conceptualization (AC) including logically analyzing ideas, planning systematically, accessing authoritative sources of information, and acting on an intellectual understanding of a situation (Kolb, 2005) might be supported through wiki work. The authentic experience of collaborating with others, influencing people and events through action, using technology, and discussing content specific to the field may support the work of students with Concrete Experience (CE) and Active Experimentation (AE) learning style preferences.

Other affordances of the wiki including close reading and engagement in the writing process aligned with literacy work in a constructivist setting. Prewriting (reading and research), drafting, revising, and editing could be used to increase knowledge of reading instructional approaches. Close reading, as a result of rereading the document following contributions and

edits, might support examination of information, lead to questioning of material within the document, and prompt further contributions, along with further edits. It was hoped that the continual construction and negotiation of text in the process of researching (reading to gain information), writing, and rereading the wiki document would serve as a scaffold for preservice teachers. As a scaffold, the group interaction and collaborative writing within the wiki might help students focus on domain knowledge that is important to this field, but also to the processes of reading and writing. These processes would include identifying problems and gaps in their understanding (Grant, 2006) and deciding as a group how to improve the document by filling in the gaps and solving identified problems through further research and clear writing.

The wiki might also provide additional benefits resulting from opportunities to work within social networks. Use of the wiki in reading methods courses might promote understanding of the social nature of literacy and the multiple realities represented in social groups.

Yet another affordance of the wiki—being able to plan online without meeting face to face—could free up class time needed for planning and allow students to contribute to the wiki document when they chose to do so. Working within their own timeframe might support reflection and analysis prior to response.

Because of these affordances, the wiki was used as a groupware tool to engage students in a social network and to encourage social construction of knowledge about reading methods. To answer the study's four research questions the following method was used.

Method

The study took place during a three week period of a semester long reading methods course for preservice teachers. Eighteen preservice teachers participated in the study.

A combination of quantitative and qualitative methods was used. Data sources included the 2005 Kolb Learning Style Inventory, wiki scores (number of wiki posts and wiki project score), and a five point Likert Scale Questionnaire and reflection document. Data were sorted according to all four learning style preferences (Abstract Conceptualization, Reflective Observation, Active Experimentation, and Concrete Experience) for each student, as identified using the 2005 Kolb Learning Style Inventory.

Participating preservice teachers completed the 2005 Kolb Learning Style Inventory by responding to twelve questions about their learning to identify individual learning style preferences. The Learning Style Inventory scores indicated the degree to which students preferred Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation.

A Twiki site was used for the study. The professor organized the wiki with sections within the document for six topics that focused on methods of reading instruction. An introduction was provided on these six approaches in week three of the course. Connections to these approaches were made in the following weeks as reading strategies were introduced. This initial introduction provided a foundation and served as a scaffold for later student investigation of the reading approaches.

One-half hour of instruction and demonstration initiated students to the wiki environment. The professor used verbal and visual modalities to demonstrate how to access the Twiki, how to log into the site, how to navigate to the writing space, and how to make use of editing tools within the space. The professor also provided written steps as to how to perform all actions demonstrated in class, and provided a written help document for students. Students were encouraged to e-mail or visit the professor's office for assistance with the wiki. Five students

(four e-mails and one office visit) took advantage of this opportunity. Each of these students indicated they were seeking assistance for themselves and for their group members.

Groups of three were formed based on student selected topics (Philips, 2000) from the six the professor identified. Students researched and collaboratively composed their research findings. Each group also completed a concept map, which they uploaded to the wiki. The concept map outlined information specific to their reading instructional method as well as a reading strategy. The reading strategy included in the wiki document further highlighted the uniqueness of the reading instructional approach.

Wiki work involved taking individual responsibility to investigate/research an approach to reading instruction and demonstrating initiative in posting information as a way of speaking knowledgeably about the approach. It also involved persevering through the collaborative process of close reading of posted information and making changes where necessary to present an accurate, detailed account of the approach in an organized manner within the wiki environment. Consistent contributions over the three week period to the creation of a collaborative document for their group were expected. Wiki history provided information for students in all groups to view changes and contributors throughout the three week period. Research skills, collaboration skills, writing skills, and technology skills were thus all important and necessary for effective work in completion of the wiki assignment in this context.

Students' work was evaluated on the basis of individual contributions to the wiki as documented in number of posts. This score provided for individual accountability. The wiki project was evaluated and a wiki project score was given to each student. Wiki project scores were based on individual posts and accuracy of the group document.

The wiki project was completed in weeks nine, ten, and eleven of the semester. In week

twelve, following three weeks of collaborative writing and reading of group documents, each wiki group discussed the contents of their wiki document in class with members of all the wiki groups. Corrective feedback was provided by the professor. The wiki assignment checklist used for the project may be found in Appendix A.

A five point Likert Scale Questionnaire (1-strongly disagree, 5- strongly agree) and reflection document with open-ended questions were used to gather data on students' experiences in the wiki project following completion of the project. (See Appendix B.) Students' responses (Appendix C) were analyzed according to learning style preference scores. Seventeen of the eighteen participating preservice teachers completed the questionnaire.

Results

Data—learning style preference scores, number of wiki posts, wiki project scores, Likert Scale Questionnaire results, and reflection document responses—were reviewed to answer questions which guided the research study:

1. Did learning style preference have an effect on use of the wiki?
2. Did use of the wiki increase understanding of the social nature of literacy?
3. Did use of the wiki increase understanding of reading instructional methods for students with various learning style preferences? and
4. Did use of the wiki support students' ability to construct knowledge in the context of the reading methods course?

Learning style preferences and wiki scores

The scores of the eighteen students who completed the study indicated preferences for a combination of the four learning style preferences. While it is possible to score between 12 and

48 for each learning style preference on the Kolb Learning Style Inventory, scores for students in this study indicated these results: Concrete Experience scores ranged from 14-39, Reflective Observation ranged from 20-40, Abstract Conceptualization scores ranged from 16-35, and Active Experimentation scores ranged from 28-42.

The number of wiki posts ranged from one to twenty-one. Sixty-five out of 500 total points for the course were possible for the wiki project. Wiki project scores ranged from forty-five to sixty-five.

Principal Component Analysis

Learning style inventory preferences are based on principle component analysis (PCA). Therefore PCA was chosen for analysis of learning style preference, wiki post, and wiki project score data in this study. PCA reduces the dimension of data by forming linear combinations of the original variables to explain as much variation as possible in the original data (Everitt & Dunn, 2001). Also, PCA produces graphical representations such as biplots that allow users to see patterns and relationships in the data.

PCA using learning style preference scores (Abstract Conceptualization, Active Experimentation, Reflective Observation, and Concrete Experience), number of wiki posts (representing individual contributions to the wiki), and the overall wiki project score (representing individual and group performance) was completed. The first two principal components together explained 84% of the variations in the data. Principle Component 1 contrasted the scores of Abstract Conceptualization and Reflective Observation to Concrete Experience and Active Experimentation. Principle Component 2 contrasted the scores of Reflective Observation to Concrete Experience and Abstract Conceptualization.

Figure 2, a biplot of standardized principle components (Everitt & Dunn, 2001), uses

these two components. Students are identified within the chart by number. Student location within the diagram indicates preferences for Concrete Experimentation (CE), Active Experimentation (AE), Abstract Conceptualization (AC), and Reflective Observation (RO). Because students have a combination of preferences, the diagram shows numbers in between the preferences, rather than clustered around them. The biplot shows students with high Abstract Conceptualization (AC) scores closest to the wiki posts (indicating they posted more than their peers) and the overall wiki project (indicating they had the higher scores on the wiki project than did their peers) in the analysis.

(Insert Figure 2 here.)

Classification and Regression Trees (CART)

Classification and Regression Trees (CART) were used to further analyze the relationship between students' learning style preference scores and their wiki work. Figure 3 illustrates the relationship between learning style preferences and the number of wiki posts while Figure 4 displays learning style preference and wiki project score data. The CARTs indicates that the number of posts were lower for students with Concrete Experience (CE) scores higher than 24. The students with lower than 24 on Concrete Experience (CE), but higher than 31 on Abstract Conceptualization (AC), have a substantially higher number of posts than others in the group. On the other hand, wiki project scores were lower for students with Active Experimentation (AE) scores higher than 40. Students who received high wiki project scores had higher than 31 Abstract Conceptualization (AC) but lower than 40 Active Experimentation (AE) and lower than 24 Concrete Experimentation (CE) scores.

(Insert Figure 3 here.)

(Insert Figure 4 here.)

Likert scale scores and wiki reflections:

A One-way Analysis of Variance (ANOVA) testing for differences among learning style preference groups was used to analyze Likert Scale Questionnaire data.

Students' learning style preference scores and responses to the nineteen items on the Likert Scale Questionnaire were used in the analysis. Means were determined for each learning style preference for each item. Group means were compared and analyzed according to variance. P values (probabilities ranging from zero to one) were examined to identify possible areas of significance. P values close to or less than 5% (.05) were considered important (Everitt & Dunn, 2001). No significant differences among learning style preference groups were found for questionnaire items other than 1, 12, and 17. For these items Least Squares Means (regression analysis) was used to look more closely at the items in question and model the numerical data. Figure 5 displays results for these questionnaire items. ANOVA and Least Squares Means analysis of questionnaire data resulted in the following important findings. (Appendix D lists Least Squares Means data for questionnaire items not found to be statistically significant.)

The lower the Reflective Observation score, the more students agreed that the points afforded the wiki project were equal to the requirements of the project. Similarly students with high Reflective Observation scores strongly disagreed they felt it was necessary to meet face to face to complete wiki work while students with middle and low Reflective Observation scores believed it was necessary. The higher the Reflective Observation score, the more students strongly agreed they felt comfortable with the contributions of their group members. The lower the Reflective Observation score, the more students strongly disagreed they felt comfortable with the contributions of their group members.

Active Experimentation learners revealed opposite results from Reflective Observation

learners in terms of how comfortable they felt with the contributions of their group members.

The higher the Active Experimentation preference score, the more strongly these students disagreed they were comfortable with the contributions of their group members. The lower the Active Experimentation preference score, the more strongly these students strongly agreed they felt comfortable with the contributions of their group members.

No significant findings were revealed for the Abstract Conceptualization preference based on the Likert Scale Questionnaire data.

(Insert Figure 5 here.)

As indicated on the Likert Scale Questionnaire, most students worked solely in the online space, were proud of their contributions to the wiki, and felt the collaborative document was well written due to writing and editing within the wiki space. Students' responses to open ended questions (What has been particularly helpful for you in use of the wiki? What in particular hindered your work with the wiki? What would you like to see continued? What would you like to see changed?) provided further information concerning their experience with the wiki. Responses to these questions fell into three categories: constructing knowledge of reading instructional approaches, social practices within the wiki environment, and use of technology. The responses are included in the discussion which follows.

Discussion and Conclusions

Research question 1: Did learning style preference have an effect on use of the wiki?

Though the wiki was selected to address all four learning preferences, students with high Abstract Conceptualization learning style preference scores performed better on the wiki tasks. These students had a higher number of contributions to the wiki, perhaps because specific tasks

associated with the wiki including reading and research prior to posting, seeking information from authoritative sources, and integrating information into a formal document aligned closely with preferences of Abstract Conceptualization learners. Students with high Reflective Observation preferences did not perform as well on the wiki project as did Abstract Conceptualization learners. While affordances of the wiki aligned with characteristics of Reflective Observation learners, these students did not contribute to the wiki to the degree Abstract Conceptualization learners did, though they indicated they enjoyed working in the wiki environment and felt comfortable with their contributions to the wiki document.

Though active work in a purposeful activity with domain specific content was meant to support the learning style preferences of Concrete Experience and Active Experimentation, students with high scores in these preferences did not contribute as often to the wiki. The higher the Concrete Experience preference score, the more poorly these students performed. The lower the Active Experimentation score the more strongly these students disagreed that they were comfortable with the contributions of their group members. This may suggest the wiki was not viewed as an authentic learning event for these students and that the hands-on nature of the experience and collaboration with peers in the environment may not have been viewed as real-life tasks of professionals in the field of reading instruction. This may suggest not just the wiki experience as a whole, but specific tasks to be completed on/with/through the wiki need to be aligned with learning style preferences.

Research question 2: Did use of the wiki increase understanding of the social nature of literacy?

The wiki was also selected to help students understand the multiple realities and discourses represented in groups, an important consideration in reading instruction and integral to selection of methods. Twelve of seventeen students indicated on the questionnaire that the

wiki provided a space for effective collaborative work. While students also commented on what it was like for them to work in the collaborative wiki environment, no one made connections to multiple realities and discourse patterns represented in groups as factors affecting reading instruction and learning.

Students' comments about the social practices within the wiki environment most often related to how their work was received by others. Students commented, "It has been particularly helpful to be able to edit things after I'm able to think about them and to allow others to edit my work with their input" and "I think the wiki assignment was good in that it let me work on my own time schedule. I also found that if I was stuck on an idea I could just check back later and see what the other group members had added." Others expressed concern about their level of confidence in contributing and editing the work of others. Their concerns were expressed in these ways: "Not being 100% confident with my writing/ideas and not being able to talk about them with other group members," "I only posted a few times because when I would go to add information, I could see some had already been added on the same topics. My group members could write very eloquently the first time and I saw it unfair to erase their hard work," "Hard for students to contribute equally and don't want to offend group members by changing something because they find that very important," and "Hard for some individuals who are less assertive."

Other comments about the social space included reference to meeting in the space. Students wrote: "It was helpful that it was a group project that didn't require much meeting time," "Being able to edit my work at my own pace and on my own time schedule," and "I would like to see who contributed what in my group, so if I changed things, I would know who to ask."

Responses to the open-ended questions indicate that for some students in the wiki project,

camaraderie mediated against their desire to make changes in the wiki document, and affected the purposefulness of the wiki exercise. Cultural practices and power structures were a part of the social practice of literacy (Street, 1993) and were evidenced in students' participatory practices in the wiki environment. Students' sense of agency, or power to act, was hampered, as evidenced by students who viewed particular students as leaders, and as a result made choices about not correcting their peers' work. In viewing particular students as leaders and others as friends, students' perceptions of their own roles and responsibilities in the construction of knowledge through the wiki environment were affected. Neither individual accountability (participation) nor the overall group project (the artifact) overpowered this sense of not wanting to correct or change the work of their peers.

Though the wiki project provided experiences related to the social nature of literacy, students did not connect this experience to reading instructional practices on their own. Further scaffolding is needed to support students' construction of knowledge concerning this component of literacy instruction.

Research question 3: Did use of the wiki increase understanding of reading instructional practices for students with various learning style preferences?

'Learning from, learning about, and learning to' (Andriessen et al, 2003) characterize the students' experiences as expressed by them in their reflections. While some students indicated through narrative comments they learned about reading instructional approaches from this experience and others about technology and how to use it, their comments did not vary greatly according to learning style preference. However, the Principal Component Analysis of all variables in the research, which included students' learning style dimension scores, number of wiki posts, and wiki project scores, indicated the higher the Abstract Conceptualization

preference score, the better students performed. The higher the Concrete Experience score, the more poorly students performed.

Students' comments about wiki technology were associated with their own level of confidence in use of technology and frustrations with editing: "I am not very good at using technology, so it was hard for me to write in it and know the commands of how to make something bold, and how to display pictures—like the concept map." Others commented positively on the capabilities of the technology in displaying information, in allowing asynchronous work, and supporting collaborative work. Still others were excited to learn how to use a wiki and perhaps use it in their future teaching. Again, the students' narrative comments did not vary greatly according to learning style preference. (See Appendix C.)

Research Question 4: Did use of the wiki support students' ability to construct knowledge in the context of the reading methods course?

Responses to open-ended questions indicate students learned about reading instructional approaches as a result of the wiki project. Students who believed the wiki was helpful in constructing knowledge of reading instructional approaches in this environment said seeing all the information together was helpful, learning more about and looking in depth at their particular approach was helpful, and researching their approach was enjoyable. Assimilation and accommodation were a part of the collaborative writing process, though students did not talk about these in their written reflections on use of the wiki in the construction of knowledge.

Five of seventeen students specifically noted in their narrative comments that they learned about reading instructional approaches and that the wiki was instrumental in learning this content. Two examples follow:

I feel that I greatly improved my knowledge of my strategy and it helped to see

other people's point of view and what they saw as important for the approaches.

I feel this assignment was very helpful to my understanding approaches to reading instruction and strategies because it made me really analyze what was important about the approach and what was not important. It made me analyze how the different strategies and approaches differ and why they differ.

Three students expressed frustration with the wiki in their narrative comments: "I felt like we had discussed the topic in sufficient detail in class," "This assignment seemed more like busy work than providing any academic benefits," and "we have talked about ALL of this before."

Four of seventeen students who completed the questionnaire stated the wiki had helped them learn more about writing and twelve of seventeen said they gained ideas on how they might use the wiki to support writing in an elementary classroom.

Future Wiki Work

Some challenges in use of the wiki were identified in this research project including supporting students' consistent participation in wiki work over the course of the project, helping students recognize expectations of wiki work, and assisting students in demonstrating skills necessary for quality work in the wiki environment.

Continued wiki experiences (Sorenson & Murchu, 2006) in conjunction with a scaffold of discussions throughout the course of the wiki project, instead of just at the beginning, will help to address these challenges. Scaffolds of ongoing discussions may focus on social construction of knowledge (using participants' contributions as prompts), negotiation of the wiki space (addressing issues of power), and expectations for wiki tasks (including individual and

group responsibilities). Sensitivity to preservice teachers' perceived roles and relationships with peers in the course may be addressed with discussions about the positive and limiting effects of peer relationships in collaborative work. Differences in preservice teachers' abilities to use and troubleshoot technological applications may be addressed through additional help sessions and encouraging them to ask for help when needed.

Making competencies explicit, providing opportunities to practice such competencies, and having preservice teachers reflect periodically throughout the wiki project on their contributions may support preservice teachers with various learning style preferences and serve as a scaffold for their success. Wiki competence, the ability to function successfully in the wiki environment, similar to practical social competence (Whitson & Stanley, 1996) requires a praxis in which preservice teachers consider their personal work in relation to larger social processes.

Wiki competence involves skills in close reading, critical thinking, and reflection—or in other words—how to challenge the work of other writers/contributors. Such competence will involve making decisions as to when to correct, add to, delete, and or write over (rewrite) the work of others. Such decisions are precipitated by being informed about the topic at hand, knowing the importance of having accurate (including multiple perspectives) information available in online environments, and being respectful of contributors while not being silenced by the position or perceived status of other contributors.

Cognizance of the effects of interactivity and intersubjectivity is important as learners work with others in constructivist environments, such as the wiki. Discussions on the similarities and differences between wiki work and other collaborative ventures will help preservice teachers see that roles are many, varied, and shifting. For example, while one may act as a leader in posting initially to the wiki, others become leaders through additional posting as well as through

editing. In other words, one preservice teacher is not responsible for posting and another for editing. Similarly, encouragement within the collaborative process may not be the role of one group member. Rather, it may be an outcome of viewing contributions which include elaboration, change, or deletion as processes in creating an accurate, detailed account or report. Encouragement may also be a prompt in the form of deciding when more research is needed to make further contributions to the wiki. The need for further contributions may be based on the status of the current document and or may be the result of fewer contributions than other group members. Preservice teachers' evidence or data for their theoretical arguments (McCarty & Swandt, 2000; Philips, 2000) and for their knowledge claims should replace their ambivalence over editing peers' contributions.

Development of intellectual dispositions that support preservice teachers' confidence, initiative, and ability to engage in dialogue and collaboration within the wiki environment will strengthen wiki work as content is investigated, discussed, analyzed, and rearticulated with others in constructivist settings.

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Figure 1: Kolb learning preferences and learning styles

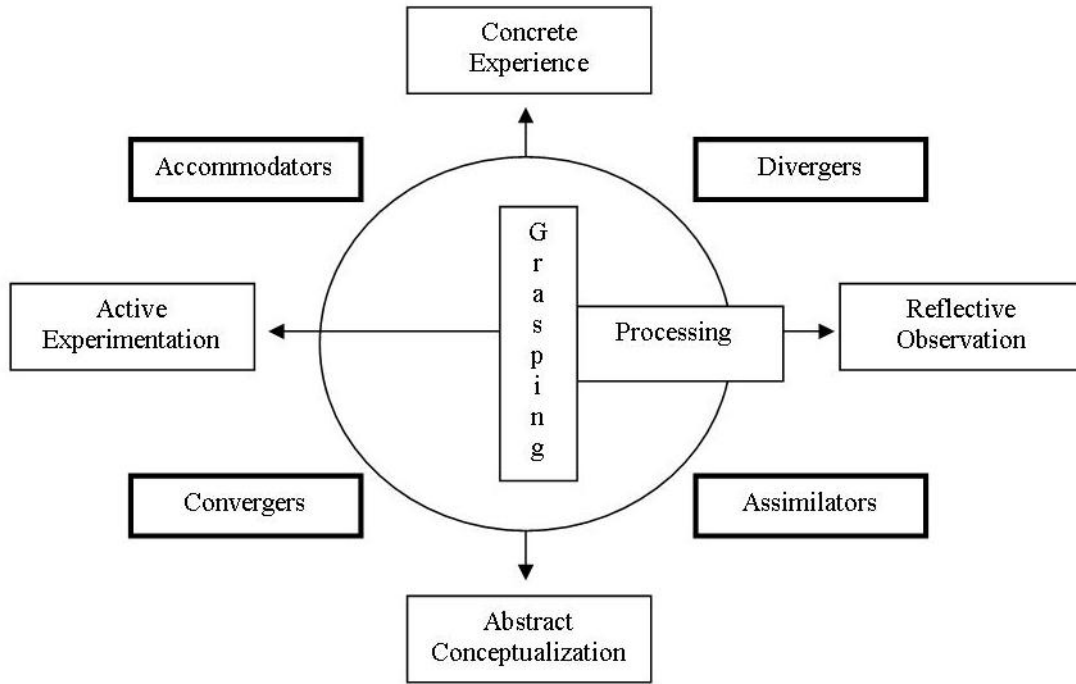


Figure 2: Biplot of standardized principle components—Learning style preference scores, wiki posts, and wiki project scores

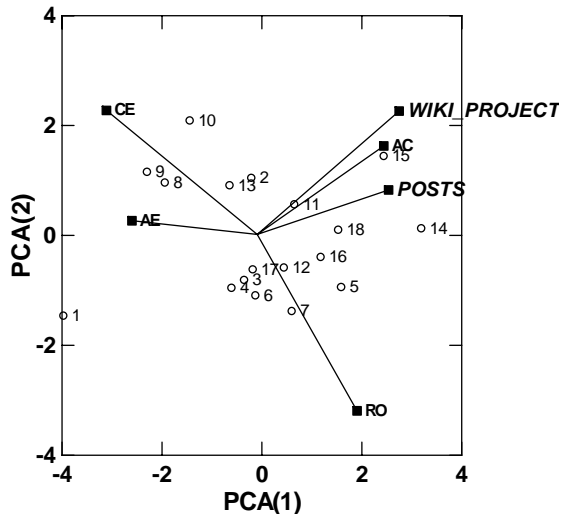


Figure 3: Number of wiki posts

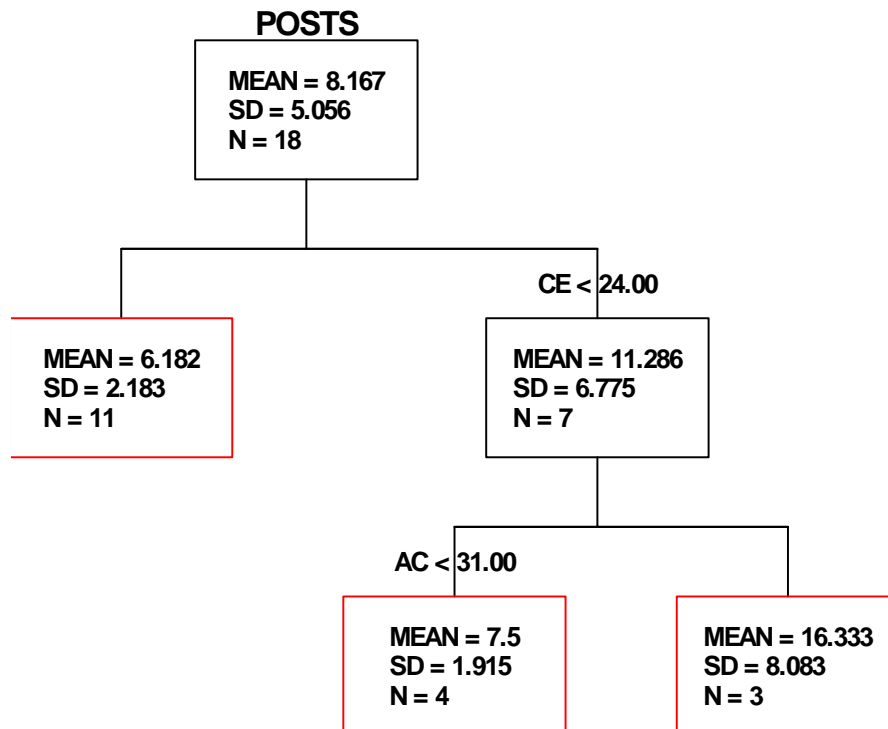


Figure 4: CART—Wiki project score

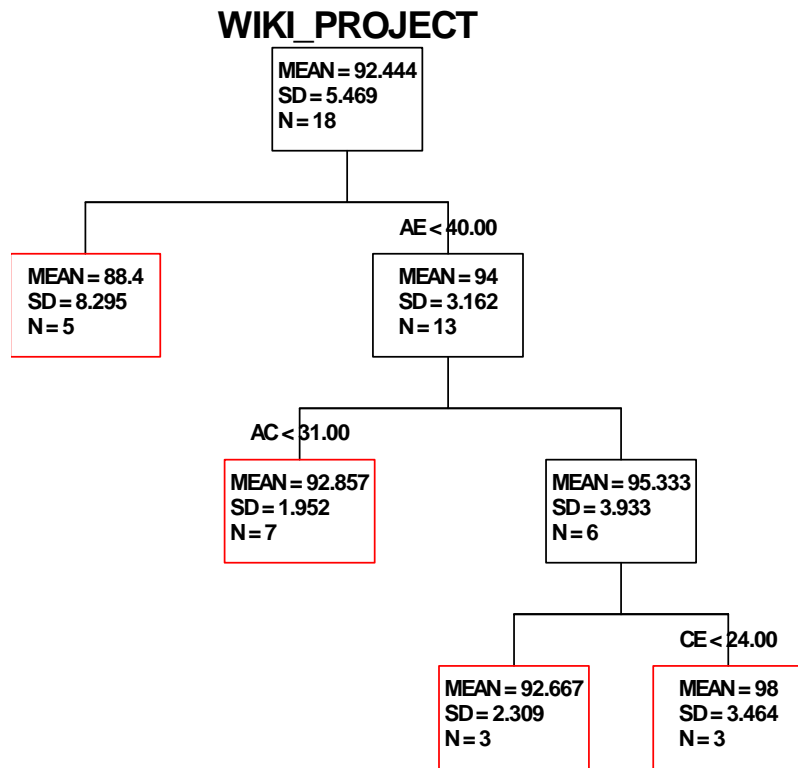
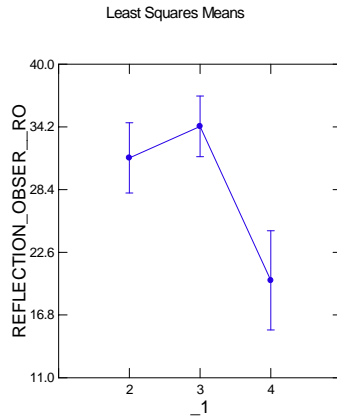


Figure 5: Questionnaire items and least squares means

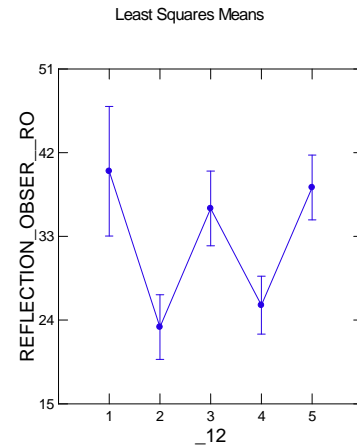
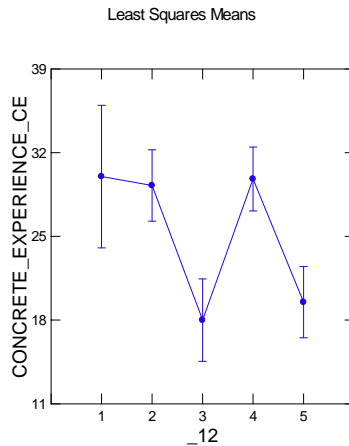
Questionnaire Item #1		
Source	Mean Squares	p-value
CE	102.964	0.165
RO	223.348	0.057
AC	21.441	0.640
AE	11.798	0.514

I believe the points afforded the wiki project were equal to the requirements of the project.



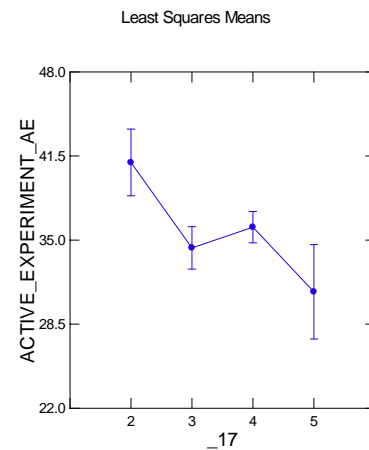
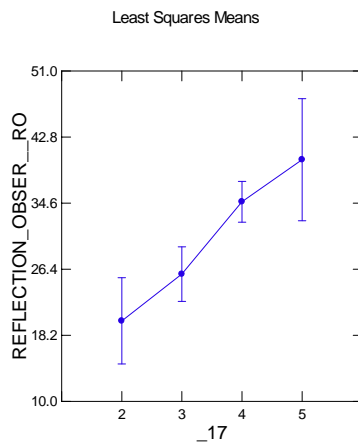
Questionnaire Item #12		
Source	Mean Squares	p-value
CE	119.980	0.045
RO	187.707	0.030
AC	58.816	0.253
AE	15.880	0.460

My group members met face to face times to work on the wiki. I felt this was necessary to complete the project well.



Questionnaire Item #17		
Source	Mean Squares	p-value
CE	128.927	0.058
RO	195.058	0.051
AC	58.227	0.272
AE	29.090	0.139

I was comfortable with the contributions my group members made to our wiki document.



APPENDIX A: Wiki Assignment Checklist

Wiki Assignment

Name _____

Individual Posts on the Wiki _____

Group Score on the Wiki _____

The Report on a specific approach to reading instruction

Approach is described accurately.

Use of the approach in the classroom is clearly explained.

Materials needed for reading instruction using this approach have been identified.

Grouping of students has been described.

Assessment of students is clearly described.

Additional information on the reading approach has been included.

References have been cited.

Individual contributions to the wiki assignment have been frequent and consistent from beginning to end in the project.

Individual contributions have been integral to the collaborative project.

The Strategy:

The strategy addresses one of the five building blocks of effective reading instruction.

The strategy is clearly explained.

Information is shared as to how the strategy fits within the specific approach to reading instruction.

The Concept Map:

The concept map includes important components of the approach to reading instruction.

The concept map has been uploaded to the discussion board.

Reporting:

All group members participate in the presentation of information.

Group members draw others into the discussion with questions and examples.

APPENDIX B: Likert Scale Questionnaire

Wiki Questionnaire

Name _____

Learning Style Preference Scores: AC___ AE___ RO___ CE___

1	2	3	4	5
Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

I believe the points afforded the wiki project (65) were equal to the requirements of the project. There was sufficient time to complete the wiki project. I asked for and received help when needed to complete the wiki project. The expectations for the wiki project were clear.

The wiki provided space for effective collaborative work. I was able to easily understand and use the wiki tools for writing and editing. Our collaborative project is well written due to writing and editing within the wiki environment. I enjoyed working within the wiki space.

Knowing that statistics on participation could be viewed positively affected my participation in the project. I worked mostly online with my group members.

My group members could have completed the project all online without face to face meetings. I learned more about writing because of this experience. I learned more about the approaches to reading instruction because of this wiki project. I have gained ideas on how I might use the wiki to support writing in an elementary classroom. I would like to see the wiki used for more collaborative projects in my coursework. I was comfortable with the contributions my group members made to our wiki document. I was comfortable with the changes my group members made to our wiki document. I am proud of my contributions to the wiki project. What has been particularly helpful for you in use of the wiki?

What in particular has hindered your work with the wiki?

What would you like to see continued?

What would you like to see changed?

APPENDIX C: Likert Scale Questionnaire: Responses to Open Ended Questions Sorted by Students' Highest Learning Style Preference Scores

What has been particularly helpful for you in use of the wiki?

- CE 38—The program is fairly easy to use.
RO 40— n/a
RO 39—It was helpful that it was a group project that didn't require much meeting time.
RO 40—It has been particularly helpful to be able to edit things after I'm able to think about them and to allow others to edit my work with their input.
RO 40—It is a good overview of all of the approaches.
RO 36—Liked the layout with the directions of how to use the wiki.
RO 38—Able to brush up on my computer science skills.
AC 34—I felt that learning how a wiki worked was helpful. I felt like I learned a lot.
AC 35—I looked much more in depth at the literature based approach. I learned about a new technology tool.
AE 40—The wiki was really easy to use. It was nice because it was collaborative, but you could do it whenever you wanted.
AE 40—Getting to see all of the information together.
AE 40—Learning more about the literacy based approach has been interesting. Learning how to use the wiki has been one more tool, I have learned, to use technology.
AE 42—The texts used, easy to get in.
AE 34—Being able to work on it at my own pace and on my own time schedule.
AE 36—Seeing other people's writing styles and learning technology on the internet.
AE 36—I like that it was relatively simple to add to.
AE 38—n/a

What in particular has hindered your work with the wiki?

- CE 38—Map was a little difficult – thank you! ☺
RO 40—I could not find the area where you could see everyone's different contributions.
RO 39—It was kind of a pain to have to reread everything each time, because I didn't know what people changed/added.
RO 40—I wasn't completely sure of all the expectations for each part.
RO 40—The editing system is problematical, with 20 people editing during the same time period things overlap and are lost.
RO 36—Things would happen to our writing like underlining and repeating sentences.
RO 38—Felt like we had discussed topic in sufficient detail in class. Wiki frustrating because changes didn't always save or random things would appear in section.
AC 34—I felt hung up because I felt like it was a race to get information up onto it.
AC 35—The expectation to alter and change others' quality work just for the sake of changing it for an assignment.
AE 40—Not being 100% confident with my writing/ideas and not being able to talk about them with other group members.
AE 40—It was difficult not knowing some of the things that it does or what to do when you get error messages.
AE 40—I only posted a few times because when I would go to add information, I could see some had already been added on the same topics. My group members could write very eloquently the first time and I saw it unfair to erase their hard work.
AE 42—My computer background
AE 34—Changes being made that I didn't agree with. I felt there wasn't a discussion.
AE 36—Constant editing by people so sometimes the changes that I made got erased and it was difficult to get them back.
AE 38—There were parts that I didn't know what to do such as bold and italicized, it took a while for me to learn and I think it should have been in a different and easier format.

What would you like to see continued?

- CE 38—I think the project as a whole is good and should be continued.
RO 40—I enjoyed the research aspect of working on the wiki. It was interesting to learn new strategies.
RO 39—It was a good experience to use for this class in the future – next year.
RO 40—I like that a group of students work on it together.
RO 40—Group collaboration
RO 36—I thought it was good to learn how to use wiki.
RO 38—Enjoyed opportunity to experiment with Inspiration to create concept map.
AC 34—I would love to see the wiki continue on – I think it is a good skill to practice and understand.
AC 35—The expectation to delete
AE 40—I like the wiki project because you really learn about your approach.
AE 40—The project should be continued. It was helpful.
AE 40—I understand getting to use the wiki, I just wish the stakes were not so high, grade wise, because I feel I did not get to contribute equally because people added all the information right away.
AE 42—The use of the wiki.
AE 34—I liked that I was able to chose the topic I wanted to work on.
AE 36—Work with technology.
AE 36—This is a good forum for collaborative work.
AE 38—n/a

What would you like to see changed?

- CE 38—Perhaps a little more discussion in class about parameters. Hard for some individuals who are less assertative – they are uncertain of their contributions – afraid to make changes. [Student’s name] – plus she has been sick on and off recently.
RO 40—As a group we should have met face-to-face but I think because no actual time was set, no one took the initiative to set up a time. I fell that meeting as a group would have been helpful.
RO 39—I understand why we changed the points. but I do not feel that there was opportunity to do 65 pts. here in the wiki. I feel like it was a lot of work but 65 pts scares me.
RO 40—Maybe a more thorough description of expectations.
RO 40—If each group had a different wiki it would solve some of the overlapping issues.
RO 36—Not have to post everyday.
RO 38—Don’t put such a large point value on assignment because doesn’t accurately represent work. Also, I know this was to show another type of technology but this form was too frustrating. I wouldn’t use with students because don’t have technological skills or level of ability to deal with things that go wrong. This assignment seemed more like busy work than providing any academic benefits. Class discussion didn’t seem to have much benefit. Most students not totally paying attention. Hard for students to contribute equally and don’t want to offend group members by changing something because they might find that very important.
AC 34—Maybe have groups meet mandatory to split up parts equally and once everyone has their specific part up letting the free for all changing up the wiki continuously begin. I just felt like I was running out of big chunks of information to write about and I could help revise but that was about it.
AC 35—It was overwhelming to be expected to contribute to the wiki daily, and I couldn’t always find time everyday to research quality material and revise the wiki. I felt like I was expected to edit and revise some high quality writing done by my group members, just for the sake of the assignment.
AE 40—It would be nice to know who wrote what. Then you could ask or talk to the person directly if you have questions or comments.
AE 40—Explain more how to upload items and different accessories.
AE 40—I would like to see it worth less and take a smaller amount of time. Also, I would rather have some sections assigned so everyone has a fair opportunity to contribute because I became a little frustrated at times.
AE 42—Move explanation of how to make changes, etc. Not have to post everyday. Examples.
AE 34—I feel that having all the topics in the same editing box made it confusing. I would have like to be able to

open and edit only mine.

AE 36—Possibly individual or smaller groups (like 2, maybe 3 people) for wiki assignments.

AE 36—As much as technology is necessary, my dislike of technology use definitely hindered my work with the wiki. I would have liked to see who contributed what in my group, so if I changed things, I would know who to ask. I would like to see who did what. I had the feeling of being behind because I couldn't see who was doing what. With this project it greatly decreased the face-to-face interaction of the collaborative group.

AE 38—I did not like the wiki assignments at all. I would have rather met in person because I like to be interactive with my peers. I think that this should be more group face-to-face oriented because there were many times when I would prepare information and go to edit our site and someone would have just added on to the exact part that I was going to do. I thought that this was unfair because I could only add very little to the project. I would feel bad just deleting everything that the last student had wrote, especially since it was almost exactly the same as what I had. I really disliked using the wiki. I think that the wiki should not be used anymore in class because I feel that I did not learn anything from this project and also from the presentations. We have already talked about ALL of this before.

APPENDIX D: Survey Data for Questionnaire Items Not Found to Be Statistically Significant

Questionnaire Item #2		
Source	Mean Squares	p-value
CE	47.021	0.379
RO	11.863	0.719
AC	2.966	0.803
AE	2.754	0.695

There was sufficient time to complete the wiki project.

Questionnaire Item #3		
Source	Mean Squares	p-value
CE	72.265	0.298
RO	66.554	0.534
AC	42.936	0.429
AE	33.599	0.086

I asked for and received help when needed to complete the wiki project.

Questionnaire Item #4		
Source	Mean Squares	p-value
CE	58.693	0.423
RO	27.757	0.890
AC	29.846	0.655
AE	2.926	0.964

Replacing the third course exam with more time and points for the wiki was appropriate.

Questionnaire Item #5		
Source	Mean Squares	p-value
CE	65.914	0.345
RO	78.712	0.452
AC	62.769	0.234
AE	18.419	0.360

The expectations for the wiki project were clear.

Questionnaire Item #6		
Source	Mean Squares	p-value
CE	110.143	0.072
RO	43.282	0.772
AC	40.571	0.486
AE	2.343	0.976

The wiki provided a space for effective collaborative work.

Questionnaire Item #7		
Source	Mean Squares	p-value
CE	24.657	0.766
RO	78.283	0.455
AC	57.511	0.278
AE	11.223	0.601

I was able to easily understand and use the wiki tools for writing and editing.

Questionnaire Item #8		
Source	Mean Squares	p-value
CE	20.363	0.725
RO	30.892	0.717
AC	15.523	0.726
AE	30.872	0.150

Our collaborative project is well written due to writing and editing within the wiki environment.

Questionnaire Item #9		
Source	Mean Squares	p-value
CE	44.534	0.586
RO	161.341	0.073
AC	41.221	0.476
AE	7.909	0.795

I enjoyed working within the wiki space.

Questionnaire Item #10		
Source	Mean Squares	p-value
CE	39.590	0.595
RO	85.710	0.409
AC	73.261	0.163
AE	12.924	0.537

Knowing that statistics on participation could be viewed positively affected my participation in the project.

Questionnaire Item #11		
Source	Mean Squares	p-value
CE	60.490	0.390
RO	43.048	0.711
AC	12.741	0.858
AE	6.392	0.794

I worked mostly online with my group members.

Questionnaire Item #13		
Source	Mean Squares	p-value
CE	44.816	0.539
RO	42.491	0.716
AC	32.056	0.570
AE	31.763	0.105

My group members could have completed the project all online without face to face meetings.

Questionnaire Item #14		
Source	Mean Squares	p-value
CE	5.302	0.921
RO	2.654	0.972
AC	8.541	0.840
AE	6.902	0.683

I learned more about writing because of this wiki experience.

Questionnaire Item #15		
Source	Mean Squares	p-value
CE	64.240	0.359
RO	14.926	0.927
AC	66.211	0.209
AE	6.032	0.808

I have gained ideas on how I might use the wiki to support writing in an elementary classroom.

Questionnaire Item #16		
Source	Mean Squares	p-value
CE	60.043	0.408
RO	130.666	0.169
AC	42.983	0.450
AE	16.901	0.421

I would like to see the wiki used for more collaborative projects in my coursework.

Questionnaire Item #18		
Source	Mean Squares	p-value
CE	7.194	0.894
RO	115.431	0.264
AC	11.233	0.794
AE	6.402	0.703

I was comfortable with the changes my group members made to our wiki document.

Questionnaire Item #19		
Source	Mean Squares	p-value
CE	65.378	0.336
RO	10.336	0.896
AC	40.084	0.423
AE	11.628	0.520

I am proud of my contributions to the wiki document.