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Asynchronous collaborative exam preparation: working or waiting in a wiki

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ASYNCHRONOUS COLLABORATIVE EXAM PREPARATION: WORKING OR WAITING IN A WIKI

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ABSTRACT

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The anxiety that final examinations produce was investigated in relation to how students cope with exam-related stress. Participants in this study collaboratively contributed to an asynchronous exam-preparation wiki as part of a pre-service teacher education course.

Qualitative data from interviews, open-ended questions, wiki content, and a focus group were gathered to determine instructor and student perceptions about the activity. Quantitative data from the Test Anxiety Inventory (German version translated to English), the COPE Inventory, and instructor grading rubrics were gathered to determine if the wiki activity helped to reduce exam anxiety, and to determine if a correlation existed between wiki contributions and self-reported coping behavior.

A *t*-test revealed no significant difference between posttest and pretest Test Anxiety Inventory scores. Pearson correlations revealed near-zero correlations between reported coping behavior and wiki contributions, as well as Test Anxiety Inventory scores and wiki contributions. Qualitative content, analyzed using a grounded theory methodology, revealed themes related to critical instructor interaction, student collaboration, and wiki content.

The data overwhelmingly showed that students did not like or benefit from the collaborative test preparation wiki activity. Trust appeared to influence participant impressions and the quality of their experience while working or waiting in the wiki. The research provides suggestions for improving trust through instructor participation, based on theory generated in the current study.

Future studies that implement best practices for instructor participation in collaborative exam-preparation wikis could investigate subtle actions and interactions within computer-supported collaborative learning environments, including motivation for contribution and general group dynamics. In addition, future research may reveal how those factors influence behavior and anxiety levels.

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CHAPTER I

INTRODUCTION

> Learning and teaching depend on creating, sustaining, and expanding a community of research practice. Members of the community are critically dependent on each other. No one is an island; no one knows it all; collaborative learning is not just nice, it is necessary for survival. (Brown, 1994, p. 10)

The purpose of *Asynchronous Collaborative Exam Preparation: Working or Waiting in a Wiki* was designed to explore the relationships between using a wiki as a student tool for collaborative exam preparation in a teacher preparation course and exam anxiety levels of students. Assessment typically serves two purposes in post-secondary education and training environments: determining learners' level of competence and comparing or ranking learner abilities (Smith & Ragan, 1999). Popular instructional design models such as analyze, design, develop, implement, and evaluate and Dick and Carey's instructional design model include assessment as a key component (Reiser & Dempsey, 2002), because the assessments generate significant information to inform the design process. Likewise, instructors use assessment results to improve instructional methods and materials. Additionally, key assessments such as the Scholastic Aptitude Test are often the determining factor in the selection of college student candidates. While assessments prove useful, student anxiety surrounding those assessments can be high given all that is tied in to the results. Elevated anxiety can impact negatively on test takers (Mealey & Host, 1992) and is commonly known as exam anxiety.

According to Keogh and French (2001), exam anxiety is a trait that predisposes individuals to react negatively to examinations. In higher education, exams and evaluative situations are often used tools in the determination of a student's academic and professional future. According to Cohen, Hasida, and Rosenfeld (2008), this may contribute to higher levels of stress and anxiety throughout the stages of the examination process. Many anxious students suffer from levels of exam anxiety that are high enough to impair performance (Kahan, 2008; Sullivan, 2002; Trifoni & Shahini 2011). Students who experience continuous anxiety may develop further problems, including depression, sleep disorders, and weight changes (Anxiety and Depression Association of America, 2010).

The cause of exam anxiety can be traced to a student's ability to adequately prepare for an examination, as well as the thoughts that students entertain up to and during an examination. Blankstein, Flett, and Watson (1992) found that exam takers either utilize problem-focused coping strategies (such as actively preparing for exams, including learning the skills needed to prepare for an exam) or emotion-focused coping strategies (such as seeking social/religious support or disassociating from the reality of the exam). Those students who engage more in emotion-focused coping behaviors tend to have lower exam scores than students who engage more in problem-focused coping behaviors (Doron, Stephan, Maiano, & Le Scanff, 2011). With this understanding, instructors have a clear idea of where to start when trying to help exam-anxious students.

How students handle their anxiety up to and through their examinations will often indicate the grade they earn (Tobias, 1985). There is an array of coping strategies and mechanisms available to students. Not all those strategies and mechanisms are healthy or beneficial to the student. Student coping strategies and mechanisms are predictable and

can be persistent (Kirchner, Forns, Amador, & Muñoz, 2010; Martin, Kliegel, Rott, Poon, & Johnson, 2008). Like Blankstein et al. (1992), Carver, Weintraub, and Scheier (1989) found that coping mechanisms can include problem-focused coping and emotion-focused coping. Problem-focused coping includes behavior that is directed toward resolving the problem or doing something to change the stress source. This form of coping is most often utilized when individuals feel that appropriate actions can be taken to address the source of stress. Emotion-focused coping includes behavior that is intended to reduce or manage the emotional distress related to the stressor. This form of coping is most often utilized when the stressor is perceived as a task that has to be endured (Folkman & Lazarus, 1980). According to Blankstein et al., exam-anxious students tend to engage more in emotion-focused coping. These students tend to have poor study and exam-preparation skills. They use emotion-focused coping skills and engage in behaviors designed primarily to reduce or eliminate negative emotional reactions rather than directly address the problem that created the negative emotions. In other words, these students tend to avoid their fears. Rather than confront their fears and learn the skills necessary to reduce or eliminate their exam anxiety, they spend valuable time denying that an important exam is in their future. Some of these students may also tend to disengage from the task when in a testing situation and become preoccupied with a variety of negative thoughts. They do poorly on the exam, because instead of focusing on the exam questions, they focus on fears, inadequacies, and past failures. These students have "learned helplessness" and may have thoughts during an exam, such as, "I am not smart enough to do this," or "I am just going to fail anyhow, why try?" Clearly, these distracting thoughts are bound to lead to failure, unless the student is able to guess all the answers correctly.

Additionally, Blankstein et al. found that students who utilize problem-focused coping skills tended to address any inadequate study and exam-preparation skills. They usually have excellent attitudes while preparing for an exam and are only moderately stressed during the exam because of any past failures. In addition, these students also are more confident about their ability to solve problems than students who tended toward emotion-focused coping behaviors.

According to McKeachie (1999), students can be taught how to proactively manage and reduce their anxiety by applying appropriate problem-solving methods, including knowledge acquisition, implementing learning techniques and problem solving strategies, time management skills, and open communication. Information about these skills are often available through university counseling or tutoring centers.

Another choice for instructors interested in helping their exam-anxious students may be to implement a class-wide strategy that helps students utilize problem-focused coping behaviors rather than emotion-focused coping behaviors. Mealey and Host (1992) suggest that having students collaborate when preparing for exams can help by providing social support for students and that students with low-level cognitive and study strategies can improve those deficiencies by observing and following the lead of students with higher-level cognitive and study strategies. Working with a group also allows students to actively engage with the content that will be on the examination.

The demands of the current workplace suggest that students need to be better prepared to work well with others in stressful situations. Cooperative or collaborative work is accepted in education and has been found to promote critical thinking and greater retention and transfer of learning. In addition, collaborative work may result in healthy

relationships among the collaborators and may improve institutional retention (Bloom, 2009). Computer-Supported Collaborative Learning (CSCL) has enjoyed success in the past decade, and that success is dependent on attending to three critical features when designing CSCL environments. The features include the technological, educational, and social aspects of the environment.

Because students have various time constraints related to coursework and social and/or familial obligations, finding time to meet with a collaborative group can be problematic. Instructors may not be able to sacrifice valuable time during class to allow for groups to meet and prepare for an examination, thus a CSCL environment provides an alternative space that alleviates some of these obstacles for students to engage in exam preparation.

Wiki as Collaborative Study Space

A wiki is a common computer-based application that has enjoyed popularity in the past decade. Wikis are essentially websites that can be edited without special software designed for web page editing, such as Dreamweaver or Front Page, and enable multiple users to edit the same page content from various locations. Wikis often allow for page creation, content editing, comments outside of the page content, the ability to retrieve overwritten content through a page history, and Really Simple Syndication feeds that inform wiki users of changes in wiki content.

Wikis can be used for educational purposes (Bruns & Humphreys, 2005; Chong & Yamamoto, 2006; Notari, 2006; Wang & Turner, 2005). Wikis are used to develop written text that includes hyperlinks and can be revised by adding, deleting, or changing any of that text (Raitman, Augar, & Zhou, 2005). The term “community of practice” is

often associated with specific wiki users (Boulos, Marimba, & Wheeler, 2006). Participants in this study may be considered a mini community of practice, as they were a group of people bound by the class and the exam-preparation wiki and shared knowledge and experience toward a common end—performing well on an examination (Wenger, 2000).

Instructors are able to maximize class time for the delivery of instruction and provide a way for students to work as a collaborative group to prepare for an examination without placing unreasonable time or travel expectations on their students. Wikis allow for the creation of web pages with only a web browser. They generally record each individual change made by users over time, and users can revert a page to any of its previous states at any time (Parker & Chao, 2007). Some wikis include Realy Simple Syndication feeds, which allow users to subscribe, so that they may receive notifications that a change in the wiki has taken place. In addition to content creation, some wikis allow users to post comments, which are generally outside of typical page content. User access in a wiki is highly customizable. Users can be allowed to create pages, add content to pages, add navigational links to pages, edit existing work, delete pages, add comments, or simply view the wiki. These features allow students to learn with each other by using a wiki as a collaborative environment in which to construct their knowledge and address any topic (Boulos et al., 2006).

The collaborative learning potential in wikis is found in their ability to allow for debate-based learning experiences (Chong & Yamamoto, 2006) or to ease the formation of knowledge (Reinhold, 2006). Wikis may be thought of as media that support learning due to their ability to ease collaborative efforts (Kim, Han, & Han, 2006; Notari, 2006). They can also support the co-construction of knowledge and inquiry learning (Yukawa,

2006). According to Bruns and Humphreys (2005), wikis have the potential to support social constructivist learning in general. In the wiki environment, students are relevant, valuable sources of knowledge to one another in higher education. This is due to rich and varied experiences in life, along with their specialized interests and aptitudes (Weigel, 2005). The mini community of practice formed through an exam-preparation wiki may transform students with emotion and avoidance coping mechanisms into students with problem-focused coping mechanisms and has strong implications for minimizing exam anxiety. This potential is relatively unexplored.

According to Leuf and Cunningham (2001), structuring the information hosted by a wiki is an important task, because a wiki system is supposed to grow over time, and participants may come from a large variety of different knowledge domains. The initial structuring of a wiki is essentially a form of scaffolding provided by the instructor so students are better able to understand their task and successfully populate pages in the wiki.

Problem to be Investigated

The purpose of this study was to determine if student use of a collaborative exam-preparation wiki could reduce exam anxiety and impact students' behavior while preparing for a course exam. A study by Chang, Morales-Arroyo, Than, Tun, and Wang (2010) found that students who participated in a collaborative wiki felt that wikis were helpful in collaborative learning and helped support their study process. In addition, the students reported that the wiki facilitated communication and was easy to use. Does wiki use also have a wider impact on student behaviors, such as exam anxiety?

Anxiety-inducing activities are common on college campuses. Anxiety can cause individuals to perform poorly in school-related tasks, including examinations. In cases where students have actually mastered the material, heightened anxiety can lead to exam scores that do not accurately reflect student knowledge. Their resulting scores can impact future coursework choices and the ability of individual students to advance to higher levels of coursework. For the purposes of this study, the researcher defined wiki implementation as:

- The creation of a wiki with structure derived from a course syllabus,
- with content derived from university-sanctioned study-skills and exam preparation information,
- leading to its subsequent assignment to students,
- for students to populate the wiki with examination-related content, and
- comments regarding the exam and wiki content.

Such an implementation was a largely untested intervention to lower student anxiety levels by encouraging students to engage in adaptive and constructive coping behaviors and actively share information and experiences with their peers.

Research Problem Description

When faced with an examination, students react by employing specific coping strategies. According to Zeidner (1995), those strategies can either be adaptive (problem-focused) or maladaptive (emotion- or avoidance-focused). Students who employ adaptive strategies tend to experience positive outcomes on examinations and experience less examination anxiety than students who employ maladaptive strategies (Zeidner, 1995). Since wikis have been shown to be useful in collaborative activity in education (Leuf &

Cunningham, 2001), would the use of a wiki to collaboratively prepare for an examination impact students' anxiety? Could it enhance examination outcomes or facilitate coping strategy choice?

Delimitation of the Problem

Participants in this study were delimited to undergraduate university students in a college of education course taught in a mid-sized southeastern regional university. Variables in this study were delimited to exam preparation and exam and study skills acquisition or reinforcement within a wiki, as well as instructor support within the required wiki. Instruments and other data sources in this study were delimited to the COPE, Test Anxiety Inventory, German version (TAI– G), Student Questionnaire, Student Focus Group, Instructor Interview, and the Campus Pack Learning Object 4.0 Wiki.

Limitations of the Problem

Level of student proficiency in technology skills impacted wiki use. Social connections created through the wiki created opportunities for students to prepare for the exam outside of the wiki (small study groups, conversations outside of the wiki, students who naturally prepare with others or employ tutoring services, etc.; these activities would not be documented and/or considered in the results of the study). Normal class activities may have reduced exam anxiety. Instructor experience with wikis and collaborative learning exercises can have a major impact on wiki participation and student opinion of the collaborative activity.

Research Assumptions

Students in the instructor-assisted wiki have less anxiety and develop better exam preparation and study skills.

Research Questions

Q1 What are the differences between self-reported pretest and posttest anxiety scores after using a wiki to collaboratively prepare for an exam?

Q2 What are the perceptions of an instructor after implementing an exam preparation wiki for an assessment class?

Q3 What are the perceptions of students after using an exam preparation wiki for a pre-service teacher preparation course?

Q4 How do students use a wiki for exam preparation?

Q5 How do student contributions in an exam preparation wiki cross-validate with student scores obtained from the COPE instrument?

Q6 What is the correlation between contribution levels in an exam-preparation wiki and student exam anxiety levels?

Variables

An independent variable is manipulated in a study by the researcher to examine its influence on the dependent variable. The independent variables in this study is the wiki.

A dependent variable is measured in a study. This variable is not manipulated by the researcher and is affected by the independent variable. The dependent variables in this study include anxiety levels, as measured by the measured by the TAI–G and coping behaviors, as measured by the COPE inventory.

Measures of Variables

Participants in the study came from two sections of the same required undergraduate course in a college of education at a mid-sized, regional university in the southeast.

Justification of the Research

Wikis are typically a web-based application. Some schools and universities question whether wikis can be a reliable source of information for academic tasks, including required papers or certain examinations (Young, 2006). Actions taken in wikis for exam preparation have not been sufficiently studied. The findings presented from this study are designed to inform instructor and student decisions about the use of a wiki for exam preparation and its viability as an alternative to traditional individual and group preparation methods, specifically for courses that are only offered online. While this research shows no statistical connections between the use of a wiki for collaborative exam preparation and the reduction of student exam anxiety, qualitative findings provide thick description about student and instructor use of the wiki as a collaborative space for exam preparation. This adds to the existing literature because the research on wiki use and exam coping behaviors is lacking. This research describes how typical student exam coping mechanisms manifested during the use of a wiki. In addition, this research reveals necessary levels of instructor support within the wiki, including scaffolding and accepted study skills strategies provided to the instructor by the university.

Why it is Important to Address the Problem

Unexplored Methods

The delivery of exam taking and study skills within an exam-preparation wiki is largely unexplored. Students may seek to further develop their exam preparation skills through university resources, such as counseling and tutoring centers. Some students may be reluctant to spend time at a tutoring center to improve their academic skills because of course loads and social time constraints. If instructors can deliver the same information

via a mandatory course wiki, students may improve their academic skills without intervention from entities outside of a course setting. Delivering exam preparation and study skill information through an exam-preparation wiki as well as having students share knowledge and experience in a mini community of practice has potential implications for minimizing exam anxiety.

Contributions to Knowledge and Practice

The use of wikis as a computer-supported collaborative environment with the intent to help students prepare for high-stakes exams and to help improve student coping mechanisms was largely untested. Observations of student interactions and actions within the wiki are useful for future instructors to best design and implement wikis within their courses for similar purposes. A key component of their design is how much instructor support is needed when requiring students to utilize a wiki for exam preparation and the acquisition or reinforcement of study and exam-preparation skills. The support included both content and technological support, both of which seemed to influence student contribution and participation.

Significance of the Research

Zeidner (1995) stated that students who experience trait anxiety and subsequently resort to emotion-focused coping strategies usually also experience state anxiety during an examination and generally have poor exam outcomes. Those students who use problem-focused coping strategies usually experience low exam anxiety and have good exam outcomes (Blankstein et al., 1992). While any intervention may not benefit those students who employ problem-focused coping strategies, students with or without trait anxiety who employ palliative (emotion or avoidance) coping strategies may experience

important differences related to taking examinations. It was the intent of this study to add to the body of literature by investigating if a wiki intervention resulted in either lower state anxiety levels prior to an exam, or higher achievement, or both. In addition, the study revealed if students utilize problem-focused strategies in the intervention. While Leuf and Cunningham (2001) indicated providing some structure in a wiki to facilitate its use, little empirical research exists that defines optimal levels of support (based on best practices of computer-supported collaborative learning) in a wiki when that wiki is used to help students prepare for an examination, including instructor-provided scripts, feedback, and participation reminders.

Definition of Terms

Affordances. Aspects of a technology that allow for specific actions, such as audio, video, and text features.

Computer-Supported Collaborative Learning (CSCL). Collaborative learning supported by technology that enhances peer interaction and work in groups, including knowledge and expertise sharing among community members (Lipponen, 2002).

Coping. Coping is a process that unfolds in the context of a situation or condition that is appraised as personally significant and as taxing or exceeding the individual's resources for coping (Folkman & Moskowitz, 2004; Lazarus & Folkman, 1984).

Exam anxiety. A situation-specific trait, namely an individual's tendency to react to exams with heightened anxiety (Hodapp, Glanzmann, & Laux, 1995).

State anxiety: State anxiety is defined as an unpleasant emotional arousal in face of threatening demands or dangers. A cognitive appraisal of threat is a prerequisite for the experience of this emotion (Lazarus, 1991).

Trait anxiety. Trait anxiety refers to a personality characteristic that manifests itself as a more or less constant feeling of dread or uneasiness (Lazarus, 1991).

Wiki. Wikis are web-based sites that allow users to add, edit, and delete content (text, images, video, and audio) to any part of the site with nothing more than a web-browser and Internet connection. One of the best known wikis is *Wikipedia*, a popular and free online encyclopedia with content generated by its users. Wikis are websites that allow users to have access to its content and change the content online (Leuf & Cunningham 2001; Raitman et al., 2005). Wikis can be available on the Internet and also can be implemented in intranets or on local computers. Wikis do not require special software outside of a web-browser, are easily accessible, and are simple for the masses to use (Desilets, Paquet, & Vinson, 2005). These qualities make wikis valuable tools for a multitude of purposes.

CHAPTER II

REVIEW OF LITERATURE

This review of literature covers research in the following areas: (a) wikis in education, (b) exam anxiety, (c) CSCL and (d) history of grounded theory.

Wikis

Use in Education

Wikis are websites that can be edited by their viewers without the use of special software or technical expertise. They have been used in education (Aharony, 2008; Hutchison & Colwell, 2012; Ioannou & Artino, 2009; Knobel & Lankshear, 2009). The search term "education wiki" in Wikispaces produced over 500,000 results. The search term "educational wiki" produced 176,000 results, and "wiki in education" produced 131,000 results. The sites include links to multimedia and allows for user questions and sharing of information regarding technology, pedagogy, and content knowledge. An edublog is a blog (contraction of web and log) or website designed as a personal journal or log of users' activity. Edublog's focus is on hosting blogs for students and teachers. It has called for nominations and awarded educational wiki sites since 2006. Winners are determined by the thousands of edublog followers, and awards are presented online. Those awards include a badge that wiki or blog owners can place on their site to indicate their popular approval.

Wikis provide users the opportunity to give and receive immediate feedback regarding page content and comments (Albion, 2008). Contributors to wikis do not need to be in the same room to share their ideas or opinions, and their asynchronous nature may allow for more thoughtful responses to other contributors (Ioannou & Artino, 2009; Matthew & Callaway, 2009). In an exam-preparation setting, it is critical to ensure that the subject matter information is as accurate as possible, that collaborators have time to consider why edits are necessary, and how best to achieve consensus on content. The commenting feature in wikis acts as a secondary information channel and allows contributors the opportunity to discuss information and editorial choices outside of the content relevant to examinations. That discussion can occur over a longer time than a face-to-face conversation might take. Diligent instructor monitoring of wiki content and student transactions, as well as consistent feedback, appears to have a significant influence on content and transactional quality.

Peer review in wikis may foster metacognition and reflexivity (Kirschner, 2004). In a study involving the use of a wiki in a language arts course, some students were reported to read the textbook more carefully than they usually would prior to thoughtfully contributing content to the class wiki. In addition, the students were reported to carefully read the wiki prior to changing existing information (Matthew & Callaway, 2009). Another study that used a wiki for the development of teacher skills (Biasutti & EL-Deghaidy, 2012) reported students paying particular attention to the quality of their contributions, including one who reported:

> I felt free to write and at the same time constrained by the responsibility to my companions: free because I knew my teammates would, if necessary, correct my mistakes, and because I could not write any nonsense without thinking about it many times: I would not have added unnecessary work to my colleagues. (p. 869)

Despite their ease of use and multiple affordances, wikis have proven problematic in the past (Biasutti & EL-Deghaidy, 2012; Ebner, Kickmeier-Rust, & Holzinger, 2008; Hutchinson & Colwell, 2012; Ioannou & Artino, 2009; Kirschner, Strijbos, Kreijns, & Beers, 2004; Matthew & Callaway, 2009; Wheeler, Yeomans, & Wheeler, 2008). Those problems include technical issues and mismatch between academic activity and the wiki structure (Ioannou & Artino, 2009), uncertainty about editing other contributors' work (Biasutti & EL-Deghaidy, 2012; Matthew & Callaway, 2009), technical issues, poor contribution (Ebner et al., 2008; Matthew & Callaway, 2009; Judd, Kennedy, & Cropper, 2010), fear of ridicule by peers for low-quality work (Wheeler et al., 2008), and the impersonal nature of wikis (Hutchinson & Colwell, 2012). Some of these issues may be minimized through meaningful training, scaffolding of the wiki, and relevant choices for academic activities within a wiki. According to Ebner et al. (2008), "future research must increasingly address socio-motivational and psychological aspects of wikis so that they may be used more successfully in educational contexts" (p. 206).

Student users of wikis should understand how the wiki may be instrumental in the success of an academic exercise, and instructors should strive to understand the challenges for students while working directly with peers in a collaborative wiki. Instructor-facilitators of the wikis should be mindful of how and why students are interacting and provide feedback and guidance to foster healthy and meaningful interaction among student contributors. Judd et al. (2010) reported that the most productive members in their wiki study provided over 40% of the material, while the least productive members provided less than 15% of the material. The problem of low contribution can be

addressed by instructors providing clear wiki participation expectations that are tied to a grade (Witney & Smallbone, 2011).

Collaborative Learning and Wikis

Successful collaboration in an educational environment depends on all participants "engaging in a coordinated effort to solve a problem or complete a task" (Järvelä, Häkkinen, Arvaja, & Leinonen, 2004, p.115). The collaboration can take place synchronously (learners meet at the same time, but not necessarily the same place) or asynchronously (learners interact with one another at different times, generally through some sort of computer environment such as a wiki) and is driven by the continuous attempt to construct and preserve a shared conception of the task or problem (Roschelle & Teasley, 1995). According to Slavin (1996),

> If information is to be retained in memory and related to information already in memory, the learner must engage in some sort of cognitive restructuring or elaboration of the material. One of the most effective means of elaboration is explaining the material to someone else. (p. 50)

While some may use the terms collaborative learning and cooperative learning interchangeably, Dillenbourg (1999) argues that, "In cooperation, partners split the work, solve sub-tasks individually, and then assemble the partial results into the final output; while in collaborative learning, partners do the work together" (p. 8).

Cooperative Learning

One technique in cooperative learning that embodies aspects of this researcher's work is the Jigsaw method. Interdependence among learners is promoted in Jigsaw when instructors provide access only to parts of required educational material. Those parts should be understood on their own, even though they collectively comprise the full range of the content to be learned. Following mastery of his or her assigned part, learners then

meet in groups to discuss and teach one another their assigned parts in an effort to fully understand the parsed material as a whole. At the end of the process, individuals are tested on all the material (Aronson, Blaney, Stephin, Sikes, & Snapp, 1978). This method has been employed in CSCL, where groups are responsible for learning and elaborating parts of a whole (Järvelä et al., 2004).

An alternative method to Jigsaw is Jigsaw II. This method was developed by Slavin (1980) and differs from the original Jigsaw method in that the learner has access to the entire body of the required educational material. One drawback to this method is reduced interdependence among learners. However, a study by Johnson, Johnson, and Stanne (1990) showed that resource interdependence was less critical than goal setting in group and individual success. Based on the Jigsaw models, the proposed examination preparation wiki benefited students in two ways: students were accountable for their own contributions, and students learned from the contributions of their peers.

Initiating group problem solving involves the groundwork of establishing roles and goals, with the goal of building shared knowledge, assumptions, and beliefs (Järvelä et al., 2004). Rules for interaction are also helpful for the maintenance of constructive communication (Brown, Eastham, & Ku, 2006). The proposed examination wiki was not accessible to students until such rules were disseminated and questions related to those rules were addressed.

The Zone of Proximal Development is defined as "the distance between the learner's actual developmental levels as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance and in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

The exam preparation wiki would seem to be an ideal environment to keep students in an appropriate Zone of Proximal Development because of the differences in peer capability and the structure and guidance provided by the instructor.

Scaffolding is when an instructor provides assistance within the Zone of Proximal Development, including managing aspects of a learning task that exceed the capacity of the learner at the outset of the task. That management allows the learner to focus on, and achieve, parts of the task that are within the learner's ability (Wood, Bruner, & Ross, 1976). For students wishing to forge ahead into unfamiliar course material, previously contributed material could be edited and improved following exposure to the relevant material in class.

Mutual benefits from CSCL include sharing expertise with the group and fostering motivation through example (Schunk, 1991). In other words, when a student sees that students of similar abilities in a collaborative group are able to succeed within the dimension of a learning task, he or she may develop a heightened belief that he or she is also capable of the same success.

Collaborative education involves peers assisting one another with a learning task. Damon (1984) proposed a conceptual foundation for a peer-based plan of education, which includes the following ideas:

Peers help to motivate each other, while searching for solutions and eliminating misconceptions through a process of debate and feedback. Peer communication facilitates increased understanding of social processes, including productive argumentation and participation. In addition, peer communication can also increase understanding of cognitive processes, including criticism and verification.

Cooperative or collaborative work is accepted in education and has been found to promote critical thinking and greater retention and transfer of learning. In addition, collaborative work may result in healthy relationships among the collaborators and may improve institutional retention (Bloom, 2009).

In some cases, learners in collaborative environments limit input to superficial knowledge instead of deeper, elaborated explanations of the problem or task assigned (Järvelä & Häkkinen, 2002). However, tasks that are too well-defined may not evoke "questions, negotiations, explanations, or arguments" (Järvelä et al., 2004, p. 116). Thus, it becomes the major challenge of the instructor to provide authentic tasks that are stimulating and demanding and evoke thoughtful responses in the collaborative environment.

Careful development of the task, including those actions that foster group cohesiveness, can help mitigate social loafing, free-riding, and the sucker effect (Kreijns, Kirschner, & Jochems, 2003). Karau and Williams (1993) define social loafing as "the tendency for individuals to expend less effort when working collectively than when working individually" (p. 681). Free riding is similar to social loafing, but the free rider intentionally reduces participation efforts while gaining from other group members' work. In other words, the social loafer's inaction is more a result of laziness than strategic non-contribution. The sucker effect is an interesting passive–aggressive phenomenon that occurs when strong group contributors contribute less to the group project to reduce the benefits free riders may reap, thus preventing themselves from being suckers (Kreijns et al., 2003).

Social loafing can occur when a group member feels his or her contributions is not valued or considered. Social loafing can greatly hinder online community development. Participating in group-work exposes the participants to the risk that they may be ridiculed or thought less of based on their contributions (Yih-Chearng, Chao-Min, & Chen-Chi, 2010). In some cases, the fear of negative impressions is greater than the fear of failing to contribute. In addition to impression management, some members of a group may feel that the information they put into any given online system the group utilizes is a potential target for unauthorized users to gather and share among other online hackers. Those fearful group members would be less likely to contribute to the group task. This fear should be mitigated by the use of a wiki within an authenticated learning environment that is closely monitored for breaches in security.

Strong social ties between group members can reduce social loafing. The emotional bond can improve trust among and between members and improve collaboration and knowledge sharing. Systems created and maintained by individuals with significant social ties usually will have more information in them than those systems with poor relationships between or among its contributors. A stronger sense of loyalty and duty to assist other members of the group invariably reduces social loafing behavior, and can also allay fears that data may be compromised by group members. Cultural differences among group members may impact levels of social loafing as well (Yih-Chearng et al., 2010).

Students with deficient motivation and self-regulation within collaborative learning tasks may require guidance tailored toward their present level of development to further engage in the learning task (Hogan & Pressley, 1997). If that guidance is not sufficient for these students, feedback in the form of a grade and acknowledgment of the

students' strengths as well as general support within the learning task process can empower them to contribute and help the group succeed (Baer & Cheryomukhin, 2011).

Exam Anxiety

The study of exam anxiety began as a novel research area in the 1950s and grew into a heavily researched phenomenon in the field of education (Culler & Holahan, 1980). Studies surrounding exam anxiety focus on why exam anxiety occurs, including gender and cultural differences and the presence of trait anxiety.

Exam anxiety has been shown to have a strong association with a decline in performance that impacts student grades (Culler & Holahan, 1980). Researchers have found that students experiencing exam anxiety tend to focus on task-irrelevant thoughts during testing situations. Morris and Liebert (1970) developed a model of exam anxiety that includes cognitive and emotional components. The worry that exam anxious students experience is a cognitive component that has a strong correlation with academic success (Culler & Holahan, 1980). The underlying assumption with this model is that students may be well prepared for an examination, but perform poorly on it because of distracting thoughts. However, some researchers have speculated that study behavior leading up to the exam can influence levels of exam anxiety in students who are characterized as highly exam anxious. This is problematic, as highly exam anxious students have been shown to have a corresponding low level of study skills competence (Wittmaier, 1972).

According to Zeidner (1998) and Lazarus and Folkman (1984), test anxiety is a phenomenon with multiple stages. The anticipatory stage occurs when students learn that they will have an examination. During this stage, students may assess the threat of the exam, engage in planning ways to prepare for the exam, regulate emotional responses to

the exam, and engage in problem-focused activity (studying) and/or emotion-focused activity (working to ameliorate negative feelings and anxiety about the exam). In the confrontation stage (Zeidner, 1998), students take the exam. During the exam, students may focus on the task of completing the exam and/or employ techniques to minimize emotional responses that arise from anxiety. Next, during the waiting stage (Zeidner, 1998), students may use information gained from the confrontation stage to predict the outcome of the examination. In addition, students will generally cease instrumental coping activity (as nothing can be done to change exam responses) and may employ emotion-focused strategies to reduce exam-related stress. The final stage (Zeidner, 1998) is the outcome stage. In this stage, students receive their examination results. Depending on the earned grade, students may focus on the implications of their grade and are either emotionally satisfied and can focus on other things, or they may experience additional anxiety that necessitates further coping behaviors.

Further studies regarding collaborative exam-preparation activities as they relate to the waiting stage and outcome stage seem merited. A logical choice for future study would be how the waiting and outcome stages affect outcomes of collaborative testing (Sandahl, 2010), particularly if collaborative preparation and collaborative exam taking are employed together. In collaborative testing, students work together in the confrontation stage. Various designs have been used to study collaborative exam taking (Kapitanoff, 2009), and many of those designs involve taking an exam individually, then re-taking the exam as a large or small group.

Types of Anxiety

According to Zeidner (1998), anxiety occurs in individuals and can be an ongoing facet of life or a reaction to a specific circumstance. The definitions below differentiate between the types of anxiety students can experience.

> State: a palpable but transitory emotional state or condition characterized by feelings of tension and apprehension and heightened autonomic nervous activity. (Spielberger, 1972, p. 24)

> Trait: an individual's predisposition to respond to stress and is congruent with the conception of chronic anxiety. According to this theory, a person with a high trait anxiety level tends to perceive a higher number of situations as threatening and concurrently has a higher level of state-anxiety than one with a low trait-anxiety level. (Spielberger, 1972, p. 24)

Zeidner (1998) reported that students who are highly trait anxious also tend to experience more state anxiety in testing situations, and are more likely to drop out of college as a result of anxiety and poor performance related to that anxiety. This study did not gather or report on the influence of trait anxiety, as students who suffer from trait or generalized anxiety require more robust cognitive behavioral interventions than a collaborative exam-preparation wiki (Zeidner, 1998). However, the potential of reducing the state anxiety prompted by an examination through efforts in a collaborative exam-preparation wiki does seem promising.

Wikis and Anxiety

While many studies have been conducted on the anxiety produced by the task of contributing to a wiki (Cowan & Jack, 2011; Liu, 2010), studies conducted on using wikis to reduce anxiety produced by other events is lacking.

Computer-Supported Collaborative Learning

A CSCL can be implemented in all levels of education. According to Stahl, Koschmann, and Suthers (2006), a CSCL can encourage learners to come together and engage in social and intellectual activities. Collaboration is emphasized in CSCL. Learning takes place through questioning, addressing lines of inquiry, observing group members, and teaching group members (Stahl et al., 2006). Instructors who wish to implement CSCL are faced with the challenge of inspiring their students to engage in and maintain a high level of interaction. Stahl et al. suggest that this can be accomplished through a combination of technology, pedagogy, and curriculum in a well-planned and coordinated implementation of those elements.

While computers are integral in CSCL environments, the computer and its CSCL software are not as important as the social interactions and collaboration among the students using them, unlike computer-assisted instruction, intelligent tutoring systems, and LOGO (a computer programming language) (Koschmann, 1996). As such, when conducting research in CSCL, one must consider the meaning-making and construction shared among collaborators. According to Stahl et al. (2006), researchers cannot limit their observations to the ideas and words of individual contributors, because those ideas and words evolve from a series of ideas from all participant–contributors. To do so would discount the important history and growth of the group members' contributions, including diagrams, utterances, and texts. Looking at the product of the CSCL environment through such a lens allows the researcher to "reconstruct the collaborative process through which group participants constructed shared meaning, which was learned as a group" (Stahl et

al., 2006 p. 416). In short, learning in CSCL is entirely constituted of the group interactions.

In cases where instructors predict insufficient interaction or confusion regarding the learning task, collaboration scripts can be useful. According to Dillenbourg (2002), CSCL scripts are instructions regarding how groups should form, interact, collaborate, and solve the learning problem. They generally have five attributes, including a description of the task, group composition, task distribution in and among groups, interaction modalities, and when tasks should occur (phase timing) (Dillenbourg, 2002). Providing scripts in CSCL has had some criticism in that the prescriptive nature of scripts reduces the opportunity for collaborative groups to organically arrive at solutions (Dillenbourg, 2002). However, in situations where time for a learning task is short and group cohesiveness is low, the benefits of enhanced task understanding and resultant interaction may outweigh violations of traditional collaborative learning practices.

Previous Research

Before CSCL, computer learning activities were traditionally isolated (Stahl et al., 2006). The development of the Internet fostered the growth of CSCL in the 1990s, which brought new challenges to educators and learners, including designing, implementing, and encouraging learners to engage in CSCL environments.

According to Stahl et al. (2006), several projects in the infancy of CSCL helped define and expand it. Deaf and hard-of-hearing students at Gallaudet often entered the school with writing skills that were not at the students' appropriate grade level. Instructors at the school wanted to help students develop their ability to write with a voice and a particular audience in mind, and that desire resulted in the English Natural Form

Instruction project (Gruber, Peyton, & Bruce, 1995). Students at Gallaudet went to newly designed classrooms and sat at computers arranged in a circle. The students and their teachers then used software similar to today's chat software and engaged in text-based discussions with the goal of developing communication skills through the discussions (Stahl et al., 2006).

Another fledgling CSCL project also was implemented to help students develop their writing skills after researchers in Toronto lamented the superficial and poorly motivated learning that occurred in traditional classrooms as compared to the learning that occurred among scholars working on shared research (Bereiter, 2002). The Computer-Supported Intentional Learning Environment helped to model classrooms after knowledge-building communities so that students in them could engage in joint text production to produce archived, scholarly works (Stahl et al., 2006).

According to Cole (1996), the Fifth Dimension project was started by researchers at Rockefeller University who wanted to help students further their reading skills in an after-school program involving "a flexible activity with the power to engage children, undergraduates, and researchers in long periods of intense interaction" (p. 289). The Fifth Dimension combined aspects of gaming (the layout of the computer space was similar to a board game, where each area contained specialized activities geared toward reading and solving problems) and pedagogy. Lower-level students received help from higher-level students and undergraduates in the School of Education at the University of California at San Diego.

The first international conference that seriously considered CSCL was held a few years after the English Natural Form Instruction, Computer-Supported Intentional

Learning Environent, and Fifth Dimension projects (Stahl et al., 2006). The conference was supported by the North Atlantic Treaty Organization and was held in Italy in 1989. In 1995, the first conference fully devoted to examining CSCL was held at Indiana University. Similar semi-annual conferences have occurred since then, and many CSCL–specific publications have followed (Stahl et al., 2006).

Best Practices

According to Stahl (2006), researchers can best understand interactions and resulting group cognition in CSCL when groups are relatively small. With small groups, researchers are better able to observe participants' undertakings in their intersubjective learning efforts (including social interactions) without losing track of the larger goal and product of shared meaning-making.

Technology in CSCL has an inherently social design. That design allows for, and promotes, social interactions that constitute group learning and resulting individual learning (Stahl et al., 2006). Wikis are often created and maintained through social negotiations, which, in the case of *Wikipedia*, may occur on talk pages (Elder, Westbrook, & Reilly, 2012). The wiki utilized in this study did not include talk pages, so social interactions occurred in comments within the wiki.

The CSCL does not try to replicate live or face-to-face interactions. Rather, it strives to make new interactions possible. Those interactions are easily recorded and are designed to create a tangible and substantive product that can be further modified if necessary. Depending on the sophistication of the CSCL software, interactions can be tracked, and the software can provide learners with appropriate responses or prompts (Stahl et al., 2006).

Coping Behavior in Adults

Coping Defined in Context of Study

According to Lazarus (1966), stress involves several processes, including primary appraisal, secondary appraisal, and coping. The process of primary appraisal involves perceiving a personal threat, while secondary appraisal involves conceptualizing a potential response to that threat, and finally, the act of responding to the threat is defined as coping. When coping does not produce a resolution to the threat, people may reappraise the threat and choose another way to respond to it until the threat is resolved (Lazarus & Folkman, 1984). Coping can be generally thought of as adaptive or maladaptive (Carver et al., 1989), but it is important to note that coping behaviors are often context-specific (Sullivan, 2010). That is, people deal with different stressors in different ways and may change coping behaviors according to the stage of the source of the stress. For instance, students may take an active, adaptive approach while preparing for an exam, but when the students are satisfied with their efforts, they may disengage from those efforts (in most cases, not attending to a source of stress is considered maladaptive, but in this case, the students may need to get their minds off the exam to preserve a healthy psychological state).

Carver et al. (1989) argued that developing a specific coping style would be counterproductive in that one must have a repertoire of styles from which to draw in order to flexibly deal with the many circumstances encountered in life. Thus, despite dispositions related to coping, specific situations often call for coping behaviors that may be atypical to individuals.

Types of Coping

According to the early work of Lazarus (1966), there are two fundamental ways of coping, including problem-focused coping and emotion-focused coping. While problem-focused coping involves attending to the source of stress to reduce or eliminate it, emotion-focused coping involves attending to and reducing the emotional state caused by the source of stress. Folkman and Lazarus (1980) found that when people feel that the source of stress is within their ability to control, they tend to utilize problem-focused coping; but if the source of stress appears out of their control, and must be endured, they typically resort to emotion-focused coping. However, further research (Carver, 2007; Carver et al., 1989) found that the two types of coping involved multiple factors.

Problem-focused coping (or active coping) involves managing the source of stress by engaging in productive, problem-solving activity. That activity can include accepting that the stressor needs to be dealt with, planning how and when to deal with the stressor, reducing activity not related to the stressor, engaging with the stressor at appropriate times, and seeking advice and information from capable peers.

Emotion-focused coping can involve not believing or acting like the problem is not real, not attending to or thinking about the problem, seeking understanding or sympathy from peers, hoping for the best, or believing that a higher power will intervene to solve the problem.

Grounded Theory

Glaser (2007) investigated the early work of Lazarsfeld on determining the qualities of good qualitative study procedures in the 1950s, which subsequently led to his ideas on grounded theory. According to Glaser (2007), Lazarsfeld's focus initially began

with revising previous theory based on early qualitative studies, which led him to the idea of waiting to generate theory until after reviewing data. Glaser stated that the biggest difference between Lazarsfeld's work and grounded theory as we know it today was that Lazarsfeld was primarily interested in revising existing theory based on newer studies. Grounded theory evolved from that by:

> Generating conceptual theory abstract of unit, time, place and people and with no pre-framing by extant theory before the research began. *Then* the discovered theory is related back to the literature, both descriptive and theoretical, but not so much to correct it as to advance it with modification by constant comparative transcending concepts, and using many of them in a multivariate theory. (Glaser, 2007, p. 10)

Lazarsfeld's work made empirical social research based on methodology a necessary style, and inspired Glaser to describe how he developed his book, *Awareness of Dying,* in terms of a methodology. While Lazarsfeld believed that previously well-respected theory developed in qualitative works should be put to the test of quantitative empirical research for validation, grounded theory as we know it today goes beyond his methodological notions by ignoring existing theory while discovering new theory based on study data, then examining how the new theory fits into current, relevant theory. Grounded theory also helped researchers move away from the idea that research done by individuals rather than by larger groups or institutes would be unsupported by emphasizing that preconceived notions of theory-building and creativity limited the growth of new theory. This freed many researchers to work without the guidance of mentors or institutions (Glaser, 2007). While some grounded theory researchers do seek the help of other Grounded Theory researchers through various forms of communication, and through institutes such as the Grounded Theory Institute (Glaser, 2007), seeking such support is purely the choice of individual researchers.

Conclusion

This review of literature has addressed wikis in education, exam anxiety, CSCL, and history of grounded theory. The current study examined what impact the use of a wiki for exam preparation had upon student anxiety levels, if existing student coping mechanisms were expressed in a collaborative exam preparation wiki, and how participant academic achievement was affected. By providing an alternative to established exam preparation, the researcher hoped to help students with insufficient exam preparation skills and/or maladaptive coping mechanisms (such as waiting until the night before an exam to prepare for that exam) to improve their exam-preparation and coping repertoire. According to *The Horizon Report 2011* (Horizon, 2011), teamwork skills are required in many professions, either face-to-face or online, and instructors are encouraged to implement team-based projects for their students. In addition, there appears to be a need for research regarding the use of wikis in collaborative exam preparation.

CHAPTER III

METHODOLOGY

The current study incorporated a quantitative–qualitative mixed methods study using data collected from a test anxiety inventory, a coping behaviors inventory, a wiki artifact, a questionnaire, and a focus group. This chapter introduces the methodology utilized throughout the study, including (a) research questions, (b) instruments, (c) procedures, and (d) data analysis.

Research Questions

Q1 What are the differences between self-reported pretest and posttest anxiety scores after using a wiki to collaboratively prepare for an exam?

Q2 What are the perceptions of an instructor after implementing an exam preparation wiki for an assessment class?

Q3 What are the perceptions of students after using an exam preparation wiki for a pre-service teacher preparation course?

Q4 How do students use a wiki for exam preparation?

Q5 How do student contributions in an exam preparation wiki cross-validate with student scores obtained from the COPE instrument?

Q6 What is the correlation between contribution levels in an exam-preparation wiki and student exam anxiety levels?

Research Design

The study utilized quantitative–qualitative mixed methods. Quantitative data from the test anxiety inventory and coping behaviors inventory as well as data from the wiki

were analyzed with common quantitative statistical analysis tests. Qualitative data from the wiki, questionnaire and focus groups were analyzed using grounded theory procedures (Creswell, 1998; Glaser & Strauss, 1967).

Participants

Participants were pre-service teaching students enrolled in a mandatory assessment class offered through a special education department located in a mid-sized regional southeastern university. The students were majors in the department, typically in their junior or senior year. The students were not officially considered a cohort group, but because many of them started their degree track at or around the same time, they were familiar with each other because of attending many of the same classes together. The students were a mix of traditional and mature. Most were under 30, but some were in their 40s, looking to begin a second career. The students were predominately Caucasian.

Sample

Sampling Method

Participants were selected using a convenience sample. They were enrolled in one of two sections of the same course offered in the fall of 2012. Both sections of the course were taught by the same instructor.

Sample Size

The relatively small sample size of the participant pool is due to the specialty of the course. Students enrolled in the special education department were required to take the course. That specific department had low enrollment numbers for courses taken by students majoring in their programs.

Instruments

Test Anxiety Inventory, German Version

Trait test anxiety was assessed with the TAIG–G (German version), translated into English (Hodapp & Benson, 1997). The instrument is a self-report measure consisting of 30 items. It includes a 4-point rating scale from (1) *almost never* to (4) *almost always*. The four subscales comprise Worry (10 items, e.g., I ask myself whether my performance will be good enough), Emotionality (8 items, e.g., My heart pounds), Cognitive Interference (6 items, e.g., Distracting thoughts keep popping into my head), and Lack of Confidence (6 items, e.g., I have faith in my own performance). See Appendix A for the full inventory. The researcher chose to use the TAI–G, English adaptation, rather than the full TAI because the four scales of the instrument appear to capture more of the multi-dimensionality of test anxiety than the original TAI. The researcher did not use the original TAI–G, because there is not a second language requirement in the college of education, and it was unlikely that participants would speak or read German. In addition, the researcher received permission from Victor Hodapp to use the translated instrument in the current study.

Reliability. In a study by Ringeisen, Buchwald, and Hodapp (2010), the researchers found the 6- to 10-item scales to have acceptable Crombach's alpha values for the English adaptation of the TAI–G of .85 or greater. In addition to reported reliability measures, I verified the reliability of the data from this study as well: Lack of Confidence = .851, Emotionality = .742, Worry = .773, and Cognitive Interference = .846.

Validity. According to Ringeisen et al. (2010), "A pattern of significant correlations between TAI–G subscales and relevant variables in test anxiety research emerged, implying criterion validity for both language adaptations" (p. 361).

Scoring procedures. Responses are totaled on each subscale for a composite score. The Lack of Confidence subscale items are worded negatively and were reverse-scored to create a confidence scale score.

COPE

The original instrument included 15 scales, including Positive Reinterpretation and Growth, Mental Disengagement, Focus on and Venting of Emotions, Use of Instrumental Social Support, Active Coping, Denial, Religious Coping, Humor, Behavioral Disengagement, Restraint, Use of Emotional Social Support, Substance Use, Acceptance, Suppression of Competing Activities, and Planning. Because of the highly sensitive nature of the questions in the Substance Use and Religious Coping scales, and the potential for no or low response rates on those items, they were not included. The researcher chose to remove other scale items to further reduce the number of tests and decrease the chance of Type I errors that can occur when multiple tests are run with a small sample size (Gay, 1996).

Sullivan (2010) conducted a study to measure the psychometric properties of the Academic Coping Strategies Scale (ACSS), which is used to assess how students cope with specific academic stressors. The ACSS includes three scales, including Approach, Avoidance, and Social Support, and includes 56 items. Sullivan (2010) suggested that the three factor structure of the ACSS may change if the initial prompt given before the self-report, "Think about a time when you received a low grade on an important exam,

significantly lower than what you usually get," is changed. The items in the COPE that seem to best fit into the three scales in the ACSS are Active Coping, Planning, Use of Instrumental Social Support, and Use of Emotional Social Support. Students can either avoid studying for the course exam (which may be indicated by a minimal contribution and/or interaction with the wiki—a question regarding study behavior outside of the wiki was asked), or they may actively study for the exam (which may be indicated by a high level of contribution and interaction with the wiki). Active Coping and Planning could be considered approach coping. A lack of contribution and/or interaction with the wiki could be considered avoidance coping. As the collaboration in the wiki was social in nature (especially dialog in the wiki comments), the use of instrumental social support (asking for advice or for information specific to the exam) and use of emotional social support (seeking sympathy or help with an emotional state related to the upcoming examination) seem analogous to the ACSS Social Support scale. The author of the COPE states on his website that researchers are "welcome to use all scales of the COPE, or to choose selected scales for use" (Carver, 2007, para. 3). Given the author's statement, reducing the COPE to 4 scales from 15 is not problematic.

Reliability. A study by Carver et al. (1989) involving 978 undergraduate students who responded to various scales (*N*s differed among groups) in two sessions within three weeks of each other found scores on the 4-item scales to have the following Crombach's alpha values: Planning =.80, Seeking Use of Instrumental Social Support = .75, Use of Emotional Social Support =.85, and Active Coping = .62 (Carver et al., 1989). Values from the current study were: Planning = .803, Seeking Use of Instrumental Social Support = .701, Use of Emotional Social Support = .862, and Active Coping = .638.

Validity. Carver et al. (1989) established that the COPE scales were valid by correlating the scales of the COPE with other established instruments that measured similar coping behaviors.

Scoring procedures. Responses are totaled for a composite score on each subscale, with no reversals in scoring.

Procedures

After approval from the Institutional Review Board from the University of Northern Colorado and the University of North Florida (see Appendix B), participants were selected from two sections of the same undergraduate course taught by the same instructor. Near the beginning of the semester, the researcher visited the class. The instructor stepped outside to minimize her presence, which might have made students feel compelled to participate. The students were informed of the study and had the opportunity to review and sign an informed consent document. The researcher was available to answer questions about their consent. The students who elected to volunteer for the study responded to the TAI–G items (see Appendix A) and to the COPE items (see Appendix C). Participants were informed in the course syllabus that they were required to participate in an exam–preparation wiki so that they would have an alternative way to prepare for the cumulative course final exam. Participants were randomly assigned to sections of the wiki. Participants received training from a university staff member who works in a department that supports the university learning management system. The outside instructional design expert provided the training to reduce the impact of the researcher on student wiki input. The staff member instructed participants on the technical use of the Campus Pack Learning Object Wiki (Version 4.0). The training included information

about adding text and graphics to the wiki, establishing hyperlinks between content, initiating comments, and responding to comments.

In the training session, participants were provided general guidelines for wiki use (e.g., “It is okay to edit wiki content not assigned to you,” “Please be civil when commenting in the wiki,” and “Avoid intentionally providing inaccurate or misleading information in the wiki”), given access to the wiki, and reminded of the sections in which they would work.

The wiki was pre-populated with a basic navigation scheme, with links to pages with headers based on the course syllabus (i.e., Chapter 12, Theorist Names, etc.). This initial scaffolding was designed to remove some of the technical issues surrounding wiki use, and gave students a clear idea of where to place information. The wiki also included study skills and test taking tips provided through a university department that offered tutoring, writing assistance, and test and study skills workshops for students (see Appendix D for a sample of material). The center typically serves approximately 20% of the student body. From fall of 2011 to spring of 2012, the department saw 3,640 students, with roughly 3 to 4 return visits from those students for a total of 12,890 visits. Many of the students are in a state of high anxiety and are seeking help for an assignment or test that is due or upcoming within 24 hours. Students who are on academic probation or suspension are required to utilize the department’s services prior to having their academic status cleared. Students who are determined to have a dysfunctional level of anxiety are referred to the university counseling center for further services.

The participants were responsible for reading required material in the wiki, responding to other sections of the wiki, and making connections between sections of the

wiki. The participants received instructor provided scripts, general encouragement (where merited) in wiki comments, and participation reminders.

Participants worked and interacted in the wiki up to the exam period. The course syllabus indicated due dates for wiki contributions. Participants re-took the TAI–G approximately one class period before the exam was administered, for posttest results. In addition, the participants responded to a questionnaire (see Appendix E).

A focus group session was held at a convenient time for both sections of the class. Light food and beverages were offered. The focus group session was conducted at the end of the semester to better understand participant perceptions about the wiki. A focus group includes the following characteristics:

> A focus group is a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment. It is conducted with approximately seven to ten people by a skilled interviewer. The discussion is relaxed, comfortable, and often enjoyable for participants as they share their ideas and perceptions. Group members influence each other by responding to ideas and comments in the discussion. (Krueger & Casey, 2000, p. 18)

Qualitative data gathered from the focus group helped the researcher to develop a deeper understanding of how students used (or did not use) the wiki to prepare for the exam. Emergent themes included opinions of the wiki in terms of effectiveness for preparing for the exam, technical ease of use, patterns of use, patterns of collaboration and potential future use of a wiki to prepare for exams in other classes. This data could be useful for instructors when planning activities for future classes.

The focus group sample depended on availability. The two sections of the course were taught on the same day. One section was held in the morning, and one section was held in the late afternoon. The students were polled to determine the best time to meet to

include as many volunteers as possible to participate in the focus group, using a poll, which allowed participants to indicate times and days that best worked for them using the web-based scheduling application.

The hour-long session was digitally recorded in an audio-only format. The recording was transcribed into Microsoft Word. Krueger and Casey (2000) suggested that the researcher should pose an initial question to allow each participant to become acquainted with the topic, recollect their thoughts, and listen to their colleagues. Participants were asked to introduce themselves to the others and briefly describe their experience when using the wiki. Following this, the researcher asked a set of questions. Example questions included (see Appendix F): (a) Did you like working in the wiki? Why? (b) Did you find other student contributions useful when you prepared for the exam? (c) What did you not like about the wiki? (d) When were you satisfied with your contribution to the wiki? (e) What obstacles did you face when collaborating in the wiki? (f) As you look back on the experience, has it been worth your investment of time and effort? and (g) Would you recommend using a wiki to prepare for exams in other courses? Additional follow-up questions occurred naturally to clarify answers and build on the responses.

Data Analysis

t-Tests

I addressed Research Question Q1 using a paired samples *t*-test. A t-test (Gall, Gall, & Borg, 2003) was applied to the anxiety scale to evaluate the significance of the change over the semester. The *t*-test is a statistical test of whether two sample means are equal. The *t*-test is appropriate when all you want to do is to compare means and when its

assumptions are met. Assumptions of the tests are that the dependent variable has a normal distribution (which can be tested using a normality test, such as the Shapiro-Wilk test), with the same (=) variance in each group (which can be tested using an *F* test or Levene's test). If variances are unequal, this can affect Type I error rate. Researchers can correct for this violation by making adjustments to the degrees of freedom using the Welch-Satterthwaite method or by not using the pooled estimate for the error term for the *t*-statistic.

The *t*-test is described as a robust test with respect to the assumption of normality. This means that even deviations away from normality do not have a large influence on Type I error rates. The exception to this is if the difference in the size of the groups is greater than 1.5 (largest compared to smallest).

Pearson Product-Moment Correlation

I addressed Research Questions Q5 and Q6 using a Pearson product-moment correlation. The Pearson product-moment correlation calculates a coefficient, *r*, which is a measure of the strength and direction of a linear relationship between two continuous variables (Gall et al., 2003). The correlation coefficient *P* (rho) is a number that summarizes the direction and degree (closeness) of linear relations between two variables. Its sample value is called *r*, and the population value is called ρ (rho). The correlation coefficient can take values between -1 through 0 to +1. The sign (+ or -) of the correlation affects its interpretation. When the correlation is positive ($r > 0$), as the value of one variable increases, so does the other. For instance, if there is an increase in weight, on average there is also an increase in overall health problems. If a correlation is negative, when one variable increases, the other variable decreases. This means that there is an

inverse, or negative, relationship between the variables. For instance, as positive reinforcement increases, undesired behavior decreases.

Guidelines for using the Pearson product-moment correlation:

- The two variables have to be measured on either an interval or ratio scale.
- The two variables do not need to be measured using the same units.

Grounded Theory

I addressed Research Questions Q2, Q3, and Q4 using grounded theory. Creswell (1998) stated that the purpose of grounded theory is to generate or discover a theory that relates to a particular situation, where individuals engage in actions in response to a phenomenon. While grounded theory typically calls for multiple interviews, this study utilized the wiki artifact, questionnaire, and focus group to develop and interrelate categories of information that led me to write theoretical propositions or hypotheses. The theory(s) I developed related to wiki use in collaborative exam preparation were then "grounded" in data related to the "actions, interactions and social processes" (Creswell, 1998, p. 56) of my participants. A theory, as it relates to grounded theory, is a reasonable and believable relationship regarding concepts and sets of those concepts, which is described near the end of a study, sometimes in narrative form. The development of the theory involves using categories of data, as well as properties and hypotheses. Properties serve as categories and descriptors or dimensions of categories, while hypotheses serve to suggest links between those properties and categories (Merriam, 1998). Rather than form a hypothesis prior to the study, hypotheses emerge during data collection and the analysis of that data in grounded theory. Data are treated with the analytic procedure of constant comparative method, where joint coding and analysis occur. Theory building in grounded

theory is largely an inductive process, though some deductive processes are also utilized. Theoretical sampling is a key component of grounded theory. It is the process of returning to data points (the wiki, questionnaire, and focus group) while directed by evolving theoretical constructs.

Glaser and Strauss (1967) described the systematic stages of coding in grounded theory as follows:

1. Open: Develop categories.
2. Axial: Develop interconnections among the categories.
3. Selective: Build "story" that connects the categories producing a discursive set of theoretical propositions

In the open coding stage, I created categories from the wiki contributions until specific categories were saturated or no new categories emerged. Each category represents a unit of information based on what occurs in the wiki, whether they are events, happenings, or instances. As mentioned above, this stage involved creating categories and examining relationships (or properties) between and among categories.

In the axial coding stage, I created a coding paradigm or logic diagram, where I visually described central categories related to the phenomenon. I examined and named the categories that influence the phenomenon (also known as causal conditions) and the resultant actions or interactions (strategies) stemming from the central phenomenon. In addition, I described the conditions that influence the strategies and described the outcomes or consequences of the strategies for the phenomenon.

Finally, in the selective coding stage, I generated a narrative that tied the categories from the axial coding stage together. Here, I presented my generated hypotheses.

CHAPTER IV

RESULTS

The purpose of this study was to discover the relationships that exist between using a wiki to collaboratively prepare for an exam and student anxiety levels as measured by the English adaptation of the TAI–G. The TAI–G is an instrument that measures test anxiety levels with subscales including Worry, Emotionality, Interference, and Lack of Confidence. The study also explored the expression of student coping mechanisms as measured by the COPE in a collaborative test preparation wiki, and if those mechanisms remained consistent throughout a semester-long undergraduate class. The COPE is a self-report instrument that measures coping behaviors with subscales, including Active Coping, Planning, Seeking Instrumental Social Support, and Seeking Emotional Social Support.

Research Question Q1

Q1 What are the differences between self-reported pretest and posttest anxiety scores after using a wiki to collaboratively prepare for an exam?

The intent of the first question was to discover if any differences in mean values of test anxiety scores before and after using a wiki for exam preparation existed. Descriptive statistics for the TAI–G scores are shown in Table 1.

Table 1

Descriptive Statistics of Pretest and Posttest Anxiety Scales

Anxiety scale	*N*	Pretest *M*	Pretest *SD*	Posttest *M*	Posttest *SD*
Worry	32	29.20	5.26	30.38	5.34
Emotionality	32	18.03	5.14	17.97	5.96
Lack of Confidence	32	13.44	3.57	13.41	3.52
Interference	32	13.85	3.73	13.72	4.24

A valid result for a paired samples *t*-test requires that the following assumptions be met:

1. The data are independently sampled.
2. Data are normally distributed.
3. Variance within each of the populations is equal.

Equality of variance can be tested using Levene's test of homogeneity of variances. According to the results of this test, Worry $p = .867$, Emotionality $p = .486$, Lack of Confidence $p = .966$, and Interference $p = .894$; there is a lack of evidence that the variances were significantly different, and the assumption was not violated. Pretest and posttest scores for all four TAI–G scales were tested for normality. No extreme scores were detected in Q–Q plots, and the Shapiro-Wilk analysis resulted in $p > .05$ for all scores but the posttest results for the Worry scale ($p = .022$). However, *t*-tests are not

greatly affected by violations of the normality assumption. Participants responded to the instrument under equivalent conditions and did not interact with each other during the administration of the TAI–G. Therefore, the assumption of independent sampling appeared not to be violated.

A paired samples *t*-test was conducted to compare means of participant pretest and posttest TAI–G scores for each of the instrument's four scales (Worry, Emotionality, Lack of Confidence, and Interference). The overall alpha level was set at .05. There was no significant difference between pretest and posttest Worry scores, $t(-1.389) = 31$ ($p = .175$). There was no significant difference between pretest and posttest Emotionality scores, $t(.091) = 31$ ($p = .928$). There was no significant difference between pretest and posttest Lack of Confidence scores, $t(.083) = 31$ ($p = .934$). There was no significant difference between pretest and posttest Interference scores, $t(.185) = 31$ ($p = .854$). Contrary to what was predicted, no significant differences were found for any of the anxiety scores in this study.

Research Question Q2

Q2 What are the perceptions of an instructor after implementing an exam preparation wiki for an assessment class?

Class Fit to Activity

During a one-hour interview (see Appendix G), the instructor reported initial concern about the types of activity she usually integrates into her methods course and how the wiki activity challenged her usual mode of teaching it. Typically, students learn how to administer specific school-based assessments and interpret their results, and a lesser degree of focus is placed on assessing student textbook reading assignments. She commented:

> I still think that if I had a different type of course, it would be better for a different type of course than for this application course because it was so full of knowing how to do those formal assessments, which is a bigger part of the course than attending to the chapters. . . . That's what made me uncomfortable, because I knew this type of class comes from expertise and application more so than what's in the textbook.
>
> The students need the textbook for foundation, but it's not real. So they [the students] work with real assessments and they are responsible for giving them to students, or the children, so they have to put their hands on it . . . doing it requires feedback, it requires interaction, so it's more than posting a summary of the textbook information.
>
> One of the things that was of concern to me was that I did not want it to be the focus of the course. I didn't want it to taint the critical task in the course. However, it did take over a bigger presence than I wanted it to.

In sections of the same course before the instructor incorporated the wiki activity, the instructor had assigned textbook sections for the students to read. Class discussion followed, but the impetus was placed on the students to attend to the textbook content. Using the wiki added a layer of material to bring in to class content discussions. She stated:

> One of the things that I tried to do, and I did purposely do each week, refer to their wiki . . . look at their wiki before each class began. Each group. Because I had a morning class and an afternoon class and then I would tell them how they addressed it well in the wiki or if they did not address it at all.
>
> In the past, all the other times they had the chapter assignments and they're told to read . . . of course, when I'm doing my lecture I refer to what was in the chapter and the review notes in the chapter, tell them some important things to write down that was going to be on the exam or they were going to need to use it for the test. . . . In some semesters I gave them a study guide. I did not provide a study guide for the midterm or the exam this time around.

Experience

Prior to the semester in which the course took place, the instructor reported that she had a limited but negative experience using a wiki for a professional activity. She felt

that the previous experience might influence her students' impression of the activity, and said:

> I had a bias going in because I had a little experience with the wiki in a professional situation where we were trying to do some DOE [Department of Education] stuff and I didn't like it then so I went in not liking it and tried to really monitor my emotions when I spoke to the students.

Her professional development training prior to the class did little to change her first impression of wiki use, but she was willing to try and incorporate a wiki into her class. She stated:

> Although I had gone through training with CIRT [Center for Instruction & Research Technology], and we had done wikis, I was still mad from when I had done it before, but I tried to be open to it and I'm doing it now. I'm doing another course. I'm going to go through the certification course to be a master online teacher. And we've got wikis now, so it's like, okay, there must be something about these wikis I can use. It's different for me; still, it is still not my mode of interaction or communication with students.

Grading/Timing

The instructor reported that the amount of work the new wiki activity created for her was daunting, but she felt it was important to keep up with student contributions so that their performance would not decline. However, there were times when other course responsibilities drew her focus. She shared,

> The wiki added tremendously to my weekly workload. It took more time than I've had to spend on a component of the course that was not a major part of the course. I got behind where I hadn't graded three wikis. That's not good. I fell down after midterm, so probably week 10 through 12, I was delayed on giving them feedback and I didn't like that. And, I got behind because their critical tasks were due; they were needing additional time getting that remediated.

The instructor went on to describe how she assigned the wiki sections and how the students should work within the wiki:

> I put out a guide with about five or six chapters at a time to tell them which section they were responsible for and then, as you know, the links were up for

> those chapters so they could have worked on them at any time. However, the chapter we were discussing for the week—they had a week cycle—so the chapter we were discussing had to be finished by Sunday because we met on Monday so it had to be finished Sunday before the class met and talked about it. Monday they could start on the chapters for the week and by Sunday it needed to be complete with everybody putting their summary of information up. They could make comments afterwards so there was a component on the rubric where they could have made substantial comments. They had to make comments or edits to either their chapter section or someone else's section. So, if they added something Monday after we had the discussion that was fine.

Students had the opportunity to use the wiki for the midterm exam and the final, but the nature of the exams required the students to be aware of how to quickly find the information they needed for any of the given exam questions. The instructor described this:

> They had to put information up for the wiki as a way to help them study for the midterm or the final. The final is cumulative. So the process was if you had the wiki up and you got your wiki notes, then when the midterm comes and the final comes you could go back to those notes as a quick way. . . . Because the exams were online. So, it was obvious, they can use their notes or their text book, and of course, the wiki to go back and see if they can find the information to help them answer. So if they were familiar with the information, it wouldn't take them long to find it.

A trainer from a university professional development unit came to class to demonstrate how to add content and comments to the pre-created wiki pages in a hands-off session. Following the session, students still had difficulty with technical aspects of the wiki. This led the instructor to clarify what exactly she expected the students to accomplish:

> We went over the grading rubric, and after the first chapters of the wiki were graded, I got feedback from them suggesting what was clear and what wasn't clear on my expectations of how they should post and respond. And they wanted to negotiate the timeline, but I didn't negotiate the timeline because it was a certain timing when they were supposed to have it up. And they got penalized if they did it at the very last minute.

That class discussion led to the instructor making a suggestion about how the individual groups might handle the division of labor in their respective wiki sections. She shared:

> I made a suggestion that as a group they could decide how they wanted . . . how they could divvy it up. Here's your section. As a group decide. So there were up to five people in a group who were doing a section, so some groups divvyed up their sections; other groups, there were two people who did everything, or one person who did everything.

Some students used class discussions as material to enhance sections of the wiki, but most chose to abandon their previous sections and focus on new ones. The instructor stated, "After they had received their grade for it, they just went on to the next thing."

The instructor felt that some students did not see the wiki activity as valuable. Despite being a class requirement, some students either minimally contributed, or did not participate at all. Reasons varied from student to student:

> You know, I was disappointed in there were . . . I think I had . . . there were at least three who didn't participate consistently and maybe two who didn't participate at all. And they took that risk—that was 10% of their grade, but umm-m. I had a look at my evaluation comments. I saw the ratings which I thought I was going to be slammed on and my ratings were higher than I truly expected, but I haven't seen the comments. Students never seemed excited about it, they never mentioned it, it was just something they had to do. I was disappointed in the few students who just chose not to participate. In fact, I had one student who told me "I know I haven't done well." When I called them in for their critical task, some said, "I know I didn't do well in the wiki. You know, I know I got behind in the wiki." You know, it was more they just said they got behind in the wiki or they mentioned, "I'm not sure what to do in the wiki because by the time I got into it everybody had posted" or, "the only time I can get into it I've already lost points because I work on the weekend, blah, blah," and occasionally, "I'm taking 20 classes."

While the activity was designed to help prepare for the course exams, students appeared to benefit more from the wiki when relating it to other course assignments. This was an unexpected development. The instructor reported:

> For the application assignments they talked about it and they told me they were excited when they talked about it. When they did the midterm or the final, they didn't talk about those either. You know, it was like, "it's over," but the application assignments; yeah, they were excited about it.

Commenting in the wiki was expected, but sometimes it was difficult for the instructor to locate the comment when she was alerted to it by the assessment tool built in to the campus pack wiki. She shared:

> One major technical glitch was that sometimes students would post and their comment—comment in particular—and if they didn't stay on the link that was already created, and they created another one for the section it was hard finding it. And then when I graded, they'd come back and say, "You didn't see my stuff?" And one student, I never saw her stuff but it was there, so when I went to the assessment and looked at comments it would show that there was a comment, but I couldn't find it anywhere, and you know, I wanted to give them all the points they earned, but. . . . So that happened, maybe 5 times where I just could not find the comments.

After pages in the wiki had been created, most group members navigated to their assigned section and added content. However, in some cases, participants created pages for their assigned section outside of the expected pre-generated page. This made it harder to find the participant's content. The instructor stated, "That made it harder to follow. And then, fortunately, they'd come up and tell me 'I created another page, I don't know whether you saw it.'"

The instructor found the built-in assessment tool to be very useful while keeping up with student views, posts, edits, and comments. Because the wiki changed constantly, it was possible to overlook contributions. The assessment gave a quantified picture of each student's activity (see Figure 1).

Last View of Wiki	Total Pages Edited	Total Comments Initiated	Total Comments	Total Views	Total Revisions
11/24/2012 6:13 PM	28% (18/64)	1% (1/104)	3% (3/111)	5% (318/6070)	9% (55/585)
12/3/2012 2:56 PM	2% (1/64)	0% (0/104)	0% (0/111)	2% (128/6070)	1% (3/585)
11/30/2012 5:52 PM	19% (12/64)	6% (6/104)	5% (6/111)	3% (198/6070)	3% (19/585)
11/30/2012 5:56 PM	17% (11/64)	4% (4/104)	5% (5/111)	3% (181/6070)	3% (15/585)
12/1/2012 2:07 PM	39% (25/64)	6% (6/104)	5% (6/111)	6% (348/6070)	8% (45/585)
12/2/2012 8:38 PM	22% (14/64)	2% (2/104)	2% (2/111)	6% (373/6070)	5% (31/585)

Figure 1. Screen capture of campus pack wiki assessment statistics.

The instructor shared:

> I used that most. So, I would go to the wiki link, read it first, then look down and see if there were comments. Read it to get an overview, did they even cover the section, whether they decide to put in pictures or videos, they were really good with the graphics . . . I then looked at the comments and then I'd look at the history and go evaluate each student and compare what they added to their group's page, and then I'd go to assessment to see if I missed something and so that was helpful. But I did that every single chapter because otherwise I would probably have missed something.

In some cases, students would open the wiki editor and save without making changes. This created a page in the page history that took time from the instructor, because she spent time looking for a change in a page that was identical to the previous version of the page.

The instructor was able to recognize patterns of work in the wiki and how individual students seemed consistent with their pattern of work for class activity outside of the wiki. She shared:

> Well, the students who are good students, they . . . even they fizzled it out. But they did the best work on everything. You know, they were conscientious, they were timely. If they referred to the wiki, it was stay in the wiki. That was rare, but again, it was just unfortunate that most of the questions were about the application, so that's what they did, but those students who were poor students, they were poor in the wiki, they were poor on the quizzes, they were poor on the exams, they were poor on the tasks, they were not vocal, they needed more explicit and one-on-one time and so, they prevailed but they needed a lot of time. So, the wiki was one thing that, those who were poor, they probably tried to put something in so they could get some points because when they looked at the other assignments they knew they were going to be remediating them. They weren't sure how they

> were going to do on the exams, they only get one shot. Those who put good stuff in and explored outside of the book, they did well anyway.

Group Dynamics

One of the bigger challenges with the wiki implementation was how students worked with one another while adding content to their group's assigned sections. Some students posted their content almost immediately, after they knew which sections to populate, while others waited for days to post. This created tension about how individual grades would be assigned. She stated:

> Students would say, for example, "Janice [pseudonym] put everything up and I didn't have anything left for me. What do I do if all the information for that section is up?" And I reminded them, you can go to another section in the chapter and look at it, edit it or make a comment, an extensive or substantial comment to it and that will count. Then they got a little more savvy on making comments to other sections. So they started making sure they put a comment in. One student in particular came up and said, "I know you probably noticed that I did the whole page and my other team members, they come in on Sunday, or they come in on Monday or Tuesday." I said, "well their grades reflect that and yours don't, so don't worry about that part, just get it up." So that meant some sections were not wholesome. Some groups. . . . You know, they just put something up.

The group dynamics were such that the quality and quantity of the wiki declined throughout the semester. Rather than putting the textbook content in their own words, or simply iki. The instructor shared:

> You know, what was so interesting was that the wikis up front were so rich, like maybe the first three. And really, on the first one, shoot, one group there was probably like 80 something entries and that narrowed to like 10 entries by the time . . . you know, it was over and done. . . . And so, after the middle, the midterm, they just died. I asked them to paraphrase and not just copy exactly out of the book. Some did still, so I had to ding them on using the direct information and not paraphrasing and being lazy.

Other students who were frustrated by group partners' early posting chose to incorporate content outside of the textbook to increase their wiki grade, in lieu of editing existing wiki content. The instructor explained:

> They started trying to go outside the text and find stuff, because everything was already up there, so now what do we do?. . . . I thought that was a good thing and I kudo'ed [sic] them on it; good research, going out and finding something else. . . . And it helped when they chose different video links to see how they saw it and their perspective. Then when I started forcing them to give us some kind of overview of the link, that was helpful to see what they thought, why that was chosen.

The instructor was generally pleased with the accuracy of the student contributions, and had to address inaccuracies only three times. She shared:

> In the grading rubric, I would say, "No, not this," and that wasn't often. It was usually just so simple that I would wish they had put a little more information, but I would say "Remember our discussion in class? I just want to clarify that isn't the case." That may have happened three times.

If there were inaccurate entries, the instructor was confident that the errors were unintentional. However, students rarely returned to the wiki to correct erroneous or unacceptably brief information. She stated:

> They didn't take that chance. And, I guess that's why I read it because I didn't want them to just put up some stuff. They got their grading information, but did not fix their errors or omissions. . . . I didn't instruct them to and I didn't post anything within the wiki to say, "note, this isn't right." This means that . . . you know, I didn't go in and put anything in myself.

The few inconsistencies in the wiki did not cause a great deal of concern for the instructor or the students, because it was not the primary source of course content. In some cases, the instructor had the impression that students avoided using the wiki as a study tool because of structure issues and content external to the course such as web links and videos that caused confusion. She said,

> It was such a rare situation that the information was really erroneous, and like I said, I can recall once where a student referred to "in the wiki," so I can't really say that students missed test questions because of the wiki. You know, once they had started their wiki, and I had also put up a vocabulary quiz, and students said that the wiki didn't help with the vocabulary terms, when they went to look at their vocabulary terms in the wiki . . . cause, they could take this quiz . . . they had to take the quiz until they got 90% on it, so they could repeat . . . they had the

> opportunity to repeat the quiz, and so they kept getting more than three wrong—it was a 20 item quiz—so they kept getting more than three wrong and they would go to the wiki to find out what was the right answer, but they said when they looked at the wiki it was so confusing that it didn't help.

Pedagogical Changes in the Course

Because the wiki activity was unfamiliar to the instructor and new to her course, she had to make adjustments in class discussions and how she helped the students prepare for their midterm and final exam. In previous classes, she provided a study guide, but she felt that the wiki sufficiently supplanted that provided guide. The instructor was concerned that her previous poor experience with wiki use might be reflected while discussing wiki content, which may cause her students to develop a negative attitude toward the activity. She shared:

> It was new, and it was forced in. It got more presence than I wanted, but I wanted it to be important. I can't say it really changed how I taught the material. I just wanted to have it as an emphasis because they had to do it as any assignment. Like, I don't want any assignment to be a waste of time or perceived as a waste of time so I was trying to refer to it. It just got more presence than I wanted, and students never referred to it. You know, I always referred to it, the content of it. Well, I shouldn't say "never"—periodically, like even on an exam response, one student said "in the wiki," but that was rare. Or in discussion, a student would say that. And, I also would bring the wiki up when I was teaching a chapter; particularly in the beginning I tried to reinforce it.

In some cases, the instructor would find helpful material in the wiki while she reviewed it prior to class. In those cases, she brought the wiki up on the classroom projector screen, and incorporated it into the class discussion. She described:

> I would bring it up on the screen, and I would say, you know, "whatever group had this section" whenever I would ask them, "Remember you said blah-blah" they would blank. They wouldn't know. . . . So I would pull it up and say "Here . . ." and they would say, "oh, wow." "This was a really good example, thank you for putting this up. You all should go back to the wiki and look at that when you get a chance. This was a really good example" and then try to make them elaborate on it. So that was why, like I said, before teaching each course, each section, I would try to read what they said as the chapter review. That would give me some

> kind of idea what they knew; whenever they posted it or whatever they found and thought was important and then try to incorporate it in my teaching.

Future Implications

While the instructor plans on using wiki activities in future courses, she remains convinced that the activity is not a good fit for the design of her assessment course. The way she would integrate the activity in the future would also change, from the initial training activity including a hands-on component, to the division of group labor. Because the grading rubric helped streamline her grading process, she would utilize similar rubrics for wiki activities in future classes. She shared:

> I'd definitely use a grading rubric. I probably would have . . . again, if I were to use it in an assessment course, which I won't, I would probably have a practice. I would have them all on the computer doing something. I would have a practice chapter reading or something that I would say, "Let's do it and see." You know, so I would use a class to do that and then I would also require that they divvy up the parts of the sections that they had to do within the chapter. So, they needed guidance on that, you know and they wouldn't respond to each other when one would ask, "You going to put something up?" so it's almost like . . . I hate that you know because it's supposed to be . . . I wanted it to be more voluntary, even though they had a grade.

The instructor reflected on her students' motivation to post helpful information for other students in the class and wondered if another evaluation process may encourage the students to take the activity more seriously. That evaluation would incorporate a peer review, which would be facilitated by a clear delineation of labor for every assigned section. The instructor explained:

> So what I have found to work, whether it was genuine or not, is when they had something to do like a peer evaluation at the end for each person's level of participation. I would do it with the chapter readings—they would have to do a peer evaluation and a peer evaluation plays into the grades, and the final grade isn't done until your peers have rated you and this is your score. And it's a form of assessment so I guess it's self-assessed. I would have the material and have them do it and then have a peer component. I mean, make them divvy up tasks; look at

> it and then divvy up tasks, tell me who's going to do what, and then have a peer component so they could stomach how to go through that.

In cases where groups self-assigned portions of their weekly section, there was less frustration and a better overall group submission, both for wiki content and timeliness of posting and editing. The way the groups communicated their labor divisions to one another changed throughout the semester, but that communication had an influence on the facilitation of the division of labor in the wiki sections. The instructor elaborated:

> Their sections were stronger and they were up and completed earlier. They already knew what they were going to do, and some, in the comments—I don't know if you noticed it—maybe the first few chapters in the comments was posted who people assigned this. They posted down who was going to do what. And, you know, they may have been doing it so I can see, but I still could see it. They probably were saying, "The researcher was responsible for this." And that was why that was like that. I don't know, but one group in particular, down in the comments section to start the group off, you know, somebody may have outlined it, or they put down "here's what you said you were going to do." But, it didn't continue throughout the semester. So I don't know if they . . . I saw them in class talking.

The instructor also felt that changing the due dates of the assignments so that her students were more familiar and comfortable with the content they were responsible for posting would be useful. Rather than trusting themselves to post accurate summaries of the textbook material without prior exposure to the material, students would discuss the content first in class, and then add their assigned content to the wiki.

> I guess my thing is I just didn't like . . . I don't like relying on the text like that. But then you have to look at the content and see if it's worthy. You know, it would be a challenge because I like them to talk about the other resources too, so it almost would be post discussion, then they post up their summary and thoughts of what they learned instead of prior because I just haven't had evidence that many students have the time to read prior to the class or the language is so new that it doesn't make sense until they hear it and then go, "Oh!" So, many students have told me they read after the lectures.

In addition to changing when the students posted, the instructor also felt that assigning topics rather than chapters would give students the opportunity to seek out supplemental sources for their contributions. She elaborated:

> So, they look at whatever resources were shared in the class, they would be encouraged to go out and get other resources, and also look at the chapter. But, the book would not be the driving force for how they put their notes, because it's not all that. . . . So, it's almost like a check of their understanding. And then, you know, I guess the rubric would have to be a little different, because their understanding, that's one thing versus how factual is the information and all of that. But, the rubric would have to change because it really would be trying to mold them into putting notes that will be good study notes.

Without changing when assignments were due, providing guidelines on how groups were to work on content, and how the wiki would be facilitated (such as adding more class time for discussion of wiki entries), the instructor ultimately felt that students would not participate if the assignment were voluntary. She reported:

> And to say, would they have used it if it was an option?. . . . I believe it would be no. I really do. Somehow they would have to get value from it, and that would be, "okay, they didn't have to do it, but if you show evidence that you used it on the midterm or the final or whatever, quiz, document evidence from the wiki" make them go back, do something like that and make it a big nice little piece of the pie on an exam, perhaps.

In summary, the instructor recognized the potential of the wiki as a study tool, but had reservations about using the wiki in an application course. In courses that fall into the lower tiers of the cognitive spectrum (knowledge and comprehension), the wiki could be beneficial. Even in these types of courses, the success of the wiki activity might be influenced by available technical support, clear group work guidelines, group dynamics, and meaningful instructor feedback.

Research Question Q3

Q3 What are the perceptions of students after using an exam preparation wiki for a pre-service teacher preparation course?

Questionnaire

Thirty-four participants responded to an end-of-semester Likert-type questionnaire prior to taking their course final exam. The questionnaire was intended to capture the participants' impression of the wiki activity and asked questions regarding attending to course content, test preparation, and communication. The questionnaire also included items that did not fall into these categories. These data for these items and for those in the three categories are described in Table 2.

Participants were roughly split when responding to Question 1, "I liked working in the wiki to prepare for the final exam," where 4 participants strongly disagreed, 15 disagreed, 14 agreed, and 1 participant strongly agreed. Whether participants liked or disliked the wiki activity, responses were generally more favorable when responding to Question 4, "I contributed my fair share to the wiki," where 14 participants strongly agreed, 14 agreed, 4 disagreed, and 2 strongly disagreed. These results are interesting when compared to Question 10, "Adding content to the wiki was easy," where 6 participants strongly disagreed, 16 disagreed, and 12 agreed. What the participants liked or disliked about the wiki, what they thought was a fair contribution, and what made adding content to the wiki was not revealed by the questionnaire.

Table 2

Questionnaire Response Frequencies

Item	Strongly disagree %	Disagree %	Agree %	Strongly agree %
I liked working in the wiki to prepare for the final exam.	11.8	44.1	41.2	2.9
Preparing for the final exam in the wiki helped me keep up with the information in the class textbook.	8.8	29.4	55.9	5.9
I would have waited longer to study for the final exam if I had not been assigned to work in the wiki.	5.9	44.1	44.1	5.9
I contributed my fair share to the wiki.	5.9	11.8	41.2	41.2
I would recommend using a wiki to help students prepare for final exams to other instructors.	11.8	35.3	50.	2.9
I would have been more anxious about the test if I had not used the wiki to prepare for it.	17.6	52.9	29.4	
Other students' contributions to the wiki helped me prepare for the exam.	5.9	41.2	47.1	5.9
The wiki commenting feature helped me communicate with other students in the class.	14.7	23.5	55.9	5.9
I felt connected to other classmates when working in the wiki.	14.7	52.9	29.4	2.9
Adding content to the wiki was easy.	17.6	47.1	35.3	

The intent of the wiki activity was to have students collaboratively prepare for the course final exam. To achieve this, the students had to attend to the course content prior to adding that content to the wiki. The majority of the information posted in the wiki came from the course textbook, but some students added content from other sources to elaborate on content and provide real-world examples of the assessments the students learned about in the course. To learn more about attending to course content, participants were asked to respond to the following items shown in quotes.

"Preparing for the final exam in the wiki helped me keep up with the information in the class textbook." Two participants strongly agreed, 19 agreed, 10 disagreed, and 3 strongly disagreed. "I would have waited longer to study for the final exam if I had not been assigned to work in the wiki." Two participants strongly disagreed, 15 disagreed, 15 agreed, and 2 participants strongly agreed.

The researcher anticipated that students in the class would benefit from the wiki activity because they would essentially be studying prior to adding content to the wiki, while adding content to the wiki, and while editing other's contributions. The activity replaced the instructor's expectation that the students should simply read the required text before class discussions. To learn more about test preparation for the course, participants were asked to respond to the following items shown in quotes.

Despite the expectation of elevated course content interaction and the potential academic benefits of the wiki activity, participants were roughly split when responding to Question 5, "I would recommend using a wiki to help students prepare for final exams to other instructors," where 4 participants strongly disagreed, 12 disagreed, 17 agreed, and 1 participant strongly agreed. While the researcher anticipated that the wiki activity would

help students keep up with course content and possibly reduce the amount of anxiety the students had regarding the final exam, participant responses were generally not favorable when responding to Question 6, "I would have been more anxious about the test if I had not used the wiki to prepare for it," where 6 participants strongly disagreed, 18 disagreed, and 10 agreed. Student life experiences, viewpoints, and skills make a diverse class structure that students could capitalize on when preparing for an exam. While one student may not accurately interpret or internalize knowledge, concepts, and procedures encountered in the course, others may fully understand and accurately apply course content in real-world situations. Class diversity, then, should be beneficial when collaborating on common content. However, participants were roughly split when responding to Question 7, "Other student's contributions to the wiki helped me prepare for the exam," where 2 participants strongly disagreed, 14 disagreed, 16 agreed, and 2 participants strongly agreed.

To collaborate, group members must communicate with one another while generating content for the wiki. That communication could occur in a number of ways, but many used the wiki commenting feature to communicate expectations and information regarding weekly entries. As such, participants were generally more favorable when responding to Question 8, "The wiki commenting feature helped me communicate with other students in the class," where 2 participants strongly agreed, 19 agreed, 8 disagreed, and 5 strongly disagreed. While it would seem logical that the communication and collaboration that occurred in the wiki would serve to build collegiality among the participants, their responses were generally not favorable when responding to Question 9,

"I felt connected to other classmates when working in the wiki," where 5 participants strongly disagreed, 18 disagreed, 10 agreed, and 1 strongly agreed.

Focus Group

A word cloud was created from the transcript of the focus group session (see Figure 2). The entire transcript was imported into a word cloud generator, which then created the word cloud based on high-frequency words, some of which emerged as themes:

Figure 2. Word cloud generated with focus group transcription.

The hour-long focus group included nine participants. The transcript was reviewed for emerging themes. The following includes those themes along with substantiating statements.

Instructor Feedback

During the course of the focus group session, participants indicated that they felt the wiki activity would have gone more smoothly and would have had more value as a study tool if the instructor had been an active participant in the wiki. Students seemed frustrated by not knowing how accurate their contributions were. A participant stated, "It would have been nice if the instructor would have gone in and said 'Yes, they are right' or 'not quite, it's more like this' or something, just to get some feedback." While another reported, "We needed more clear, clear expectations of what this was. There were no . . . nothing clear." Another said, "When we got it back, it was just like a score." Another reported, "She would just say 'elaborate on your edit' and that would be all she would say; she wouldn't say what we did correctly or incorrectly."

While the participants hoped for more feedback from the instructor, where that feedback would occur did not seem as important as the feedback itself. Some students were accepting of the wiki rubric as a medium for feedback, while others hoped for feedback during instructional time, "I wish she would have discussed in class."

Although participants were frustrated with the amount and quality of the feedback, they did seem to recognize the potential benefit of the activity. A participant shared:

> With more support and feedback from the instructor this would have been an amazing thing to even have in this class if we would have had better support and more feedback on what was expected, what she wanted, and everything between.

While another participant reported:

> I think this is always coming back to the lack of support we had. This is a great tool that was handed to us but with lack of support and feedback on understanding what we needed to do, so it was a great idea, but it wasn't able to be followed through correctly.

Despite the potential of the great/amazing activity, the level of support offered was discouraging enough to foster high levels of apathy. One participant stated, "I basically just stopped caring. If you don't care, I'm not going to care."

Instructor Intervention

Similar to the previous theme of wanting more participation or feedback from the instructor, several participants explained that they wanted the instructor to take an active role in editing their entries, rather than trust their classmates to post accurate and reliable content, or edit erroneous or misleading content. The opinions on this theme ranged from a teacher-centered approach, "I wish she would have just gone in and erased if something was wrong," to a more inclusive one, where student contributions would essentially receive the instructor's content blessing. A participant stated:

> I think that if the teacher could go into the wiki and do an overall summary at the end after we've all gotten our grade and everything and just like write it in red and that way everybody could see what the importance was in all of the section. She wouldn't even have to write it herself. Like she could take the top best 10 from people.

Instructor Experience Level

Focus group members were aware that the wiki activity was the first she had used in one of her own classes, and that her experience with the technology and management of virtual group members was limited. That lack of experience caused some participants to doubt the ability of the instructor to provide technical support. A participant shared:

> She was new too so it was a new learning experience for her too. I think that before a professor used it, they should have proper training on the wiki before it begins and that way when we do have trouble we have a source to go to then when it actually came up to it, there was no support from our professor.

Some felt that the newness of the activity also affected the instructor's ability to keep up with the wiki: "I think it makes more work for the professor" and to fairly grade student contributions. A participant voiced this concern:

> The professor should have had more training, because, to be fair, this was her first time using a wiki as well. So before a professor puts this into the classroom, they should have a training seminar, or maybe two or three or whatever it takes just so that they are more familiar with the wiki so they can help us with all our questions and have a better idea how to grade it.

Others noticed lapses in grading turnaround. "Yeah, she was definitely behind because we didn't see grades for weeks and then all of a sudden we would have six of them."

Group Dynamics and Roles

Students were assigned to groups that included three to five people. Each group was tasked with populating specific sections in the wiki that covered specific textbook chapter sections. It then became the group's responsibility to plan the division of labor for each assigned section. Some groups handled the responsibility well. A participant reported:

> In our group, we got our information and emails and stuff so eventually I was the one who organized, "Okay, so, so-and-so is doing this part in the chapter." And I just went in and "Okay, you have this and I have this and another person has this," so that everything was included—And everything was covered. We covered the entire chapter every time because we broke it up.

Group organizers were largely satisfied with the process they had put into place. One of those organizers shared:

> Because it was already broken up, we didn't feel overwhelmed, like, "oh my gosh. I have to fit all of this in here." Alright, so I did my part and we ended up having this really great wiki over the whole chapter because it was already broken up for us into four parts or five parts.

And group members who had such leaders appreciated the difference it made, including this participant, who stated:

> Yeah, I support the group thing, as much as actually I dislike this whole thing. I support the group thing, I feel like if we would have like we did towards the end where the groups started breaking up the chapters equally, kind of like the way your group did and the way my group started doing that a lot too, and then we could submit that to the teacher and be like, "this is my section, and this is her section." That way, if your section got taken it wasn't your fault. Because, once everything has been written you get points off because you can't . . . there's not anything left to write so you don't get any points. You feel like that person just stole your points from you. So I feel like if there was that safety there. If there was just some way to keep you safe, to where you feel like your points aren't going to be taken from you, which sometimes it happens in class then it would have been a better experience.

However, the process seemed to make some group organizers anxious. "That was a little stressful for us because I had to make sure that everything I gave somebody was an equal amount. But, it was broken up pretty good."

In some cases, group members did not work well together, and became divided into the workers and the free riders. "So I think in general in college there are times when you're going to be a leader and sometimes you're going to need someone to save your butt!" and "Well, there were two other people who never did anything."

Division of labor had been an issue with several of the participants, who had bad experiences working in groups. "In other classes, I've gotten into group projects where it was me and one other person, and I said I'll do everything, just e-mail me your name and that's about it."

Organization of group labor did help to clarify roles in some groups, but in others those roles emerged out of the need to complete the assignment and get a good grade. Some posted the initial content, then others edited that either with text formatting, such as bolding and bulleting. A participant expressed:

> People within a group broke the chapter into sections. They headed it and it wasn't just paragraph after paragraph and you have to try to figure out what does this apply to within the chapter? A couple of the sections that people did they bolded each part and then they discussed each bullet point and that was so much more helpful than just reading a bunch of paragraphs.

Another participant agreed that the edits and chunking of the textbook information made it easier to digest and comprehend. She went on to say:

> In my class, there wasn't [sic] a lot of paragraph chunks of information. There was a lot of bulleted, summarized, put it in your own words kind of information which I found beneficial because I could read it in the text book and then go to theirs and think, "Oh, that makes sense" or watch the YouTube video, or whatever resources they brought in.

A theme about concern surrounding editing other students' contributions emerged. That concern showed up in the wiki comment section, where some participants who did not want to hurt other's feelings added content that ideally would have been placed in the wiki content area. A participant stated:

> Instead of having the edits, having a comments section would have been better, because like I know doing discussion board, you have to write this and then post about this and then write two comments like we have in some of our other classes and I feel like the comments they force you to read other people's work so then you're getting the information from other people's work. So I feel like that is so much better than me being able to comment on someone else's work and more comfortable than me going in and saying, "your work's not good enough. I'm going to change it for you."

Some told others in the comment section what they planned to do, and then did it "I would just put in the comments, 'You left this little section out' and then type up that little section and put it in the comments instead of going in and changing somebody else's wiki."

Others felt that it was the instructor's responsibility to point out errors or omissions in the wiki pages. A student commented:

> Everyone has pride in their work and you don't want to hurt somebody's pride or make them self-conscious because they spelled one thing wrong. I mean, if there's a misspelling, let the teacher correct it. I don't feel like my peers should correct it.

When one participant expressed her concerns about how the group was to address wiki assignments to the instructor, she reported this interaction:

> I was like, I would write my first paragraph, and that's it? And she was like "yeah. Your group is supposed to come along and add collaboratively and add more stuff." But I didn't even know Jane [pseudonym] was in my group. I didn't know her name. I mean, I knew she was in my class, but that's about it.

Another participant reported being left out of group assignments:

> For mine . . . I wasn't even in a group for the first three weeks. She never included me in a group, so she just like stuck me in a group the last minute. So I was just like, "well, I'll just post in this group instead because I don't really know where I'm posting." So I didn't even do it after a couple of weeks because like every group I was put in one person was always filling everything, so I was like what am I supposed to put now? So there's nothing for me to really put in there because I'll just be repeating what someone else said so I don't want to repeat what someone else said because that's pretty much doing nothing.

Some students had trouble because their group members were eager to get in the wiki and finish their section, often leaving those who got into the wiki later uncertain about how to contribute. A frustrated participant shared:

> It kind of got to the point that you're not adding the information, you're not looking for the information to learn it, you're looking for it for what you can add that hasn't been added yet. You're not reading to learn, you're just like "they didn't add this part, I'll just type it in." I think it could be really beneficial for like an online course, like a hybrid course.

Contribution Motivation

Because the wiki activity was mandatory in the course, students used the grade they might receive for participation as a primary source of motivation to contribute. Some added original chapter content, some added external content, edits, and comments. One participant padded his contributions in this way:

> That's a little trick thing—the more you post, the better you look to the teacher. She sees percentage, sees my name, says, "Okay, good work. He's all over the place. Good percentage. Next wiki grade." Because I'm sure professors do that too. I'm sure they want to rush through this thing too. Because they have to grade it.

Some students felt personally responsible to make sure the wiki was a good study tool for everyone and took it upon themselves to go above and beyond the assignment requirements, "So I would look at it close to the time we had class and there would be this whole big section of the chapter missing so I would just put it in so that people would have that information."

Another student shared the sentiment, "You would post a little bit, so then I would go ahead and finish out the chapter because if people are using this for their study guide, then it needs to be in there." A different participant summed up the group dynamic phenomenon with this:

> In a class, you're always going to have a mixed pod. You are going to have people in the class who are there for seriousness, and then you are going to have the people that are just in college because they think they need to be there. So I think that's something that the teacher or any of us don't have any control over. If you're going to make an assignment, you're going to have people who take it very seriously, and give you these beautiful pieces of work that you can use. And then you're going to have people that are literally just doing the bare minimum just to say they did it so they can get the points so they don't fail the class.

Wiki Structure

The instructor had a specific scope and sequence for her class, which did not follow the scope and sequence of the course textbook. Instead of following chapters numerically, she mixed up the order in which the class addressed the textbook chapters in the wiki. That organization translated into a navigation panel that was not sequentially ordered. That order caused some confusion, in addition to students erroneously creating new chapter sections instead of populating the pre-made sections. "I had trouble

navigating to that wiki when I wanted to look up information, like studying for the midterm. I was like, "this was chapter two . . . two would be up here and two would be down here and chapter three would be in between."

Supplemental Material in Wiki

Students were expected to summarize their chapter sections in the wiki, but others added supplementary information to their sections, either because the necessary chapter content was already in place, or because the students felt that the class would understand the section content better with the supplementary content. In some cases, this was counterproductive ("you are honestly confusing me more"), but others took a more pragmatic view ("I don't know about anybody else, but I can't just read something and go 'Oh I got it,' I have to like hear it or see someone do it, so halfway through the class I started looking up YouTube stuff and putting that in the wikis") and ("people put it in layman's terms").

Wiki as Supplement or Primary Information Source

Trust issues emerged during the focus group session. The lack of trust was directed either at other students and their ability to accurately summarize chapter content, or at external resources in the wiki, including the numerous videos ("Are they giving you the correct information on YouTube?") Some immediately associated the course wiki with *Wikipedia* and took the activity less seriously as a result ("I think of *Wikipedia* right away and being trained in high school where your teachers said 'if you use *Wikipedia*, it's not going to be valid.'") However, some chose to ignore their concerns and instead relied on the wiki entries for class, "I stopped reading the book after the wikis started coming out and that was bad, because I rely on somebody else's accuracy to do it." Others

realized that a certain degree of personal responsibility would insure that they could recognize inaccurate or incomplete wiki information, “I would still say I would advocate for some group work but I wouldn’t take my group’s words on the wiki for law. I would-n’t honestly say ‘that’s absolutely true’—no, I would probably check it for myself.”

In some cases, the quality and usefulness of contributions in the wiki was questioned because of errors that could have been easily avoided, such as frequent spelling errors, “That’s what I wish more people in my class would have done, [use spell check] because I stopped taking people seriously when they kept spelling assessment wrong.”

Some students were unsure about their ability to add accurate and reliable information to the wiki. A student commented: “And I didn’t want . . . like I’m dumb. I didn’t want my interpretation of what I read to be out there and be wrong and it affects someone else’s grade. So, I don’t want to bring everybody else down.” That self-doubt led some to take information verbatim from the textbook rather than summarize it. One of those participants stated:

> I felt like posting it from the text book was more useful because that’s what I had problems with. I didn’t want to contribute something and have it be my interpretation and have it be wrong, so I just copied the text book.

Identification of Author

The names of students who contributed to the wiki appeared in a section of the wiki that showed the most recent wiki updates, and in the history feature of the wiki, but not within the content pages. This lack of author identity caused concern for some, including the participant who commented:

> We had that way of checking to see who wrote what and I felt like that was okay but I felt like if it had been in the actual wiki our name would have been tagged in

> some way that way, like I feel like you would be more credible, like people sitting at this table because we all obviously care about our grade or we wouldn't be here giving our opinion to you. I find you more credible than I would find the person who maybe posted every once in a while more credible. So I would take your information a little bit more serious when I write it than I would somebody else's. And that's why I kind of liked the comments section, because I knew I was talking to you. I knew you, I knew your face, I knew you from class, and I knew how credible your discussion was so I built off of that and I felt more confident in our information.

Communication In and Out of Wiki/Comments

Students communicated about content or technical concerns both in and out of the wiki. When communication took place in the wiki, it occurred primarily in the comment section, with good results. A student shared:

> Like towards the end, I started talking to people, other students within it. Like you would say something and then I would comment on what you said within your wiki, and I felt like that was really beneficial, being able to kind of bounce back from each other because it was like a mode of communication with my class-mates.

However, students did take advantage of their weekly class time to speak in person with their classmates for support, "As far as IT [information technology] support in my class, the people I sat with, we are so close. We are like all buddies now, umm, I was the IT support." Another participant reiterated with this:

> Hey, how do we upload the link? How do we add the videos so that it actually comes up? Just for that table. I don't know how any of the other 4/5ths of the class did, but for anything like that they came to me. And I had experience with it prior, so it came easy to me I guess.

Other communication dealt with productivity issues, "No one really talked to me about the wiki, except 'oh man, I forgot to do the wiki' and I got a lot of 'hey, is some-thing due this week?"'

More Ideal Class Formats for Wiki

Participants had definite opinions about how the wiki activity could have been improved. Some reiterated their desire to have groups take quizzes based on the wiki content. For instance, "five of you are going to write about this chapter, then you are going to create the quiz, and the rest of the class is going to answer" or, "a little quiz for it that would force me to still read the book or take the information from there."

Some of the participants wished for bonus points for either editing their own sections or other sections the week after submissions were due. One of those participants commented:

> I think there should have been an edit section, so that after the wiki was done for the next week, maybe you could have gotten some bonus points if you go into the previous wiki and then add some additional information from the class discussion. I think that could have been a better tool for someone else to edit misinformation from the last week. That way you are motivated for bonus points to go back and add more information and you're not stepping on someone else's toes or ruining their work.

Another participant felt that the activity would work better for her if individuals were assigned to his or her own private wiki. She stated:

> If we each had our own type of individual wiki, and we had each chapter that we had to read ourselves and include a little part, and then it was due by the midterm, that would make each of us read each chapter in the book, that would make us have our own study guide that we created ourselves and were graded upon rather than collaboration with all these other group members who we don't know if they posted the right information.

General Opinion

Participants had the opportunity to sum up their opinions about the wiki activity toward the end of the session. Those opinions were divided. Some saw merit in the wiki, "It has great potential to do some stuff. I would love to have this in a math class."

Another person agreed, "I would love to see this in my language development class. Oh

my goodness, this would have been so beneficial for language development class. This would have been a great thing to have had. Great support." A participant added, "I did like, however, that the wiki made me read the chapter. That was the beneficial part." Others shared a more negative attitude, including a participant who voiced:

> I hated the whole thing. I was one that didn't post anything. I started to in the beginning trying to figure where in our group would post stuff and I tried to figure out what to put and then it got to where, I hate going on Blackboard to begin with and the fact that I had to go out of my way to put this stuff in that I knew I was never going to use. I'm like, write it on note cards and study it, I'm not going to go on the computer and look at it. I felt bad because I wasn't contributing but at the same time. . . . Like, I did maybe the first two weeks and then trying to figure out what to post out of three sentences that weren't covered, I'm like, I don't know how to, . . . so I just gave up on it. I totally bailed on it, and it was really frustrating. I did not like it at all. Like I said, I'm more of a write on note cards, and do it yourself, for yourself.

Another student agreed: "Pure busy work. Like how she [another participant] talked about giving a chapter and then doing a quiz off of what they put on there. Making it useful for a reason, not just well, we want you to post and we hope you use it." The issue of collaboration resurfaced, with a similar dichotomy. A participant stated:

> I hate collaboration. I am not a good group worker; I don't like depending on other people cause I see things completely different than someone to say; I have a complete different learning style than everyone else and everyone else is wrong so to me the whole idea was unbeneficial if you are talking in terms of using the wiki as a study guide.

Another participant responded, "I think there is someone in the group that can give you an idea, like 'I didn't think of that.'" The session concluded with a participant's closing summary:

> It is a really great idea and it's easy to navigate. It's a great system. You know, the editing, and the being able to post and everything like that. The system and the program itself were great, and I have to applaud you for that. I think that we all do. It's just that the application was something that you were not in control of.

Research Question Q4

Q4 How do students use a wiki for exam preparation?

The wiki was initially created by the instructor and researcher. Chapter pages were created in the order that the chapters were discussed in class. Each chapter was broken into several sections, and pages were created under the chapter heading as placeholders for student content. After the placeholders were created, the instructor posted a document in the learning management system that detailed student group assignments. Those groups were assigned chapters sections to cover. However, it fell upon the group members to decide how to complete the group task (see Table 3).

The instructor posted three of these group assignment documents in Blackboard, which outlined the chapter sections for 10 chapters. Students were expected to read chapter content and begin posting content on the Sunday before class the next day. Groups had until Wednesday of the same week to complete their sections. This allowed the students to incorporate class lecture into their sections. (No lecture on chapter content occurred prior to the day students were expected to begin summarizing chapter content).

Table 3

Intellectual Performances and Adaptive Behavior Student Group Assignments

Group	Topic area
1	Considerations in Assessment of Learning Aptitude [Student names]
2	Sources of Information About Learning Aptitude [Student names]
3	Group Tests of Intellectual Performance AND Wechsler Intelligence Scale for Children-Fourth Edition [Student names]
4	Woodcock-Johnson III Tests of Cognitive Abilities and Woodcock-Johnson III Normative Update [Student names]
5	Adaptive Behavior Measures AND Other Adaptive Behavior [Student names]

Some groups were more cohesive than others, and those groups planned, either in the wiki comment sections or in person, how to best develop their assigned sections. Other groups took a less collaborative approach, and developed their assigned sections independently. In these cases, strong initial posters emerged, followed by others who were not as quick to post chapter content. The latecomers either edited formatting or added supplementary content such as images, links, and videos, as the chapter summary content was accurate and mostly complete. In some cases, students elected to not

participate in the wiki. This not only cost the students 10% of their final grade, but also left some groups short a partner.

Strong differences about the look and use of the content area and the comment area emerged between the two classes that comprised the participant group. Both classes developed chapter summary information in the content area, and organized that information with bulleted and numbered lists, with some narrative throughout. Additional material such as images or videos served as supplemental material to add clarification or break up the sections (see Table 4). In some cases, the additional material served to add levity to an otherwise dry or emotionally charged section. Both classes sought answers or clarification roughly equally to one another in the comment area.

Table 4

Wiki Content Types

Content type	Group A	Group B
Images	10	85
Links to external resources	26	49
Videos	23	49
Documents (PDF, .DOCX, .PPTX)	0	17

One class was generous in the use of color and font types and sizes. The class also placed many videos, images, links, and documents (including Word documents, Portable

Document Formats [PDFs], and PowerPoint files) throughout their wiki. The comment section was used by this class to extensively post praise and affirmative statements for their partners and to provide answers and guidance (see Table 5).

The other class took a different approach to populating the wiki in several ways. One of the biggest differences with this group was the use of consistent font color (black) and font family and size (Arial—the default font with default size of 12). This class did not insert as many videos, images, or links. They did not add any documents to their wiki. The comment section for this class was notably different because much material that could have been added in the content area was placed in the comment area. In addition, the comment area was used substantially more for planning on how to address section content.

The following is a summary of participant responses to open-ended questions in a questionnaire that was administered at the end of the semester, prior to the final exam. Several themes emerged for each of the three questions.

Table 5

Wiki Comment Themes

Theme (total)	Example
Praise/Affirmation (144)	– I like the Norm vs. Criterion Referenced Tests video! It was very informative and I liked the illustrations used in the video as well. – This has some great information. It will be very helpful when studying. – I like the way you title each specific area, it helps me stay focused in what I am learning. – I can't wait to use this to study with. – This is very easy to follow and it gives great examples. Definitely a good study tool. – Your information was very appealing to the eye. The format made me want to read the information you provided. – The pictures really help create a better understanding of the subject matter. Thanks for them!
Providing answers/guidance (111)	– I feel it's important for professionals to not only build trust but maintain that trust. I have seen a professional lose the trust of other professionals, students, parents, and I feel it would be impossible to earn it back. – Your hyperlink did not work, so I went in and fixed it for you. I like the source, it's good to have an idea of where educators can go to get more information. – The link provided for creating rubrics can be useful to teachers. Providing students with a rubric gives clear expectations of what the assignment should entail. It not only serves purpose for portfolio assessment as mentioned in the wiki, but it can be used for projects, essays, science experiments and many other assignments, Although it takes time to create a rubric, it is worth it in the end for both the teacher and the student.

(Table continues)

Table 5 (continued)

Theme (total)	Example
Seeking answers/guidance (18)	– After reading this, the one thing I learned is that the word "test" should be avoided because students may associate that word with past failures. This is something that I would agree with because as students when we hear the word test it does build a certain level of anxiety. However, if we can't use the word test then what word should we use? – There was a video posted on here, but it wasn't working so I took it off, there is still an area there for a video to be placed if someone would like to try and re-upload the video. – I'm so bad with posting these videos. They never work when I put them up.
Planning (12)	– D: Discuss the strategies Communication and Commitment – K: Discuss the strategies Equality and Skills – A: Discuss the strategies Trust and Respect – J: Non-examples/how not to for each of the above mentioned strategies – I changed the outline of the section so that it is easier to comprehend and goes along with the book a little better. Hope this works for everyone

Note. Some comments fell in to more than one theme. Generally, those comments included praise and answers/guidance. For example, "There is a third hearing loss video which is called a mixed hearing loss which is a little bit of each. It mentions it in the video, but it is not posted in the description. Great video choices!"

How did you use the wiki? Participants used the wiki in multiple ways during the course of the study. Many reported that they worked in the wiki primarily for a grade. Some described the activity as just another assignment, "Per the instruction of the instructor.

Posting an outline/summarization of the info in my assigned section per chapter plus commenting or supplementing my peer's info," or "I simply used the wiki to complete the assigned wiki task for a grade. Other than that, I did not use the wiki." Some students volunteered why they saw the wiki only as an assignment. The following is a summary of the comments:

> I used the wiki when I needed to add information for a grade. I did not use it for the exam. People always leave out information, and I cannot rely on the wiki for specific answers to test. It is very broad when people add their information.
>
> As an assignment that warranted a grade in the class. Did not seem efficient for study use, material added was too varied from the book information.
>
> I used it for class assignment. I didn't find it too helpful while preparing for the test. There was way too much additional info.
>
> I tried to read the wiki to further clarify what I learned in the chapter, however it felt like a big mess and confused me further.

A student described her method of addressing the assignment; "By first reading through the other student's work to see if anything needed to be added, and then going in and doing my section of the material."

Most students reported using the wiki to study for the final exam: "We used the wiki in our class to post important and detailed information about each chapter," and "Basically the wiki was used as a study tool." Some described how they used the wiki as a study tool, including, "I copied my items from Microsoft Word. This was much easier but editing afterwards was difficult at times, although I eventually got the hang of it." As well as, "Copy and paste a lot of information for study sheets," and "Read my section, summarized it in a Word document and pasted it in wiki. Also used it for review."

Some students reported that they reviewed the wiki entries rather than the textbook when pressed for time, "Study, or if couldn't read that week, reviewed the wiki."

Other students reported working in the wiki minimally as an assignment or a study tool, such as the participant who wrote:

> Honestly, for all that is required of me in my classes, I found it very difficult to remember to go on and do it. When I did, which was rare, I saw the potential it would do to help me . . . but I was overwhelmed with a lot more.

What might have made the wiki activity better? Most of the participants had opinions about improving the wiki activity. Those opinions included the need for class time to work in and review the wiki entries, such as: "More instructional time on usage," "I think actually going over our class wiki submissions would have been more beneficial," and "Have a group complete a whole chapter and present it to the class."

Others reported that improving how tasks in the wiki were assigned would have improved the activity. Group dynamics varied from group to group, often creating frustration. Some felt that they did not have enough to work on: "Having enough info for everyone to write on." Others felt that they had to carry their group mates through their assigned sections: "Better assigning student's parts. A lot of the time students did not contribute to their assigned sections, leaving important parts of the chapter out."

Some participants wanted less supplemental information in the wiki (which may simply have been created to meet assignment requirements): "More concise material that was allowed to be added—some people added off-topic material. The site seemed jumbled because people were trying to get the grade." Some just wanted "More effort from everyone," while others wanted a wiki of their own "if it was individual."

While collaboration was an important aspect of the wiki, some did not feel that the groups collaborated enough. One person wanted, "more specific editing directions. For example, everyone should've had to edit another persons' section instead of their

own. That didn't happen at all." Some collaboration did not occur because of mistrust, "If it didn't have to rely on others for certain info," or because of the fear of offending fellow group mates, "Also you never wanted to step on anyone's toes so the edit requirement was horrible."

Participants expressed an interest in improving the structure of the wiki: "If the chapters were in a row," or "If it was formatted differently," or "Easier layout to find chapter and subheadings," or "Make more sections to separate thoughts and information."

Some reported that they wanted more time to complete their wiki sections: "If we were given more than two or three days to submit it to receive full credit," or "Giving to us a week ahead. I was always struggling with the timeline of getting it Monday and being due Wednesday."

Another theme that emerged was the desire to have assessments (beside the midterm and final examinations) tied to the wiki, whether for a grade or as an example of what the final exam might look like: "Maybe knowing some sample questions so we know what to expect on the exam," or "Maybe if there were questions associated with chapters and not just outlining," or "Weekly quizzes to assess understanding."

Trouble with technical aspects of the wiki also emerged. A participant was not aware of the Realy Simple Syndication feature of the wiki, and stated: "A better activity log—for comments and edits." Another had trouble working between the wiki edit and view modes, "Too much back and forth [between edit and view] to make sure your item is posted correctly, like a video/picture." More substantial training may have made these participants' experience better: "Being able to add information easier would help me. Posting pictures, media clips, etc. was somewhat difficult," or "Have it to where it won't

be possible to have your contribution rejected or deleted because someone added the same time you did or did not save."

Some of the participants reported that having a grade associated with the assignment caused them additional stress and detracted their focus from the primary intent of the wiki as an exam study tool. The participants reported, "Not relying on it so much for a grade," or "Not worrying about the grade I would receive on it. I was more focused on contributing enough to receive a good grade rather than the content itself."

When were you satisfied with your contribution to the wiki? The strongest theme to emerge from this question was meeting minimum assignment requirements: "Contributed amount required but rarely more." A competitive environment emerged in some groups, where individuals were certain that he or she would get credit for posting first, may have prompted a participant to comment, "When I was the first to post information for my group." Some participants were motivated to finish to get a grade for themselves: "When I completed my selection I was assigned on time," or "When I was able to post what information I wanted to, however this was hard because other classmates would get to it before I could." Others were also concerned about their group members: "When I saw that all the information assigned to my group had been covered," or "When I had contributed an equal amount like the rest of the students." The work levels of group members did cause frustration for some of their group mates: "Every single week with every single posting. I contributed tons of information to the wiki. My group, however, did not." A participant wrote:

> I felt satisfied with my contribution because I outlined my section for study purposes and tried to add relevant information to others. However, not all groups did this, which made using it as a study tool hard.

Some participants were motivated solely by receiving their desired grade: “When I received a good grade,” or “When I received a grade of B or higher.”

One way for students to either deal with contributing to an assignment when all chapter content had been adequately addressed was to look for and post supplementary information. They may have also been interested in adding this supplementary information to help the class (and themselves) better understand the chapter content. Students reported: “When I used a lot of examples, videos, graphic organizers, etc. to give information,” or “When I was able to find things online such as cartoons, photos, or forms which tied it to life experiences,” or “When I was able to find outside information that connected with the topic at hand.”

Some participants reported a high level of dissatisfaction with the wiki, and responded, “Never,” or “Never, I didn't really get the time to finish them,” or “When I had time to really focus on it or when I felt I put into my statements. I mostly hated it though. The only nice thing was that it had a spell checker.”

Research Question Q5

Q5 How do student contributions in an exam preparation wiki cross-validate with student scores obtained from the COPE instrument?

The COPE consisted of 16 items (= .808): the Instrumental Social Support subscale consisted of 4 items (= .709), the Active Coping subscale consisted of 4 items (= .640), the Emotional Support subscale consisted of 4 items (= .862), and the Planning subscale consisted of 4 items (= .803). See Table 6 for descriptive statistics.

Table 6

COPE Scale and Rubric Score Statistics

Scale	*M*	*SD*	*N*
Overall COPE	46.44	7.411	16
Instrumental Social Support	11	2.59	35
Active Coping	12.26	2.356	35
Emotional Support	11	2.59	35
Planning	10.17	3.658	35
Rubric score	106.4	36.929	35

Each student's weekly wiki contribution was evaluated by the instructor using a rubric that included the following considerations: Topic Area (total of 5 points), Edit Notes of Another Peer (total of 5 points), Timely Posting (total of 2 points), and Grammatically Correct (total of 3 points).

A Pearson product-moment correlation coefficient was computed to assess the relationship between the wiki rubric scores and composite Instrumental Social Support COPE scores. There was not a significant linear correlation between the two variables: $r = .084$, $n = 35$, $p = .632$. A scatterplot summarizes the results (see Figure 3).

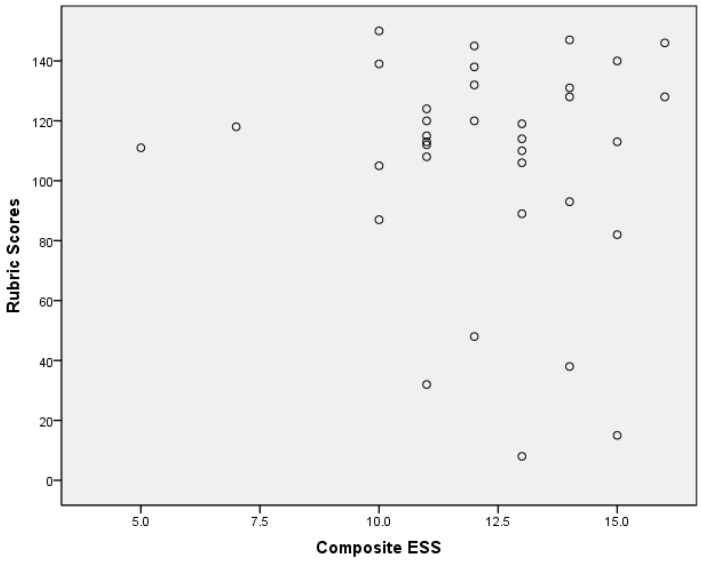

Figure 3. Scatterplot of wiki rubric scores and composite Instrumental Social Support COPE scores.

A Pearson product-moment correlation coefficient was computed to assess the relationship between the wiki rubric scores and composite Emotional Social Support COPE scores. There was not a significant linear correlation between the two variables: $r = -.083$, $n = 35$, $p = .637$. A scatterplot summarizes the results (see Figure 4).

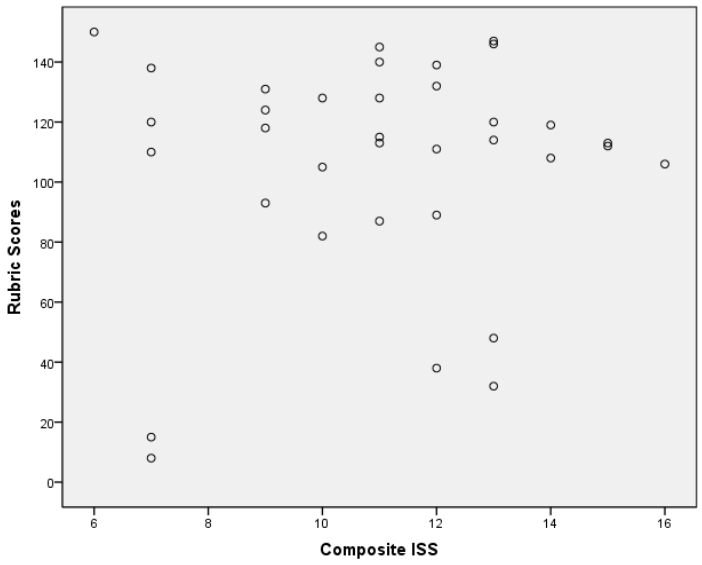

Figure 4. Scatterplot of wiki rubric scores and composite Emotional Social Support COPE scores.

A Pearson product-moment correlation coefficient was computed to assess the relationship between the wiki rubric scores and composite Active COPE scores. There was not a significant linear correlation between the two variables: $r = .043$, $n = 35$, $p = .806$. A scatterplot summarizes the results (see Figure 5)

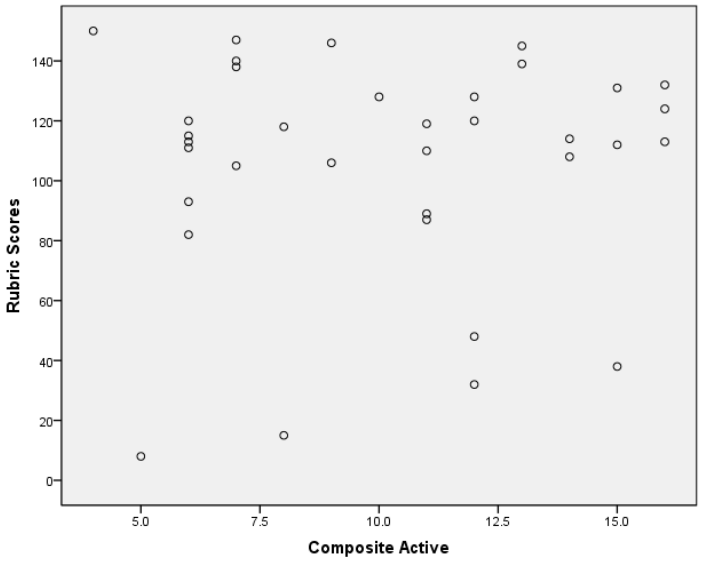

Figure 5. Scatterplot of wiki rubric scores and composite Active COPE scores.

A Pearson product-moment correlation coefficient was computed to assess the relationship between the wiki rubric scores and composite Planning COPE scores. There was not a significant linear correlation between the two variables: $r = .081$, $n = 35$, $p = .644$. A scatterplot summarizes the results (see Figure 6).

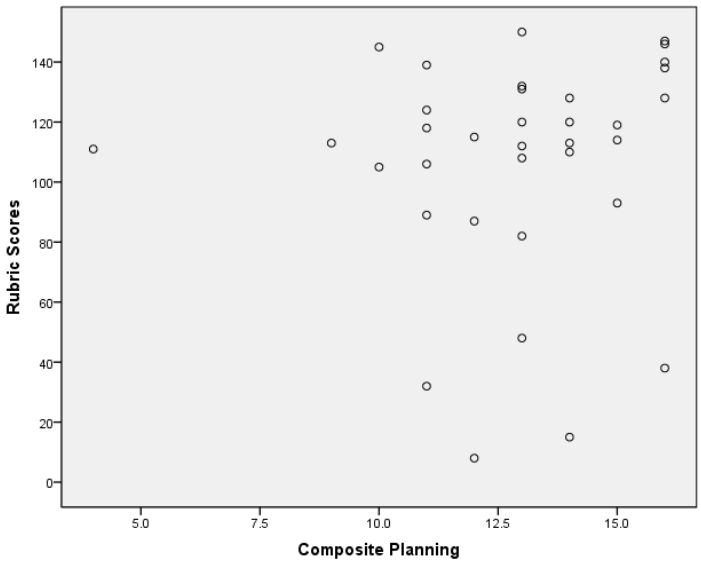

Figure 6. Scatterplot of wiki rubric scores and composite Planning COPE scores.

Research Question Q6

Q6 What is the correlation between contribution levels in an exam-preparation wiki and student exam anxiety levels?

The Figure 7 rubric was used by the instructor to score the weekly contributions of the participants. Their evaluation included level of topic coverage, editing quality, timeliness of posts, and accurate use of language, including people first terminology. People first is language that respectfully puts people before their identified disability, such as, “She has a diagnosis of Down syndrome” rather than “She is a mongoloid,” or “He has been diagnosed with a cognitive disability” rather than “He is retarded.” This authentic language is a key component in the delivery and reporting of assessments of exceptional learners and is not easily detected using computer-generated assessment data. In addition, context specific contributions and/or edits present the same challenge for computer scoring. While assessment data for the campus pack wiki can be retrieved in the learning management system concerning the Last View of Wiki, Total Pages Edited, Total Comments Initiated, Total Comments, Total Views, and Total Revisions, this data do not provide a measurement of content accuracy or logical content structure. Thus, using the wiki rubric scores that were naturally generated in the course as a measure of contribution levels seemed more logical than using the assessment data found in the campus pack assessment reports.

	Unacceptable	Acceptable	Desired
Topic Area	**1 Point** Notes were sporadic without clear connection to assigned topic.	**3 Points** Included general notes related to topic area that addressed key information from reading(s). Paraphrasing of material from text was minimal.	**5 Points** Paraphrased substantial notes (no more than one page) related to topic area that addressed key information from reading(s).
Edit Notes of Another Peer	**1 Point** Poorly developed editing notes.	**3 Points** Read another person's notes and revised accuracy by adding, removing, or expanding on thoughts. This included, but was not limited to: adding a link to another resource (e.g., video, article, quote); making a comment that explained your position or understanding of notes posted; organizing notes for easier reading; or providing general examples related to topics of assigned chapter. Edits were unclear with no more than 3 comprehensible notes.	**5 Points** Read another person's notes and revised accuracy by adding, removing, or expanding on thoughts. This included, but was not limited to: adding a link to another resource (e.g., video, article, quote); making a comment that explained your position or understanding of notes posted; organizing notes for easier reading; or providing specific examples related to topics of assigned chapter. Edits were at least 3-5 comprehensible notes.
Timely Posting	**0 Points** Submitted original post too late for peers to read your work and post editing notes.	**1 Point** Submitted original post 2 days or more after the required timeframe, which limited the time your peers could read your work, and post editing notes.	**2 Points** Submitted original notes at the beginning of the required timeframe in order to allow your peers to read your work and post editing notes.
Grammatically Correct	**1 Point** Writing was difficult to understand due to grammatical errors and did not use people first language.	**2 Points** Had several grammatical errors and did not consistently use people first language.	**3 Points** Consistently used people first language and had few to no grammatical errors.

Figure 7. Instructor wiki grading rubric.

A Pearson product-moment correlation coefficient was computed to assess the relationship between the total rubric scores and the total difference between posttest and pretest TAI–G scores (see Table 7).

Table 7

English adaptation of Test Anxiety Inventory, German Version (TAI–G) and Rubric Scores Descriptive Statistics

Scores	*M*	*SD*
Rubric	106.4	36.929
Differences between posttest and pretest TAI–G	.943437	12.

There was not a significant linear correlation between the two variables: $r = .052$, $n = 32$, $p = .777$. A scatterplot summarizes the results (see Figure 8).

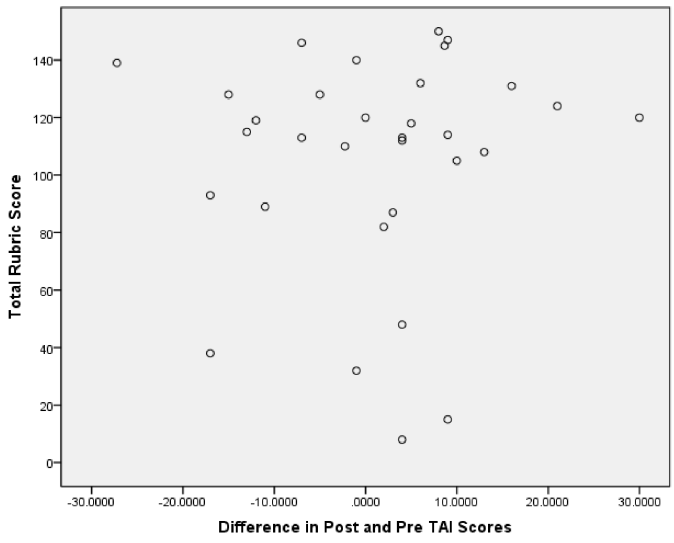

Figure 8. Scatterplot of difference between TAI–G posttest and pretest scores.

Overall, there was not a significant linear correlation between rubric scores and self-reported anxiety levels as measured by the TAI–G.

CHAPTER V

DISCUSSION

The purpose of this study was to explore the relationships between using a wiki as a student tool for collaborative exam preparation in a teacher preparation course and exam anxiety levels of students. Student anxiety levels were measured by the English adaptation of the TAI–G. The TAI–G is an instrument that measures test anxiety levels, with subscales including Worry, Emotionality, Interference, and Lack of Confidence. The study also explored the expression of student coping mechanisms as measured by the COPE in a collaborative test preparation wiki, and if those mechanisms remained consistent throughout a semester-long undergraduate class. The COPE is a self-report instrument that measures coping behaviors with subscales including Active Coping, Planning, Seeking Instrumental Social Support, and Seeking Emotional Social Support. Qualitative data were collected through document analysis, a student focus group, and an instructor interview to provide participant perspective about the student and teacher behaviors and experiences in the collaborative wiki environment; the data were analyzed using grounded theory procedures (Creswell, 1998; Glaser & Strauss, 1967).

The research was guided by six research questions:

Q1 What are the differences between self-reported pretest and posttest anxiety scores after using a wiki to collaboratively prepare for an exam?

Q2 What are the perceptions of an instructor after implementing an exam preparation wiki for an assessment class?

Q3 What are the perceptions of students after using an exam preparation wiki for a pre-service teacher preparation course?

Q4 How do students use a wiki for exam preparation?

Q5 How do student contributions in an exam preparation wiki cross-validate with student scores obtained from the COPE instrument?

Q6 What is the correlation between contribution levels in an exam-preparation wiki and student exam anxiety levels?

Chapter V discusses the findings as they relate to each of the research questions. Implications and future research are also shared.

Wikis are used in a variety of ways in education (Aharony, 2008; Hutchinson & Colwell, 2011; Ioannou & Artino, 2009; Knobel & Lankshear, 2009). The collaboration that takes place in a course wiki such as the wiki in the current study should be closely moderated (Brown et al., 2006), and the task to be completed should be designed in such a way that promotes participants' cohesion in their collaborative efforts (Kreijns et al., 2003). Test anxiety is common for students (Zeidner, 1998), and individuals cope with that anxiety in a variety of ways (Carver et al., 1989). There appears to be little research to date that examines the use of a wiki to collaboratively prepare for a course exam.

Influence on Anxiety

There was no significant difference in the pretest and posttest scores as measured by the English adaptation of the TAI–G. In the current study, collaborative examination preparation efforts by 34 pre-service teaching students did not have an effect on test anxiety levels prior to taking the course final exam.

Role of Instructor in Wiki Success

The researcher interviewed the instructor for one hour at the end of the semester in which the study took place. The instructor was initially concerned with the fit of the

class to the wiki activity. The course was focused on the administration and interpretation of various educational assessments, and the instructor felt that the wiki might be better used in courses based on knowledge and comprehension of material, rather than the application–intensive nature of her course. Her prior experience with the use of wikis was unpleasant, yet she was willing to incorporate the wiki into her course. These two factors may have resulted in the instructor projecting a lack of confidence in the activity, despite her efforts to minimize the impact of her doubts about the value of wikis in collaborative exercises.

The workload for the instructor was greatly increased. While she was initially committed to continuous evaluation of student wiki contributions, other activities in the course eventually took precedence, and she fell behind in her monitoring and grading of student wiki contributions. Students were expected to contribute chapter material to the wiki prior to classes that covered the material. Little class time was dedicated to direct discussion of the student's weekly contributions, and it was rare that students returned to their contributions to add or edit material after class sessions.

A trainer from an instructional design and support unit at the university where the current study took place briefly visited the participants in class to train them in the use of the wiki. The instruction was presented on a projection screen, and students did not have the opportunity to follow along on a computer of their own. This brief training did not thoroughly address technical aspects of the wiki, such as embedding z video. The instructor did not feel adequately prepared to answer some student questions about completing various technical tasks in the wiki, which she felt may have frustrated her students.

Grades for the wiki were based on contribution, editing, comments and the considerate use of language that was accurate and sensitive to individuals with disabilities. The instructor used the wiki assessment tool to monitor changes and comments in the wiki and would follow up by locating the changes and comments in the wiki for grading purposes. In some cases, comments were collapsed and the instructor needed to click “show all” or “show response” to see the comments. In other cases, students erroneously created duplicate sections of the wiki, which were out of order with the instructor-imposed non-numerically sequenced section structure. These considerations caused grading and feedback delays that may have influenced student contributions.

Groups were assigned specific sections of chapters to cover in the wiki. The instructor did not assign sections to specific individuals. This left it to the students to work out who would cover the sections; some groups coordinated this in class, some in the wiki comment area, and some did not coordinate at all. In most cases, the instructor felt that the good students consistently contributed on time with accurate material, and poor students either minimally contributed or contributed nothing at all. This dynamic was frustrating for the instructor, but was not unexpected. A basic trend emerged where students who contributed early caused frustration for students who entered their section and found nothing left to contribute. The content had been adequately covered and needed no editing, so some of those students often resorted to seeking out external resources such as video, images, or documents that directly related to their wiki section. In other cases, the students simply entered comments in the comment area that affirmed the efficacy of existing contributions.

The combination of the instructor's opinion about the wiki, level of experience, timeliness of feedback, and group dynamics seemed to take its toll on the quality of the student contributions, which declined as the semester progressed. While she felt that the rubric she designed was helpful for her own grading purposes, it did not seem to benefit the students that much. She suggested that a peer-evaluation process might inspire students to take more pride in their efforts related to the collaborative activity. In addition, she felt that students might be more comfortable contributing to the wiki after the material had been sufficiently discussed in class, and that more class time dedicated to review and discussion of the student entries would provide students with confidence that the material they posted would actually be beneficial when preparing for the exam. Despite some of the challenges related to the assignment, she felt that it did help students be motivated to attend to the chapter content.

Considerations for Student Collaboration in Wikis

Thirty-four students responded to a questionnaire at the end of the semester. The questionnaire included questions regarding attending to course content, test preparation, and communication, as well as general impressions about the wiki and the student's own contribution to it. The questionnaire also included several open-ended questions, which had a high response rate.

More students did not like working in the wiki to prepare for the exam than those who did, but most agreed that the activity helped them keep up with textbook readings. Interestingly, more than 82% of the class felt that they contributed their fair share to the wiki. The class was evenly split between agreeing and disagreeing when responding to the question, "I would have waited longer to study for the final exam if I had not been

assigned to work in the wiki," and the class was nearly split when asked if they would recommend using a wiki to help students prepare for final exams to other instructors. However, roughly 70% of the students either disagreed or strongly disagreed that they would have been more anxious about the test without the wiki activity. The class was roughly split when asked if other student contributions were helpful when preparing for the exam. Nearly 70% of the class did not feel that adding content to the wiki was easy, but 62% of the class reported that the comment section facilitated group communication. Despite that augmented communication, nearly 66% of the students disagreed or strongly disagreed that they felt connected to their classmates as a result of working in the wiki. Nine participants volunteered to be part of a focus group session that lasted approximately one hour. Several themes emerged from the session, and as the questionnaire responses demonstrated, opinions about the activity were divided. In addition, the themes that emerged in the focus group were similar to those that emerged in the instructor interview. The following is a summary of those themes.

Instructor Feedback

Participants reported in the focus group session that the wiki would have been more valuable as a test preparation tool had the instructor provided specific feedback regarding content. Grades for the wiki were largely based on the instructor–created rubric, and feedback beyond numeric scores was limited. As a result, students were not sure if their entries were accurate. For some participants, this created apathy. The students and instructor both noted a decline in wiki activity toward the end of the semester, despite the upcoming final examination. Students were sensitive to the time demands of the instructor regarding keeping up with the wiki feedback, but even those who valued the experi-

ence were frustrated by the low level of feedback. Some students suggested that the feedback could occur in class, but time restrictions prevented this from happening as well.

Instructor Intervention

Student contributions in the wiki were not edited by the instructor, and she also did not utilize the comment sections to provide guidance. Several students voiced their desire to have their poor contributions edited or deleted altogether by the instructor. This would have served dual purposes; the students would know what the instructor deemed as acceptable, and her presence could have been a motivating factor to contribute. Had the instructor maintained an active presence in the wiki as a moderator and provider of moral support, student apathy may not have reached the level it did by the end of the semester.

One participant suggested that the instructor should have taken the best contributions from both course sections and shared them between the groups. While this seems like a sound idea, the ultimate purpose of the activity was to have students engage with content so that they would better understand it. Students were expected to be able to recognize good contributions and edit the contributions that lacked accuracy or were incomplete. A possible solution to this could have been the instructor actively engaging with the wiki at the beginning of the semester to serve as a role model. The instructor could then have taken a less active role, perhaps by including comments and suggestions in the comment area of the wiki.

Instructor Experience Level

The participants knew from the beginning that the instructor had minimal experience with the use of wiki technology. As such, the experience was a learning

experience for all participants, including the instructor. Students did not feel that they could get sufficient technical support from the instructor, and several groups relied on members who were comfortable with the technical aspects of the wiki to provide technical support. Not all groups were so fortunate, and they seemed to struggle more as a result. Students also reported that they wanted the instructor to have more training in the technology to have a better understanding of how to grade content created and edited by a small group of students.

Group Dynamics and Roles

The instructor placed as few as three but no more than five students in groups and expected them to address specific textbook chapter sections without much guidance regarding which tasks the group members would work on. Cooperative learning activities can be more productive if group member roles are clear (Johnson et al., 1990). To be fair, the roles could change on a weekly basis. The coordination that assigning roles affords eliminates doubt about who does what and when they do it. As the semester progressed, some students recognized the need for a leader to designate weekly tasks. Some groups resorted to posting job tasks in the discussion area, but conversations in class regarding tasks also occured. Participants who were in groups that lacked this coordination often were frustrated either by their group mates not contributing or by their group mates contributing too much, too soon. In the case of the former, the contributing members were irritated that they were the only workers in the group, and in the case of the latter, students who entered the wiki to contribute after other group members had addressed the assigned sections often were at a loss as to what they could add to earn their weekly grade. These students often became re-organizers of information, breaking paragraphs

into more digestible chunks, or adding headings, etc. to make their sections easier to follow. Students who did not initially contribute or edit often sought outside resources to bring in to their sections. Those resources were either links to websites, images, documents, or videos that enhanced understanding of section content. If the group member had been given specific sections to work on, these resources may have not been as prolific.

Contribution Motivation

The wiki activity counted as 10% of the students' final grade. Most students reported that their primary motivation to contribute with their group members was receiving a grade. However, some students took a more altruistic view, and felt intrinsically motivated to have the wiki become a valuable study tool: "I would go ahead and finish out the chapter because if people are using this for their study guide, then it needs to be in there." Interestingly, these same students were also some of the early contributors or group organizers. It is possible that the students were generally good students who took pride and responsibility for their school work. Another possibility is that some students simply had more time to focus on the wiki. Several students reported that they were working parents, so individual time constraints may have taken precedence over intrinsic motivation.

Wiki Structure

The textbook chapters in the wiki were not listed in numerical order. Chapters appeared in this order: 2, 3, 14, 8, 4, 6, 7, 5, 15, 13. While the course content was delivered using the same order, the navigation, based on the chapter order, was disconcerting enough to students to merit complaints. Some students who were not technically familiar with entering a pre-made page and entering the page edit mode to add content to

it resorted to creating new pages that further confounded the chapter order. This issue could have been resolved by the instructor creating a logically ordered hyperlink index on the wiki entry page, rather than relying on students using the navigation scheme generated by the wiki as new chapter and section pages were created.

Supplemental Material in Wiki

As discussed in the Group Dynamics and Roles section, students who were at a loss for what to contribute to their assigned chapter sections often found outside resources to add to their sections. Participants reported that the material often provided a real-world example for section content, and thus helped enhance understanding. However, some students reported being confused by the supplemental material, or reported that they did not trust the accuracy of the materials.

Wiki as Supplement or Primary Information Source

Some confusion existed about the nature of the wiki. While most participants recognized that the wiki was not intended as a substitute for the course text, some relied on the wiki to get through class discussions rather than reading the textbook. Participants reported that they often did not trust content in the wiki. However, those same participants did not feel compelled to ensure that content in the wiki not generated by their assigned group was accurate and reliable for study purposes. In some cases, participants did not feel comfortable summarizing chapter content and went against that requirement by transcribing chapter content verbatim.

Identification of Author

Without looking at the page history of each chapter section, it was difficult to determine who did what on any of the wiki pages. Students did not include their name

with their contributions. This low level of anonymity created further trust issues with some participants who recognized the inconsistent participation and quality of various group member contributions. Once again, rather than work on questionable content to enhance the trustworthiness of it, some participants simply wrote off the work of their peers and resorted to their established study methods.

Communication In and Out of Wiki/Comments

Communication related to member assignments generally took place in the wiki comment area or in class. Comments were part of the wiki assessment rubric, which resulted in active use of the comment section. The most frequently occurring type of comment was praise or affirmation of student contributions, followed by answers to questions about section content. It is possible that giving praise is the most non-threatening type of communication that could count for points. A participant reported that he used this trick to pad his grade and give the impression that he was very active in the wiki. Had the instructor entered the comment section and modeled meaningful commenting, this type of grade padding may have been less prevalent.

Alternative Class Formats for Wiki

Participants offered several suggestions about how the wiki activity could have been improved. These suggestions included having weekly quizzes based on wiki section content, receiving extra credit for editing or contributing to other group sections, having specific groups address entire chapters and present the chapter material to class while the wiki was displayed on the classroom projector screen, and even more radically, having each student create a private wiki. This last suggestion, of course, ignores the collabora-

tive nature of wikis and might be better accomplished in a course blog (a contraction of web and log, which is defined by an authorship of one, akin to a journal or diary).

Opinions were mixed about the wiki activity. Some students saw the wiki as busy work with no other purpose than to serve as data for the researcher. Others recognized the potential value of the wiki as a study tool, but not for courses that expected to address course content higher in the spectrum of cognitive processes. While issues concerning collaboration were confounding to many participants, some recognized the value of differing opinions and interpretations of course content.

Student Contributions: The Optimal and the Actual

The course wiki was intended to help students interact with course content while collaborating with fellow classmates to produce a searchable body of knowledge related to the course final exam. The research hoped that participants would utilize their collective knowledge and experience for their own benefit, and ultimately, the benefit of all students in the course. In addition, the research hoped that the wiki comment section would facilitate lively discussion about the course material, including conversations about planning how to address the course content, as well as serving as an outlet for help requests and solutions to those requests.

Students were expected to summarize specific sections of chapters in the course textbook and place those summaries in the appropriate wiki section. The syllabus entry for the wiki activity stated, “Throughout the course, you will enhance your professional knowledge and skills related to assessing students with exceptionalities via active participation in a class learning community using wikis.” The syllabus also referred to the wiki grading rubric, which further defined how students were to use the wiki. The Edit

Notes of Another Peer section of the rubric specifically suggested that students add links to resources including videos or articles. The same section specified that students could add comments to fulfill the point requirement as long as the comment served to, “explain your position or understanding of notes posted, organize notes for easier reading, or provide specific examples related to topics of assigned chapter.”

Despite receiving the same set of instructions, the same grading rubric, and having similar class sizes (20 for Group A and 19 for Group B), the wikis for the two sections of the course were given distinctively different treatments. Both contained appropriate summaries of chapter readings, primarily in list form. Both groups agreed that such lists were easier to read and digest than content organized in paragraphs. The patterns of contribution to the wiki were also similar, probably due to the wording of the grading rubric. Students typically added content, edited that content, and then added external content, with little variation. Beyond this, text formatting, the use of the comment section and the number of external resources sharply contrasted.

The wiki for Group A was primarily created and edited using a consistent font type and size with black as the primary text color. This group used the wiki comment area for planning, which may explain why this group had 54 more comments than Group B. In total, the group included 26 hyperlinks, 23 videos, and 10 images across the 70 wiki pages. Six additional pages were erroneously added and populated by this group. These additional pages had the same headings as the placeholders created by the researcher, such as Chapter 2 Steps of the Assessment Process.

Group B utilized a variety of font sizes, types and colors. Color, as well as increased font size. was used for organizational purposes in headings and lists. This group

did not use the comment area for planning as much as Group A, which may explain their lower number of comments (104). Another possible explanation for this is that some participants in Group A padded their contributions with comments giving praise, such as "good job," which resulted in 15 more praise/affirmation type comments than Group B had. Group B seemed more comfortable with editing the work of others than Group A, which may explain why they had 25 comments that provided guidance or answers, while Group B had 53. Rather than edit in the content area of the wiki, Group B chose to not intrude on content created by others and thus, added the corrected or expounded content in the comment area. Group B seemed to place more trust and value in external resources, and as a result, had 23 more links, 26 more videos, 75 more pictures, and 17 documents (Group A had none). The other interesting difference between the groups is the number of revisions, where Group A had 381 and Group B had 585. The combination of formatting text and inserting external resources may have accounted for Group B having nearly 1,000 more page views than group A, because participants had to view a page before editing it.

Participants responded to three open–ended questions included on a questionnaire at the end of the semester, prior to taking the course final exam. The questions included (a) "How did you use the wiki?" (b) "What might have made the wiki activity better?" and (c) "When were you satisfied with your contribution to the wiki?" When responding to the first question, participants reported that they mainly used the wiki to fulfill the grade requirement, but many reported using it for its original purpose—to study for the course exam.

When responding to the second question, participants reported that they wanted more instructor feedback, class time to review the wiki submissions, better-defined roles as group members, less external content in the wiki, better collaboration and planning by group members, a numerically ordered (lowest to highest) navigation scheme, more time to complete assignments, and waiting to submit content to the wiki until after the class had discussed the content. Some wanted quizzes based on the wiki, but others reported that they did not want a grade tied to the wiki activity.

The third question revealed a difference between those who were extrinsically motivated to contribute to the wiki and those who were intrinsically motivated to contribute to the wiki. Those students who were extrinsically motivated to contribute reported that they were satisfied when they got the grade they wanted. This sometimes entailed students entering the wiki as soon as the content pages were available so that they could add their summary without having to edit others' work, or figure out which content still needed to be added. Some also reported that they found and added external content because "everything else had been done." Other participants felt that the wiki was a legitimate way for the class to study. These students were motivated by their own desire to help their group succeed with assignments and by being part of a project that was useful to the class as a study tool. These students also saw the external content as beneficial because it helped them understand abstract concepts through the use of concrete examples presented in layman's terms.

Student Behavior Reflected in the Wiki

At the beginning of the semester, participants responded to an inventory that measured specific coping behaviors with subscales that included Active Coping, Seeking

Instrumental Social Support, Seeking Emotional Support, and Planning. Student scores were based on the wiki rubric. All four COPE subscales were compared with student cumulative wiki scores using a Pearson product-moment correlation, which resulted in non-significant linear correlations between each of the COPE subscales and the cumulative wiki scores. The COPE was designed to discover how individuals cope with difficult life experiences. In the present study, the difficult experience was intended to be the course final exam, but factors such as low feedback, poor collaboration, and technical challenges in the wiki may have caused students to be anxious more about contributing to the wiki than the course exam. Those students with a high composite score for Active Coping may have been frustrated by the wiki, and subsequently may have chosen to minimize their contribution so that they could study for the exam without worrying about working with a group or struggling with technical challenges posed by the wiki activity. Of course, without participation, their cumulative wiki score would be quite low. Those students with a high composite score for Seeking Emotional Support may not have trusted their group mates enough to ask questions in the comment area regarding feelings they had about the course final exam or the wiki activity. As the wiki was viewable by every student in the class, some may have felt embarrassed to ask for any kind of emotional support. While planning did take part in the comment area, that planning related primarily to the weekly wiki assignment, not the final examination, specifically. Similarly, requests for instrumental social support were directed at addressing the weekly wiki entries, rather than at how to prepare for the exam as a whole.

There was no significant linear correlation between student contributions as measured by the instructor wiki grading rubric and the difference between posttest and

pretest TAI–G scores. Students neither benefitted from, nor were they negatively impacted, in regard to test anxiety levels by their collaborative efforts in the test preparation wiki.

Influencing Trust in a Wiki

The concept of trust appeared to drive student attitudes about either working in the wiki or waiting for others to work first. Lack of trust regarding individual contributions, group interactions, wiki content (including textbook summaries and external content), instructor assessment practices, and the value of using a wiki for collaborative exam preparation was overwhelming. Instructor involvement appeared to be an influence on the establishment, or loss, of trust in all the forms mentioned above.

The instructor interview, questionnaire, and focus group were sources of data that affirmed the researcher's bias regarding the potential of CSCL environments for collaborative test preparation. The instructor revealed in the interview that she had been impressed by the quality of summaries and sources placed in the wiki, and that collaboration seemed to be beneficial because it enabled students to populate the wiki with a variety of resources and viewpoints. In addition, the instructor reported that strong students helped less motivated or capable others, both with planning how to address the wiki sections and with content organization and content choices.

In the questionnaire, nearly 62% of the participants agreed or strongly agreed that preparing for the final exam in the wiki helped them keep up with the information in the class textbook. Nearly 53% of the participants agreed or strongly agreed that they would recommend using a wiki to help students prepare for final exams to other instructors, and nearly 62% of the participants agreed or strongly agreed that the wiki commenting feature

helped them communicate with other students in the class. The open–ended questionnaire responses included statements that revealed that the wiki was used for test preparation, and that collaboration in an exam preparation wiki was satisfying when participants made meaningful contributions for the good of the group. Focus group data included statements similar to those from the open–ended questionnaire mentioned above. Participants also shared many suggestions for improvement for the activity during the focus group session, which appeared to be related to the concept of trust, and how instructor participation influenced trust. The following is a summary of those suggestions, as well as similar suggestions made by the instructor during the instructor interview.

An instructor experienced in wiki implementation and moderation may foster students' self-efficacy (trust in oneself to be able to successfully complete a task) by guiding and encouraging students through the process of generating accurate material with clear expectations, active assessment, and timely feedback. The instructor may foster trust in group members by moderating social and editing transactions and by setting manageable deadlines and providing clear assessment rubrics for those transactions. The instructor may foster trust in external content, such as video, supplemental text, and web sites, by intelligently discussing and actively evaluating the external content synchronously in class and asynchronously out of class. The concept map below (see Figure 9) shows the relationships that could influence trust while using a wiki for collaborative exam preparation.

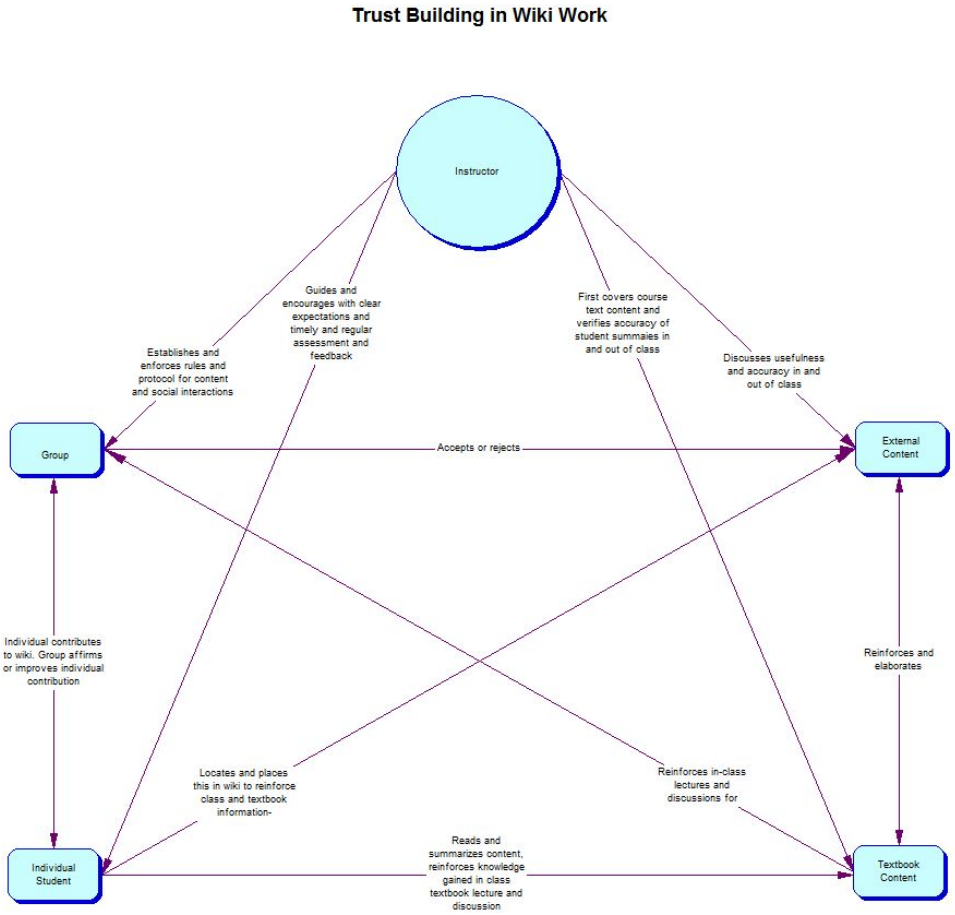

Figure 9. Trust building in wiki work.

Because there were no significant differences in anxiety levels and no significant linear correlations between anxiety levels and wiki rubric scores, as well as no significant linear correlations between coping behaviors and wiki rubric scores, this theory is not fully developed.

Recommendations

Implications for the Field

Many students dislike working in groups, especially those that are poorly organized and managed. Feedback is a critical part of mitigating this. The instructor must be an active participant in collaborative assignments, both to act as a sounding board for ideas and as a moderator when group conflicts occur. Students should not be expected to summarize course material that has not been covered in class by an instructor or other individual(s) familiar with the content. Having a group present material to a class following preparation of that material in a wiki may inspire other groups of students to put forth their best effort while contributing content to a wiki. Both the participants and the instructor reported that a peer-review process could have helped reduce tension about grades and performance differences that resulted in uneven contribution levels. Having students confidentially rate their group mates' performance while collaboratively preparing for an exam could eliminate some social loafing and other phenomena related to group work. While it seemed necessary to make the wiki activity mandatory for the current study, instructors may elect to have students choose from a pool of activities related to preparing for the course exam. Those students who are familiar with their learning style and ability to work with others toward a common end may benefit by working with likeminded classmates while not having to worry about carrying the group through the activity. Wikis should be logically structured and the navigation scheme should be easy to follow. Enabling Realy Simple Syndication features in wikis helps to alert students to changes in the wiki, which may require prompt attention. Instructors

should be well-trained and practiced in the use of wikis, as well as the dynamics, pitfalls, and benefits of collaborative work.

Implications for Future Research

The current study found no significant difference between posttest and pretest TAI–G scores after students participated in the test-preparation wiki. However, participants indicated that the activity would have been more beneficial in a course that requires memorization of course content, such as a history of education or introduction to educational psychology course. An experimental research design with randomly selected participants and a control group that involves the use of a carefully moderated wiki to mitigate test anxiety may or may not reveal that wikis can be successfully used to reduce test anxiety in courses with large numbers. In addition, qualitative research involving a group of volunteers who are familiar and comfortable with one another may reveal that reported coping behaviors are eventually expressed in online environments. Such research could benefit project managers who expect their subordinates to work closely in online environments while designing products and building knowledge bases.

Conclusion

The data overwhelmingly showed that students did not like or benefit from the collaborative test-preparation wiki activity. Failing to establish trust or losing trust, which appeared to be influenced by instructor participation, appeared to influence participant impressions and the quality of their experience while working or waiting in the wiki. The research provides suggestions for improving trust through instructor participation, based on theory generated in the current study.

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APPENDIX A

TEST ANXIETY INVENTORY (TAI–G)
ENGLISH ADAPTATION

Instructions

These items deal with ways you cope with the stress in your life regarding course examinations. There are many ways to try to deal with problems. These items ask what you've been doing to cope with course examinations. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says; How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

1 = I haven't been doing this at all
2 = I've been doing this a little bit
3 = I've been doing this a medium amount
4 = I've been doing this a lot

Test Anxiety Inventory (TAI-G)

In the following you find a couple of statements that describe feelings and thoughts one might have when taking an exam. Please indicate how often you have such feelings and thoughts in exam situations in general.

	Almost never	Sometimes	Often	Almost always
1. I am confident about my performance.				
2. I think about how important the examination is for me.				
3. I get "butterflies."				
4. I think about my abilities.				
5. Distracting thoughts keep "popping" into my head.				
6. I worry about whether I can cope with being examined.				
7. I am "up-tight."				
8. I have faith in my own performance				
9. I am thinking about the consequences of failing.				
10. I talk myself whether my performance will be good enough.				
11. I am preoccupied by other thoughts which distract me.				
12. I feel uneasy.				
13. I know that I can rely on myself.				
14. I think about how important it is for for me to receive a good result.				

	Almost never	Sometimes	Often	Almost always
15. I easily lose my train of thoughts.				
16. My heart pounds.				
17. I worry about my results.				
18. I feel anxious.				
19. I forget things because I am too preoccupied with my personal problems.				
20. I am satisfied with myself.				
21. I am concerned about my grades.				
22. I tremble with fear.				
23. I worry that something might go wrong.				
24. My concentration is interrupted by interfering thoughts.				
25. I feel overwhelmed.				
26. I think that I will succeed.				
27. I think about what will happen if I don’t do well.				
28. I feel upset.				
29. I am convinced that I will do well.				
30. I have the feeling everything is so so difficult for me.				

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVALS

UNIVERSITY of
NORTHERN COLORADO

Institutional Review Board

August 6, 2012

TO: Wendy Highby
University Libraries

FROM: The Office of Sponsored Programs

RE: Exempt Review of *Collaborative Exam Preparation: Using a WIKI to Engage in Test Preparation Activities and Moderate Coping Behaviors*, submitted by Nicholas Eastham (Research Advisor: Mia Kim William)

The above proposal is being submitted to you for exemption review. When approved, return the proposal to Sherry May in the Office of Sponsored Programs.

I recommend approval. as amended. See attached. Mr. Eastham will provide copy of UNF IRB documentation when complete.

W Highby 8-14-12
Wendy Highby Date

The above referenced prospectus has been reviewed for compliance with HHS guidelines for ethical principles in human subjects research. The decision of the Institutional Review Board is that the project is exempt from further review.

IT IS THE ADVISOR'S RESPONSIBILITY TO NOTIFY THE STUDENT OF THIS STATUS.

Comments:

25 Kepner Hall ~ Campus Box #143
Greeley, Colorado 80639
Ph: 970.351.1907 ~ Fax: 970.351.1934

UNIVERSITY of NORTH FLORIDA.
Office of Research and Sponsored Programs
1 UNF Drive
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

DATE: September 07, 2012

UNF IRB Number: 367892-3
Approval Date: 9-07-2012
Expiration Date: Exempt - None
Processed on behalf of UNF's IRB KLC

TO: Mr. Nicholas Eastham
Education and Human Services

VIA: Dr. Janice Seabrooks-Blackmore
Exceptional Student and Deaf Education

FROM: Dr. Katherine Kasten, Chairperson
On behalf of the UNF Institutional Review Board

RE: Review of New Project by the UNF Institutional Review Board IRB#367892-3: "Collaborative exam preparation: Using a wiki to engage in test preparation activities and moderate coping behaviors"

This is to advise you that your project, "Collaborative exam preparation: Using a wiki to engage in test preparation activities and moderate coping behaviors" was reviewed on behalf of the UNF Institutional Review Board and has been declared Exempt, Category 2." Therefore, this project requires no further IRB oversight unless substantive changes are made.

This approval applies to your project in the form and content as submitted to the IRB for review. All participants must receive a stamped and dated copy of the approved informed consent document. Any variations or modifications to the approved protocol and/or informed consent forms that might increase risk to human participants must be submitted to the IRB prior to implementing the changes. Please see the UNF Standard Operating Procedures for additional information about what types of changes might elevate risk to human participants. Any unanticipated problems involving risk and any occurrence of serious harm to subjects and others shall be reported promptly to the IRB within 3 business days.

Your study has been approved as of 9/07/2012. Because your project was approved as exempt, no further IRB oversight is required for this project unless you intend to make a change that might elevate risk to participants. As an exempt study, continuing review will be unnecessary. When you are ready to close your project, please complete a Closing Report Form which can also be found in the documents library called "Forms and Templates" in IRBNet.

As you may know, **CITI Course Completion Reports are valid for 3 years.** Your completion report is valid through 9/07/2014. If your completion report expires within the next 60 days or has expired, please take CITI's refresher course and contact us to let us know you have completed that training. If you have not yet completed your CITI training or if you need to complete the refresher course, please do so by following this link: http://www.citiprogram.org/. Should you have questions regarding your project or any other IRB issues, please contact the research integrity unit of the Office of Research and Sponsored Programs by emailing IRB@unf.edu or calling (904) 620-2455.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within UNF's records. All records shall be accessible for inspection and copying by authorized representatives of the department or agency at reasonable times and in a reasonable manner. A copy of this approval may also be sent to the dean and/or chair of your department.

UNF IRB Number: 367892-3
Approval Date: 9-07-2012
Expiration Date: Exempt - None
Processed on behalf of UNF's IRB KLC

APPENDIX C

COPE

COPE

Instructions

I am interested in how people respond when they have a final examination in a college course. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you have an upcoming final examination. Obviously, different course activities bring out somewhat different responses, but think about what you usually do when you are under a lot of stress related to a course exam.

Respond to each of the following items by checking one box on your answer sheet for each question, using the response choices listed. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU face an upcoming exam.

1 = I usually don't do this at all
2 = I usually do this a little bit
3 = I usually do this a medium amount
4 = I usually do this a lot

		1 = I usually don't do this at all	2 = I usually do this a little bit	3 = I usually do this a medium amount	4 = I usually do this a lot
1	I try to get advice from someone about what to do.				
2	I concentrate my efforts on doing something about it.				
3	I discuss my feelings with someone.				
4	I talk to someone to find out more about the situation.				
5	I make a plan of action.				
6	I try to get emotional support from friends or relatives..				
7	I take additional action to try to get rid of the problem.				
8	I talk to someone who could do something concrete about the problem.				
9	I try to come up with a strategy about what to do.				
10	I get sympathy and understanding from someone.				
11	I think about how I might best handle the problem.				
12	I ask people who have had similar experiences what they did				
13	I take direct action to get around the problem.				
14	I talk to someone about how I feel.				
15	I think hard about what steps to take.				
16	I do what has to be done, one step at a time**.**				

APPENDIX D

TEST PREPARATION AND STUDY SKILLS MATERIALS

University of Central Florida

Student Academic Resource Center
We teach the tools that are indispensable to learning

10 Test Preparation Hints

1. **Prepare for exams from the first day assignments are made.**

2. **Recite notes aloud from memory.** As the number of recitations increase, information is moved from short-term memory toward long-term memory where it must go to be stored and recalled when needed. One way to recite is to look at a main idea and recite the details aloud without looking. Then, check the details to see how much was recalled correctly. Read aloud any incorrectly recited material and go through this process repeatedly until it is recited correctly from memory, then move on to the next idea.

3. **Review notes on a regular basis,** for example, every other day. This improves memory, reduces test anxiety, and allows time between reviews for the information to consolidate (gell) in the mind. Spacing out reviews also results in better recall at test time. It is *normal* to forget on tests when notes are reviewed only once or twice.

4. **Re-write notes after each lecture.** Condense main ideas and clarifying details into a more organized format that promotes and speeds learning. For example, turn main ideas into questions and details into answers. Put one question on the front of the notecard and its answer on the back. Do the same as you take notes from textbooks.

5. **Self-test using a study system that includes a step to reveal how much has been learned and not yet learned before a test is taken, when something can still be done about it.**

6. **Use the instructor's clues to ideas that are likely to appear on exams.** Did the instructor narrow down potential testable material? What clues were given about what may appear on the test? Were sample test questions or review sheets provided? How much time was devoted to each topic? What questions did the instructor ask in class? What did the instructor repeat?

7. **Check to see if old tests from previous semesters are available** for review. This will provide a clue on how test questions may be constructed and the *types* of information instructors believe is important for you to learn.

8. **Utilize study groups.** If there are no study groups, start them. Study groups provide opportunities to check the completeness and accuracy of notes with others and to quiz each other. Research shows that study group members typically earn higher grades than non-study group students.

9. **Use all 5 types of studying** to increase chances of academic success.

   Type 1. <u>Studying to gather information.</u> **Its purpose is to formulate complete and accurate sets of lecture and textbook notes.** This type of studying requires a **means for verifying if notes are complete and accurate.**
   Some ways to do this are to clear up "confusing" material with instructors, com-

pare you notes with an "A" student's, compare notes in a study group, and refine your ability to spot main ideas in textbooks and lectures.

Type 2. **Studying to learn.** Its purpose is to **move information from short-term memory** toward long-term memory. This requires **repeated recitation** of material **to be learned**. One way to do this is to read a main idea and recite aloud all the details you can recall, without looking. Then, check the details for accuracy. Do this as many times as it takes to recite all the details accurately from memory before moving on to the next main idea.

Type 3. **Studying to check for learning**. Its purpose is to reveal what has and has not yet been learned before a test is taken when something can still be done about it. This type of studying requires a system for self-testing to determine how well the material has been learned and what remains to be learned **before a test is taken.** One way to do this is to take the material you believe has been learned, read a main idea aloud and recite aloud all the details you can recall without looking, then check. The best time to discover that you haven't learned something is not during a test.

Type 4. **Studying to refresh.** Its purpose is to **prevent forgetting**. This type of studying requires **regular reviews** of material already learned. One way to do this is to have a calendar book and make time in your schedule to review the material you have learned.

Type 5. **Study to improve learning skills.** It has 2 purposes: ***(1) identify which skills for learning worked, so they may be repeated,*** and ***(2) identity which skills did not work well, so they may be modified and not repeated.*** This requires **analyses of returned tests and quizzes**. Unless this is done, grade- raising learning skills are more likely to remain a mystery and grade limiting learning skills are more likely to be repeated.

3 steps for studying to improve learning skills when exams are returned are:

Step 1. **Identify answers that were correct** and determine how you studied to get these answers correct.

Step 2. **Identify answers that were all or partially incorrect** and determine how you studied or didn't study that led to a loss of points.

Step 3. **Modify or replace learning skills that resulted in lost points**. To do this, use the resources to improve and refine your learning skills such as do what A students do, do what is suggested in a learning skills book, take a learning skills class, attend learning skills workshops, meet with learning skills counselors, visit with instructors, or utilize resources in your campus learning center.

10. **Cramming doesn't work** for most students because *it limits learning which in turn limits grades*. Start studying to gather information early. Spend ***most of your time*** studying to learn and studying to check for learning. Study to refresh every 2 or 3 days.

University of Central Florida

Student Academic Resource Center
We teach the tools that are indispensable to learning

What does "S-T-U-D-Y" Mean in College?

In college, the word "study" includes many activities essential to good grades. Unfortunately, many students do not know what to do beyond rereading and cramming when studying for college level classes.

Below is a list of important activities for college level study. Some must be done on a regular basis while others are done once or twice per semester. It is important to understand that there are many tasks that must be accomplished to do the job of learning properly in college.

1. Set up a study schedule that includes a minimum of 2 hours of studying for every hour that you are in the classroom. This will vary depending on courses and majors.
2. Rewrite lecture notes as soon after class as possible.
3. Read text assignments and build notes beginning from the 1st lecture or textbook.
4. Quiz yourself over & over from notes on a regular basis as soon as you have notes.

5. Self-test on a regular basis. Discover what you know and what you don't know before you take a test when you can still do something about it. Do not wait until you get a test back to find out what you have and have not learned. Discover how may times you have to self-test in order to recall all of the details from memory by looking only at the main idea.

6. Form study groups. Compare notes, develop potential test questions and answers, quiz one another.
7. Do homework.
8. Work on assigned projects (individual and group).
9. Attend SI sessions and get tutoring.
10. Research for & write papers & essays. Start early and do little by little each week.
11. Develop mnemonics, diagrams, charts, & sketches in notes to increase learning and speed recall.
12. Meet with learning skills advisor.
13. Lab practice (language, sciences, etc.)
14. See instructors during office hours.
15. Teaching or tutoring someone else.

APPENDIX E

SAMPLE QUESTIONNAIRE

Sample Questionnaire

Please respond to the following questions on a scale from 1 to 4, where 1 means "strongly disagree," and 4 means "strongly agree." Check the number that best reflects your opinion.

		1 =Strongly Disagree	2 = Disagree	3 = Agree	4 =Strongly Agree
1	I liked working in the wiki to prepare for the final exam.				
2	Preparing for the final exam in the wiki helped me keep up with the information in the class textbook				
3	I would have waited longer to study for the final exam if I had not been assigned to work in the wiki				
4	I contributed my fair share to the wiki				
5	I would recommend using a wiki to help students prepare for final exams to other instructors				
6	I would have been more anxious about the test if I had not used the wiki to prepare for it.				
7	Other student's contributions to the wiki helped me prepare for the exam.				
8	The wiki commenting feature helped me communicate with other students in the class.				
9	I felt connected to other classmates when working in the wiki.				
10	Adding content to the wiki was easy**.**				

Please respond to the following open-ended questions:

1. How did you use the wiki?

2. What might have made the wiki activity better?

3. When were you satisfied with your contribution to the wiki?

APPENDIX F

SAMPLE FOCUS GROUP QUESTIONS

Sample Focus Group Questions

1. Did you like working in the wiki? Why or why not?
2. Did you find other student contributions useful when you prepared for the exam?
3. What did you not like about the wiki?
4. How did you use the commenting feature in the wiki?
5. What kind of help did you ask for others in the wiki?
6. When were you satisfied with your contribution to the wiki?
7. What obstacles did you face when collaborating in the wiki?
8. As you look back on the experience working in the wiki, was it been worth your investment of time and effort?
9. Would you recommend using a wiki to prepare for exams in other courses?

Additional follow-up questions will occur naturally to clarify answers and build on the responses.

APPENDIX G

SAMPLE INSTRUCTOR INTERVIEW QUESTIONS

Sample Instructor Interview Questions

1. What technical challenges did the exam-preparation wiki pose for you?
2. What pedagogical challenges did the exam-preparation wiki pose for you?
3. If you used a similar wiki in future classes, what would you do the same?
4. If you used a similar wiki in future classes, what would you do the differently?
5. Do you think the students benefitted from using the wiki? Why or Why not?
6. Did using the wiki result in a change of typical work load for you when teaching the class? How so?
7. Did students share their opinions of the wiki assignment with you?
8. Do you think the wiki was beneficial for the students?