AN ABSTRACT OF THE DISSERTATION OF

Richard R. Aman for the degree of Doctor of Philosophy in Education presented on May 29, 2009.

Title: Improving Student Satisfaction and Retention with Online Instruction through Systematic Faculty Peer Review of Courses

Abstract approved:

George H. Copa

The purpose of the study was to determine if online courses that were faculty peer reviewed based on five factors of quality instruction resulted in increased levels of student satisfaction and higher rates of student retention when compared with non-reviewed courses in a post-secondary context. The five factors of quality online instruction used in the study were: outcomes, assessment, resource materials, student interaction, and technology. The study utilized a quasi-experimental method with an online questionnaire administered to 455 student participants from nine community colleges in Maryland and Oregon. Students were enrolled in 41 online courses that were either formally faculty peer reviewed or not. The study posed four research questions. The first two study questions compared peer reviewed and non-peer reviewed courses in terms of student satisfaction and student retention. The second two questions used a regression analysis to order the contribution of the factors of quality online instruction related to student satisfaction and retention in peer reviewed courses.

The results of the study findings were categorized into three areas: (1) student retention findings, (2) student satisfaction findings, and (3) factors of quality instruction influencing student satisfaction findings. First, no significance was found in the relationship of faculty peer review to increased student retention. Second, a significant

relationship was found in the use of the faculty peer review process and increased student satisfaction. Third, a stepwise regression analysis revealed there was significance found in the order and contribution of each of the five factors of online quality as predictive of increased student satisfaction in reviewed courses. This order was: (1) resource materials, (2) assessment, (3) technology, (4) outcomes, and (5) student interactions. Findings from the study provided the basis for four recommendations related to educational and professional practice. These recommendations focused on: accreditation standards associated with online learning and college self-studies, criteria for institutional funding models in online course development, use of study questionnaire for instructional quality assessment purposes, and quality improvement processes related to the Baldridge Education Criteria.

Improving Student Satisfaction and Retention with Online Instruction through Systematic Faculty Peer Review of Courses

by
Richard R. Aman

A DISSERTATION

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APPROVED:

Major Professor, representing Education

Dean of the College of Education

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Richard R. Aman, Author

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Improving Student Satisfaction and Retention with Online Instruction through Systematic Faculty Peer Review of Courses

> *The 12.9 percent growth rate for online enrollments far exceeds the 1.2 percent growth of the overall higher education student population. (Allen & Seaman, 2008, p.1)*

CHAPTER 1: FOCUS AND SIGNIFICANCE

Online course enrollments increased from 1.98 million in 2003 to 2.35 million in 2004. Sixty-three percent of colleges and universities offering undergraduate face-to-face courses also offer undergraduate courses online (Allen, Joyce, & Seaman, 2005). "The annual market for distance learning is currently $4.5 billion, and it is expected to grow to $11 billion by 2005" (Kariya, 2003, p. 49). There is a growing trend toward online learning for degrees and certificates in higher education. "A large majority of colleges of all sizes (except for schools under 1500 students) believe online education is critical to their long term strategy…" (Allen et al., 2005, p. 11). Online learning is not only growing, but it is growing at an increasing rate. "The online enrollment projections have been realized, and there is no evidence that enrollments have reached a plateau. Online enrollments continue to grow at rates faster than for the overall student body, and schools expect the rate of growth to further increase" (Sloan-C, 2004, ¶ 3). Allen and Seaman (2008) in their research report "Staying the Course – Online Learning in the United States" found that over twenty percent of all U.S. higher education students were taking at least one online course in the fall of 2007.

For academic institutions to be competitive in the delivery of academic degrees, certificates, and courses, they must support student learning with a variety of modalities and ensure the satisfaction of the student's experience with all modalities. "Student

satisfaction reflects the effectiveness of all aspects of the educational experience. The goal is that all students who complete a course express satisfaction with course rigor and fairness, with professor and peer interaction, and with support services" (Sloan-C, 2006a, ¶ 1). It is an essential challenge for institutions of higher education to embed the characteristics of best practice for quality of instruction into the rapidly growing area of online course delivery. Fierce competition for students will make student satisfaction a critical factor in attracting and retaining online students. Colleges and universities are competing beyond their geographical districts in the online environment.

> Today, universities are facing new competitive forces. As the need for advanced education becomes more intense, some institutions are moving far beyond their traditional geographical areas to compete for students and resources. There are hundreds of colleges and universities that increasingly view themselves as competing in a national or even international marketplace. (Duderstadt, 1997, p. 79)

The premise of this study was that online instruction can be improved through the systematic application of a peer review process administered by trained faculty to insert factors of best practice into online courses.

Purpose of Study and Research Questions

The purpose of the dissertation study was to determine if online courses that are faculty peer reviewed based on attributes of quality instruction result in better student satisfaction levels and higher rates of student retention over non-reviewed courses in a post-secondary context. Both student satisfaction and student retention rates are valid metrics of institutional effectiveness to compare peer reviewed and non-peer reviewed courses. Abel (2005) in his article, "Implementing Best Practice in Online Learning," selected 21 higher education institutions to participate in a research study. When academic leaders were asked to rate metrics of success for their institutions, 21% selected

student satisfaction and another 21% selected growth in enrollments as important measures of success. Student satisfaction and enrollment growth (retention) accounted for 42% of all responses. Student satisfaction and retention are important measures for determining the effect of systematic peer review within online instruction. The following four questions were addressed in the study:

1. Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses? Thousands of courses have been developed for the online environment in the last decade (Sloan-C, 2004). In many cases, well meaning faculty developed online courses using approaches suitable for face-to-face delivery. These faculty have been minimally trained, and in some instances, not trained at all in the application of proven practice of online pedagogy and delivery (McKenzie, Mims, Bennett, & Waugh, 2000). There are numerous academic strategies available to introduce quality factors into online courses (Ross, Batzer & Bennington, 2002). One method is the use of a standard, best practice rubric or checklist administered by trained faculty peers. The research study explored the application of a peer review approach for the purpose of improved student satisfaction in online courses as the first research question. The study discerned if there was a significant difference between peer reviewed online courses and non-reviewed courses in student satisfaction.
2. Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses? Retention in online courses has been a problem for many academic

institutions (McCracken, 2004). If the application of a systematic peer review leads to a more satisfied student, if may also manifest itself in greater student retention within online courses. The study determined if student retention was significantly higher in courses that have had a systematic peer review by faculty when compared with non-reviewed online courses.

3. Which factors of quality instruction most directly relate to increased levels of student satisfaction in online courses? There are a number of factors of best practice in online course delivery (WCET, 2004). It may be that not all of these factors have an equal effect on improving student satisfaction and retention in online courses. The study discerned which of these factors was most important in this regard.
4. Which factors of quality online instruction are most important in terms of increased retention levels of students in online courses? All factors of online quality may not equally affect student retention. The study discerned which of these factors was more important regarding student retention.

Definitions

1. Online Learning – Delivery of full courses asynchronously and virtually through the Internet. Online learning can encompass numerous modalities and technologies. For the purpose of this study, online instruction was limited to fully web delivered courses using a formal learning management system (LMS) of either WebCT or BlackBoard.
2. Online Course – A single course taught asynchronously primarily via the Internet by a qualified instructor delivered mostly through the use of a learning management system (LMS).

3. Student Satisfaction – For the purpose of this study, student satisfaction was defined in two ways. First, in order to probe into the concept of satisfaction, this study queried students on their levels of satisfaction with factors of quality found to be present in a course. The premise was that courses that contain factors of quality online instruction would satisfy students more than courses that did not contain these factors of quality. Second, this study inquired into student satisfaction through a comparison of student course retention rates within similar courses. The assumption was that students would drop courses they found did not satisfy their needs. Retention rates were expected to be consistently higher in courses that have embedded factors of quality instruction.
4. Systematic Peer Review – A peer was defined as a faculty member who had been trained in the concepts of best practice in online course delivery. Although a reviewer is primarily a faculty member, this definition can include instructional designers and academic administrators. In addition, the faculty peer reviewer applied a consistent scoring rubric to the online course. A scoring rubric consists of well defined, best practice factors found in academic literature and shown to provide positive results in the delivery of online instruction. A review would normally be completed with a team of three peers, one of which would be a content expert. Within the team, all members were trained in the application of best practice through the use of a best practice rubric (see Appendix A). For the purposes of the study, Quality Matters was considered as the "Systematic Peer Review" process.
5. Course Discipline – Denoted by course subjects such as: mathematics, writing, science, and sociology.

6. Course Level – Denoted by the sequence such as: Mathematics 100, Mathematics 201, and Writing 121, Writing 221.

Significance of the Study

The purpose of this research was to study the effect of a peer review process for improving online instruction within the academic community for four reasons: (1) there is a large and increasing trend in higher education of students demanding high quality, online delivered courses to meet a variety of personal academic goals; (2) the credibility of academic institutions depend upon a high quality student experience with distance delivered courses; (3) accrediting bodies of post-secondary institutions are beginning to require evidence of quality in distance education programs; and (4) at this time, there did not appear to be research available to the academic community that informs about the effects of systematic faculty peer review techniques on the quality of online instruction.

Growing Trend in Student Demand for Quality Online Instruction

In a report of 1,100 higher education institutions conducted in 2004 by Sloan-C (2005), the researchers concluded that online enrollments continue to grow at rates faster than for the broader student population, and institutions of higher education expect the rate of growth to continue. The National Center for Education Statistics issues enrollment projections annually showing that the number of students taking at least one online course is now over two million. “There are 2.6 million students learning online this semester and there is no evidence enrollment has reached a plateau” (Sloan-C, p. 10; see Figure 1.1).

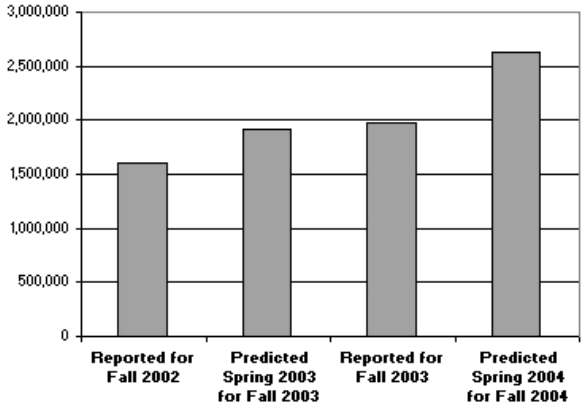

Figure 1.1 Online enrollments in United States for 2002-2004.
Source: Sloan-C, (2004), ¶ 11.

College students frequently rely on online learning courses to make up part or the whole of their education (Bickle & Carroll, 2003). Students are more demanding of their learning experiences, expecting better quality and flexibility in course delivery mode. "With fast emerging delivery systems and broader access, a major need in distance education today is quality assurance, both in academic content and student support" (Ross et al., 2002, p. 48). The concept of quality in online courses is central to both satisfying learner requirements and retaining students in programs. Research dealing with online learning indicated that specific components within online courses enhance perceived quality of these courses from the perspective of students (Ross et al.). The use of systematic faculty peer review for courses with a consistent rubric of agreed upon criteria may help to instill these best practices into online courses, and therein improve student satisfaction and retention in online courses.

Credibility of Institutions Offering Online Instruction

> Moore (2001), a noted expert in online learning, made the following observation:
>
> There is an American, Peter Drucker, you've probably heard of, who says that residential universities as we know them will be defunct within 30 years. I don't think that's true, and I hope it isn't. I think there will be students who now

> unhappily and expensively go to a campus because they have no alternative, who will not do so, and will study at a distance. They will get high quality learning from the best instructors anywhere in the world. (¶ 42)

Strategies and approaches of academic institutions change over time as the demands of their students change. The offering of online and distributed learning courses can affect the institutions educational goals, intended student populations, curriculum, and approach to instruction. Data collected in 2004 indicated that: (a) the majority of all schools (53.6%) agree that online education is critical to their long-term strategy; (b) among public and private for-profit institutions, almost two-thirds (over 65% in both cases) agree; and (c) the larger the institution, the more likely it believes that online education is critical (Sloan-C, 2005, see Figure 1.2).

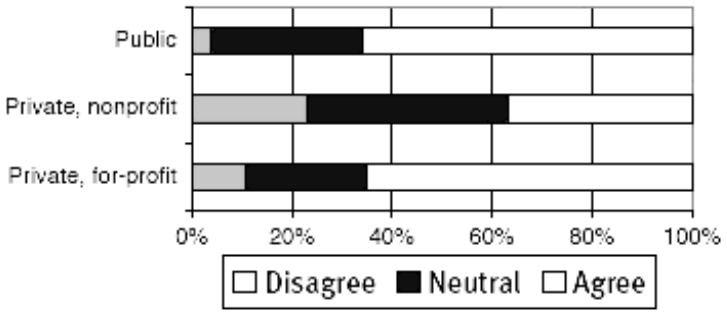

Figure 1.2 Online learning as critical to long term strategy in higher education. Source: Sloan-C, (2004), ¶ 7.

High quality online instruction can have a significant impact on the academic institution (Moore, 2001). Moore suggested that the integrity and the reputation of institutions rely on the quality of their academic programs. Online courses and programs are emerging in the instructional mix of academic institutions. The satisfaction and retention of students enrolled in these courses are strategically and financially vital to the mission of higher education institutions (Ross et al., 2002).

Higher education is embracing online course technologies to reach a growing number of non-traditional learners who would be unable to attend conventional courses due to workload, timing, or physical location issues. Academic departments are searching for both a mechanism to embed best practice features into new online courses as they are developed and employ quality improvement techniques to existing courses (Mundy & Grabau, 1999). The purpose of these academic quality efforts is to both provide online courses that meet the required course outcomes and give students the quality learning experience they desire (Ortiz-Rodriquez, Teig, Irani, Robers & Rhoades, 2005).

Consistent quality in on-line courses is a problem as evidenced by increasing numbers of distance delivered courses created by faculty who lack experience and skills in these methods for instruction. A study of online teaching faculty from the State University of West Georgia found that a majority of instructors, 62%, received only one to five hours of instruction before teaching their first online course (McKenzie, et al., 2000). Faculty may not be applying factors of best practice that research has shown to be effective to online courses. Lack of solid online course preparation for faculty comes about for a number of reasons including: lack of funding, proper training, time, and lack of resources (McKenzie et al.). Lack of preparation can result in online courses that do not fully meet the needs of students or cause students to drop courses prematurely (Ross et al., 2002).

The application of a systematic peer review process should improve the quality of online courses for learners and calm some criticism of online pedagogy by critics. Students have an expectation of a good learning experience and post-secondary

institutions depend upon satisfied students to stay engaged and recommend their experience to others.

Accrediting Organizations of Post-Secondary Institutions Seek Evidence of Quality in Online Instruction

Accrediting bodies are seeking valid measures to assess quality in online instruction. "Accreditation undertakes this examination, in some cases, based on new standards and processes that have been developed specifically to assure the quality of distance learning" (Council for Higher Education Accreditation, 2002, p. 3). Online learning is becoming a larger and more important factor of teaching and learning for many, if not most academic institutions. In a poll conducted in 2000 of the North Central Association of Colleges and Schools, 80% of university presidents, administrators, and faculty members rated increased demands for accountability and 78% rated expanding use of distance education as the two trends having greatest impact for the future (de Alva, 2000). Distance educators must plan to accommodate this emphasis on accountability if they are to contribute to maintaining an institution's accreditation and meet student demands (Department of Education, 2006). In a survey conducted by the Council for Higher Education Accreditation (CHEA) in December 2001 through January 2002, of the 3,077 institutions in the study, 1,708 offered some level of online learning (see Figure 1.3).

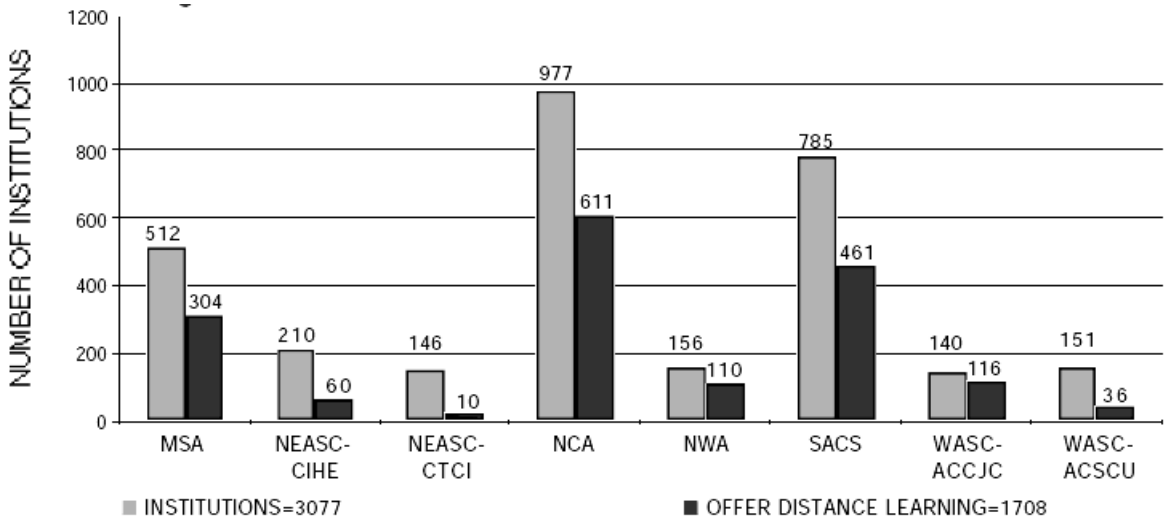

Figure 1.3 Online learning at institutions accredited by regional accrediting organizations: Middle States Association of Colleges and Schools (MSA), New England Association of Schools and Colleges (NEASC - Commission on Institutions of Higher Education, Commission on Technical and Career Institutions), North Central Association of Colleges and Schools (NCA), Northwest Commission on Colleges and Universities (NWA), Southern Association of Colleges and Schools (SACS), Western Association of Schools and Colleges (WASC - Accrediting Commission for Community and Junior Colleges, Accrediting Commission for Senior Colleges and Universities).
Source: CHEA, (2002), p. 5.

Accrediting bodies in the United States have reviewed college and university academic standards and practice for many years. Online learning as a new modality has not been fully integrated into the accreditation process. CHEA stated that assuring quality in online learning presents three major challenges for accreditation bodies: (a) alternative design of instruction, (b) alternative providers of higher education, and (c) expanded focus on training. Post-secondary institutions need to show accrediting bodies that they understand online learning courses must be designed differently from the traditional classroom based learning environment, and require different accrediting standards. CHEA pointed out that this online modality requires a unique review approach. CHEA recognized that academic barriers to market entry have diminished and alternative educational providers will appear and must be evaluated. Finally, there is an expanding

demand for training versus traditional transfer credit, presenting another challenge to accrediting bodies. The CHEA asked: "What must accreditors do to assure that these alternative designs sustain a level of quality commensurate with their respective organizations" (CHEA, 2002 p. 2). Documentation of systematic peer review should be solid evidence that curriculum is indeed rigorous and comparable to classroom based courses.

With the increase in the number of online courses, the requirements for verifying quality within online courses would be driven not only from formal accrediting bodies, but also from quality assurance processes within the institutions themselves. Industry requires benchmarking procedures that can measure learner performance at the end of training.

> Judging by present trend, there is no doubt that Web-based learning and training will continue to expand, with the growth in markets, the trend towards lifelong learning and the need for universities to offer flexible, on demand educational services. In this scenario, it is likely that quality assurance processes for online assessment will intensify, with benchmarking procedures developed to compare learner performance to exit level or industry standards. (McLoughlin & Luca, 2001)

Lack of Systematic Research on Effects of Faculty Peer Review of Online Instruction

"While there is now some statistical information available on distance education at higher education institutions in the United States, very few if any research surveys have focused on online education" (Sloan-C, 2003, ¶ 1). The notion of faculty peer review has been used for many years in the improvement of academic instruction for face-to-face courses. The use of faculty review has proven to be important to increasing quality within traditional classroom based courses (Edgerton, 1993). Peer review of professional journals and academic articles is a time-honored approach to ensuring the

quality of academic work. Peer review can provide formal, administratively endorsed opportunities for professors to support one another in using technologies and new teaching techniques (Mundy & Grabau, 1999).

Current academic literature lacks systematic research studies into the results of peer review techniques applied to online courses. One of the most notable online peer review efforts in the United States, Quality Matters, headquartered through Maryland Online, has not systematically researched the effect of their peer review process on the 500 faculty trained, and the 66 online courses that have had the quality process applied (Kane, 2004).

Considerable research was available describing factors of quality found in exemplary online courses (Chickering & Ehrmann, 1996). There were several articles describing a peer review process of online courses (Barbera, 2004). Although there was literature dealing with the quality of online courses, the value of peer reviewing, and a focus on high student satisfaction, there appeared to be little current research concerning the application of peer review techniques toward online course improvement. This study intended to add to the scholarly body of knowledge related to increasing the quality of online instruction.

Summary of Focus and Significance

Online instruction is a growing trend in post-secondary education, driven by the demands of students. The credibility and growth of colleges and universities is related in part to the perceived quality of their online courses offerings and overall satisfaction of students, as well as the acknowledgement of accrediting bodies. Current academic research has clearly defined criteria of quality instruction shown to be effective and

demanded by online students. One method to insert and confirm the presence of best online practice within courses is through an approach of systematic peer review by trained faculty. No study to date had examined the peer review process to verify what effect if any, it had for online student satisfaction and retention. This study intended to undertake these efforts by examining the application of a systematic peer review process to improve both student satisfaction levels and retention rates in online courses. The four questions this research study answered were: (a) Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses? (b) Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses? (c) Which factors of quality instruction were most important in terms of increased student satisfaction? (d) Which factors of quality instruction were most important in terms of increased student retention levels in online courses?

CHAPTER 2: REVIEW OF LITERATURE

> *The literature review in a research study accomplishes several purposes. It shares with the reader the results of other studies that are closely related to the study being reported. It relates a study to the larger ongoing dialogue in the literature about a topic... It provides a framework for establishing the importance of the study as well as a benchmark for comparing the results of a study with other findings.*
> *(Creswell, 2003, p. 29)*

The purpose of the review of literature was to gather and evaluate the most current academic research relevant to the topic of student satisfaction and retention in online instruction. Both student satisfaction and retention in online courses were influenced by factors of quality instruction. The central question guiding the literature review was: What does current literature indicate as best practice and list as factors of quality instruction found in quality online instruction? The literature review was also used in the selection of the design approach for the study as well as the development of the conceptual framework used in the study.

Approach to Review of Literature

The Oregon State University (OSU) online library was utilized in searching literature for studies using various philosophical approaches that discussed quality factors of online courses. The primary source of data was the OSU Research Database and the full text education search function. EBSCO host, Electronic Journals Service (EJS), and Education Resources Information Center (ERIC) were used as a search tool. The primary search strategy included journals that were peer reviewed, and full text studies found in a variety of categories of education literature. Higher relevance was placed on more recent studies with emphasis on works written within the past five years. A variety of key word search techniques were utilized using phrases such as: online learning, distance learning,

quality, peer review, rubric, and higher education evaluation. The initial search strategy included the use of a combination of terms such as: “online learning,” “online instruction,” and “peer review.” This approach yielded fewer than ten results, most of little value. An important insight from this failed search was that little is presently written on the topic of peer review approaches to online learning. In subsequent key word searches “online learning” and “quality” yielded 99 journal articles, several of value.

In performing the literature review, common factors or themes cited in academic sources were shown to be important to successful online courses. Both qualitative and quantitative journal studies were utilized for the literature review. Preference was placed on peer-reviewed journals, but in several instances selected websites associated with nationally recognized organizations in online learning were used. Journal studies that described online instructional factors using a “rubric approach” to online course quality, “student satisfaction factors,” or “student retention factors” were considered important to the review. Research studies or journal articles that sought to explore student motives for selecting distance delivered courses were not selected for the review. The review of literature focused on the specific characteristics described by students that contribute to satisfaction or retention in online courses. To take advantage of new research, some emphasis was placed on information emanating from regional and national conferences and presentations.

The review of literature applied Creswell’s (2005) recommended strategy when reviewing the content of research studies. This strategy focused on: (a) statement of the problem; (b) central theme of or focus of the study; (c) key results related to the study; and (d) critique of any flaws in reasoning, logic, or methodological approach.

Organization of the Review of Literature

The review of literature was organized into five major areas of focus relating to the purpose of the study. The areas of focus included: (a) general factors of quality found in online instruction, (b) factors influencing student retention in online instruction, (c) factors influencing student satisfaction in online instruction, (d) factors used by accreditation bodies in the assessment of online instruction, and (e) use of faculty peer review in higher education. The summary of the review of literature presents a synthesis of the factors directly related to the online learning experience and factors indirectly related to the online learning experience. Factors indirectly related to the online learning experience were included in the study's conceptual framework and used for developing the study's data collection instrument. The factors indirectly related to the learning experience were used as confounding or moderating variables in the study design.

Review of Literature

The purpose of this section of the review of literature was to compare and contrast a variety of course improvement rubrics and scoring matrices found in the related literature. This section searched for factors of quality that could influence student satisfaction and retention as well as general online instructional techniques from the faculty and course designers' perspective. These general factors provided the foundational data that was used in the creation of the conceptual framework for the study.

General Factors of Quality Found in Online Instruction

Numerous research studies exist that described methods for improvement in the delivery of online courses. There were several common factors found in these studies. The function of this section was to collect, describe, and synthesize commonly held

approaches for enhancing quality in online courses. These approaches were used to formulate the conceptual framework that guided the research study. Subsequent sections highlight specific studies dealing with factors related directly to student satisfaction and retention.

"Implementing the Seven Principles: Technology as a Lever" authored by Chickering and Ehrmann (1996) described technology as a "lever" for implementing the seven principles of good practice for learning. The purpose of this pivotal work was that Chickering and Ehrmann found that technology was added to many forms of course delivery. Any instructional strategy can be supported by varied technologies, just as any given technology might support different instructional strategies. These authors argued that for any given instructional strategy, some technologies were better than others. This work was cited in over 300 academic journal articles. Chickering and Ehrmann provided numerous examples of technology being utilized in support of best online practice. According to their principles, good practice in course design consisted of: (a) encouraging contacts between students and faculty, (b) developing reciprocity and cooperation among students, (c) using active learning techniques, (d) providing prompt feedback, (e) emphasizing time on task, (f) communicating high expectations, and (g) respecting diverse talents and ways of learning. Although this article was one of the most cited works in the area of use of technology in learning, it provided only partial insight into online learning as a specific modality. This article was aimed primarily at classroom-based instruction using instructional technology as a supplement. It added important insights into the role of dialog and student interaction to the study. The value of this work lay in the description Chickering and Ehrmann provided for interaction of student with

faculty, students with other students, and students with the learning materials. The authors postulated that student interaction was important to student satisfaction and accomplishment within a course, whether online or face-to-face. The concept of student interaction proved to be a theme of great importance in the area of best practice of online learning. Chickering and Ehrmann emphasized the importance of active learning techniques, defined as the process whereby learners were actively engaged in the learning process. Use of these techniques in an online course was anticipated to yield satisfied students. Chickering and Ehrmann's work reinforced the importance of learner interaction, learner support, and student assessment as important factors in a quality online course.

Another noteworthy approach to the implementation quality into online courses was the Quality Matters Project. Quality Matters was created with a federal grant through the Fund for the Improvement of Postsecondary Education (FIPSE) in 2002. The Quality Matters project was initiated in response to lack of consistency and best practice in online courses. Its basic purpose was to infuse principles of academic quality and accountability from faculty peer review into online courses. "The Quality Matters project proposes to develop a replicable pathway for inter-institutional quality assurance and course improvements in online learning. It will create and implement a process to certify the quality of online courses and online components" (Kane, 2004, p. 1).

> The story of Quality Matters (QM) begins in the fall of 2002 when a small community of Maryland distance educators informally problem solved to assure quality in the online distance learning courses that they shared and to prepare for anticipated questions from future regional accreditation teams visits. (Shattuck, 2007, p.1)

The Quality Matters review process is a faculty-centered, peer review process to certify the quality of online courses and online components. The Quality Matters rubric cited eight factors of a quality course. Factors found to be of highest value in the Quality Matters research included: (a) course overview and introductions, (b) learning objectives, (c) assessment and measurement, (d) learning resources, (e) learner interaction, (f) course technology, (g) learner support, and (h) accessibility. The Quality Matters work used a significant number of research-based articles and academic best practice rubrics to verify the eight factors they selected as best practice. Sener and Shattuck (2005) have cross-linked these eight best practice characteristics with both research literature and academic standards set by accreditation bodies. The selection of these quality factors were supported by both literature and accreditation criteria. The detail placed in the creation of the Quality Matters rubric along with the training required of qualified faculty in this peer review instrument make it a deluxe version of the faculty peer review process.

The Quality Matters rubric of instructional standards informed the selection of many of the best practice factors in this study. Additionally, its approach to faculty training for review is one of the best and most complete, and is accepted within more than 120 institutions nationally (Kane, 2004). The Quality Matters rubric was well researched and cited within the Quality Matters website. The flaw thus far in the Quality Matters approach was that there had been no systematic research or definitive data that confirmed the effectiveness of this process of online course quality. This lack of research was one of the primary reasons that this study is important to the academic community on a national level.

The Pennsylvania State University organization, Innovations in Distance Learning (IDL), has created a rubric of guiding principles and practices for online learning. This was a faculty driven initiative whose goal was the development of a set of categories of guiding principles and practices for the design and development of distance education programs. The five factors addressed by these guiding principles included: (1) learning goals and content presentation, (2) interactions, (3) assessment and measurement, (4) instructional media and tools, and (5) learner support and services (Innovations in Distance Learning, 1995). The importance of this work by IDL was that it closely parallels the factors emphasized by Quality Matters. Two independent organizations had come to essentially the same conclusions in selecting quality factors for online instruction.

In summary, this section of the review of literature served as a general overview of factors of quality found in online courses. It combined selected research done by Chickering and Ehrmann (1996) as well as an overview of Quality Matters and Innovations in Distance Learning quality factors used in the examination of online courses. The result of this general review of literature indicated that there were several established models and rubrics in place for defining factors of quality in online course delivery. Many of these models and rubrics used common quality factors. These common factors were: (a) learning goals and outcomes, (b) student interactions, (c) assessment and measurement, (d) instructional media and technology, and (e) learner support and services. See Appendix A for an example of a peer review process that focuses on these common factors of quality.

Factors Used by Accreditation Commissions in the Assessment of Online Instruction

This section of the literature review focuses on the new emphasis accreditation bodies are placing on online learning. Accreditation bodies have long been a tool for evaluating the rigor and academic soundness of instructional programs in colleges and universities. With the significant increase in acceptance of online instruction, these accrediting bodies have begun to evaluate academic institutions on best practice and criteria for acceptable course delivery through online modalities (CHEA, 2002). The purpose of looking at approaches being taken by accrediting bodies reinforced the significance of the study and demonstrated the concern for quality being placed on online learning by the bodies responsible for assessing institutions. Credibility of institutions offering online courses and particularly degrees is at stake as well as the competition coming from private for profit institutions. The quality of the online instruction many times is a concern for students who want their degree to be credible both to their employers and to other universities. Having an accredited program can help institutions deal with worries about the prestige of their online programs and degrees (Dash, 2000).

Regional and national accrediting bodies are responsible for all academic accreditation, including online programs offered in the United States. The accrediting bodies hold academic institutions offering online degrees to the same high standards as degrees offered through traditional on campus instruction. Accrediting bodies recognize that the specific standards that are applied to traditional campus based institutions need to be adapted for online instruction to ensure high quality education is provided to online students. The delivery of instruction via online means verses face-to-face was considered "alternative design of instruction" by CHEA (2002).

The U.S. Department of Education (2006) identified 12 accrediting organizations whose scope of recognition as determined by the Secretary of Education included the evaluation of distance education programs. The paper explored the problem of increasing numbers of post secondary institutions that were providing online degrees and the validity of online degrees versus campus based degrees. The paper described the factors selected by these organizations in describing evidence reviewers should consider in making assessments of the quality of an institution or program. These factors were described as components of: (a) mission, (b) curriculum and instruction, (c) faculty support, (d) student and academic services, (e) planning for sustainability and growth, and (f) evaluation and assessment. The paper was written to provide guidance to post secondary institutions that would lead to more consistent and thorough assessment of distance education programs. The document clearly reflected the acceptance of online courses as critical components of many colleges and universities and requiring specific oversight by the Department of Education. The paper identified curriculum and instruction for specific courses that were important to accreditation, and in particular, syllabi, course outcomes, and appropriate interaction between faculty members and students. There was emphasis on assessment tied to course outcomes, all reflecting best practice for online courses.

This paper demonstrated solid evidence that online education is important and will grow in significance. Online course delivery must be evaluated in ways congruent with non-online instruction. The paper was written at a policy level and yielded little new insight concerning best practice, but it did reinforce the importance of online education. This expansion of online learning presents challenges to the regional accrediting

commissions. “As such they present extraordinary and distinct challenges to the eight regional accrediting commissions which assure the quality of the great majority of degree-granting institutions of higher learning in the United States” (Council of Regional Accrediting Commissions, 2001b).

The Western Cooperative for Educational Telecommunications (WCET) developed a matrix for the description of quality of online course delivery. This rubric was developed in response to a lack of clear accreditation factors for use in the evaluation of online programs and courses in higher education. In an article, “Best Practices for Electronically Offered Degree and Certificate Programs” (WCET, 2005), five essential factors were described by the eight regional accrediting entities through its Council of Regional Accrediting Commissions. These factors of best practice were: (1) institutional context and commitment, (2) curriculum and instruction, (3) faculty support, (4) student support, and (5) evaluation and assessment.

The WCET article was important to this study in that it quantified five areas that provide significant support to quality online courses and programs. Accreditation factors were very important to college and university standing in the academic community. These five areas of institutional emphasis represented areas critical to many of the accrediting bodies, areas accrediting teams should consider when evaluating online learning programs.

CHEA in the monograph, “Accreditation and Assuring Quality in Distance Learning” (2002), made the argument: “Accreditation examines and makes a judgment about how the fundamental features of an institution’s operation that are important to quality are affected by distance learning challenges” (p. 1). There are nine national

accrediting bodies and eight regional accrediting bodies that are making significant changes to their accreditation standards, policies, or procedures due to the challenges of online learning. This monograph emphasized the use of seven accreditation processes in ensuring quality within online courses:

1. Institutional Mission - Does offering distance learning make sense in this institution?
2. Institutional Organizational Structure - Is the institution suitably structured to offer quality distance learning?
3. Institutional Resources - Does the institution sustain adequate financing to offer quality distance learning?
4. Curriculum and Instruction - Does the institution have appropriate curricula and design of instruction to offer quality distance learning?
5. Faculty Support - Are faculty competent and engaged in offering distance learning courses, and do they have adequate resources, facilities, and equipment?
6. Student Support - Do students have needed counseling, advising, equipment, facilities, and instructional materials to pursue distance learning?
7. Student Learning Outcomes - Does the institution routinely evaluate the quality of distance learning based on evidence of student achievement? (2002, p. 7)

The implications for this study were that quality in online instruction is important to national and regional accrediting organizations. Hence, the quality of online instruction is important to academic institutions that wish to retain regional or national accreditation. Areas of best practice in online instruction were highlighted in this section and compiled in Table 2.1. Many of the areas emphasized by accreditation bodies are the same areas of focus found in other sections of the literature review, adding further evidence to the importance of these factors.

Table 2.1 Factors Cited by Accrediting Bodies as Contributing to Quality in Online Instruction	
Source	Factors of Quality in Online Instruction
U.S. Department of Education, 2006	(a) Mission, (b) curriculum and instruction, (c) faculty support, (d) student and academic services, (e) planning for sustainability and growth, and (f) evaluation and assessment.
WCET, 2005	(a) Institutional context and commitment, (b) curriculum and instruction, (c) faculty support, (d) student support, and (e) evaluation and assessment.
CHEA, 2002	(a) Institutional mission, (b) institutional organizational structure, (c) institutional resources, (d) curriculum and instruction, (e) faculty support, (f) student support, and (g) student learning outcomes.

Factors Influencing Student Satisfaction in Online Instruction

This section of the review of literature focuses on the importance of student satisfaction as a measure of quality in online instruction and the factors that relate to student satisfaction with online courses. Student satisfaction is an important measure of the quality of online courses. The Sloan-C Quality Framework (Sloan-C, 2006b) described online student satisfaction as: "Students are pleased with their experiences in learning online, including interaction with instructors and peers, learning outcomes that match expectations, services, and orientation" (¶ 3). There was considerable academic research on factors that improve student satisfaction within online courses. Of schools offering online courses, 41% agreed that students were at least as satisfied with their online courses, 56% were neutral, and only 3% disagreed (Sloan-C 2004, ¶ 9).

Ortiz-Rodriquez, and others (2005) in their study, "College Students' Perceptions of Quality in Distance Education," examined the topic of quality from the perspective of the online student's perspective versus the more common administrative perspectives of quality. The study asked questions such as: What does quality mean for students taking a

distance learning course? How are distance education students' expectations being met? (p. 98). Ortiz-Rodriques et al. studied a population of 1,269 students in the summer of 2002 in large southeastern universities. Within the total population of online students, a random sample of 400 was selected. The study was qualitative in nature using a single open-ended question delivered via a web-based form. The question asked was: "List as many factors as you can that you personally believe could potentially affect the quality of a distance education course in any way" (p. 100). Ultimately, 54% of the sample responded. Factors identified as leading to a quality experience included: increased communications, excellence in course materials, prompt delivery of materials, administrative issues such as registration and financial aid, and support services both technical and academic. In this study, most students identified communication as an important factor contributing to a quality learning experience. Communications included student-to-faculty, student-to-student, timely feedback, and help when needed. One theme that was common to all the studies when looking at factors for success was student interactions or communications.

Although the design of the study solicited good, non-directed feedback from students, many students did not provide detailed or specific feedback to the questions. The study findings emphasized communications and feedback, confirming several of the primary factors of online quality found in other parts of the review of literature. The other weakness found in this study was that a list of responses was not provided. It would have been beneficial to see the responses as gathered in the students' own words. These responses may have added context and depth to the research.

Wyatt (2005) argued, in "Satisfaction, Academic Rigor, and Interaction: Perceptions of Online Instruction," that online courses offered at colleges and universities throughout the U.S. were both praised and scorned by members of the higher education community. Wyatt's premise was that students sought degree programs online based on the need for flexibility of time, distance, work, and family-related constraints. Wyatt claimed that opponents of online instruction worry there is a general lack of quality and consequently an inferior learning experience for students. Wyatt's study reported the results of a survey that measures the opinions of a random sample of students at a medium sized public university in the Midwest who had taken both online and traditional (not online) courses. The survey was emailed to 262 students in spring of 2002 and consisted of 13 closed-ended questions and one open-ended question. There was a 45% return consisting of 120 students. Wyatt found no statistical significance when comparing the interaction between online and not online students, inferring neither modality was considered to be markedly superior. When students were asked if online courses were more academically demanding, Wyatt found 25% responded much more, 32% slightly more, and 36% as demanding. This was significant, indicating that online courses were demanding. Asked if online instruction provided a quality academic experience, 30% responded excellent, 47% good, and 12% average. There was significance in this finding as it showed students strongly agreed the online experience was of quality. Finally, the study asked how satisfied students were with the online course: 54% were very satisfied, 33% somewhat, and 3% were neither satisfied nor dissatisfied. Wyatt found that online delivery of courses was not a substitute for social interaction of students, but did meet a

niche of access for a number of respondents. The vast majority of students in this study indicated being either satisfied or very satisfied with their experience.

Wyatt (2005) made an assertion that students participating in the study indicated they had a quality experience with online courses and a high level of satisfaction. The findings appeared to be sound and well documented. Wyatt concluded with the question; "Does the perception that online courses are more academic challenging than traditional courses hold across other universities? Further research is needed to answer this question" (p. 467).

In the study "Student Satisfaction and Perceived Learning with On-line Courses: Principles and Examples from the SUNY Learning Network," Fredericksen, Pickett, Shea, Pelz, and Swan (2000) cited several demographic factors as enhancing a student's overall satisfaction with an online course. One interesting demographic factor cited was student age. The study had a sample size of 1,406 students and found that older students were most satisfied with their online courses.

> Age may also play a part in perceived learning in on-line courses. The youngest students (16-25) reported that they learned the least and that they were the least satisfied with on-line learning. Students in the 36-45 year old range reported that they learned the most and were the most satisfied with on-line learning. (p. 24)

In the same study, women were found to be slightly more satisfied with their online experience. A similar importance factor for the study was student interaction; "Interaction with the teacher is the most significant contributor to perceived learning in these on-line courses" (Fredricksen et al., 2000, p. 20).

Kim and Moore (2005) in the study entitled "Web-based Learning: Factors Affecting Students' Satisfaction and Learning Experience" surveyed 82 graduate students who were taking at least one web–based course from a public university. The authors

found that students with technical experience (i.e., Internet, computer, E-mail, and Web experience) were more likely to prefer web courses. In the background of their study, Kim and Moore pointed out that some studies revealed that computer experience or skills have little impact on the learning performance although they might affect the level of satisfaction. “For other learner–related factors (e.g., age, gender, learning styles, strategies), research results were rather inconsistent” (2005, ¶ 5).

Arbaugh (2001) in the study entitled “How Instructor Immediacy Behaviors Affect Student Satisfaction and Learning in Web-Based Courses” selected 10 control variables for the study of student satisfaction. These control variables were: student age, gender, number of international students, number of prior web-based courses taken by a student, student attitude toward the delivery technology, class section size, number of credit hours per course, and the use of audio clips. In a survey of 25 of the 28 web-based class sections offered by the MBA program at the University of Wisconsin Oshkosh, from summer 1999 through spring 2001, attitude toward course software was found to be a significant predictor of satisfaction with the delivery medium. Prior student course experience was also positively associated with satisfaction with the delivery medium.

Several common factors relating to student satisfaction in online courses emerged from the review of literature on student satisfaction. Ortiz-Rodriquez et al. (2005) found that student-to-student and student-to-instructor interaction, good course design, timely response times, feedback from the faculty member, good software interface, rich media, and accessibility were all factors in a quality experience for the learners. Wyatt (2005) selected factors of good interaction between learners as well as with the professor as important to student satisfaction.

The review of literature suggested factors directly related to online learning that influenced student satisfaction consisted of: (a) student interaction, (b) prompt faculty feedback, (c) use of appropriate technologies, (d) good course design, and (e) use of suitable course materials. With respect to factors related to student satisfaction, but indirect to the learning experience in online instruction, the review suggests the following factors be considered: (a) number of prior online courses taken, (b) student comfort with online technology, (c) gender of student, and (d) age of student. The factors directly related to the learning experience and, in turn, related to student satisfaction were used to develop the conceptual framework for the study. The factors indirectly related to the learning experience and related to student satisfaction were used to identify the potential confounding or moderating variables for the study.

The rationale for selecting student satisfaction as one of the dependent variable in the study included: (a) the large number of studies that have used student satisfaction as a measure of instructional quality, (b) the difficulty in identifying or developing and collecting data regarding measures of learning achievement or use of learning in subsequent activities such as employment or further education across a diverse variety of course, (c) the ease of measuring student satisfaction through online instruments, and (d) emphasis placed on the importance of student satisfaction as evidenced through tools such as the Noel-Levitz Student Satisfaction Survey.

Factors Influencing Student Retention in Online Instruction

This section of the review of literature emphasizes research to identify factors related to increasing student retention in online courses. Student retention is an important component for any higher education institution delivering online courses (Bocchi,

Eastman, and Swift, 2004). In many cases, online course delivery yielded lower student retention rates. Related literature indicated there were approaches in the delivery of online courses that would improve student retention within courses. The support needs of students exclusively studying in an online environment were substantively the same as for students on a campus (Raphael, 2006). The issue for online delivery became providing essentially the same services for students who were accessing instruction from a distance, or needed courses at times not offered on campus. This support emphasized the integration of institutional systems in order to ensure virtual students have access to comparable educational resources, experiences, and environments as their campus-based peers (Raphael). Demands from online students require student services to begin to parallel services provided on campus. Such student support was essential to student retention, learning achievement, and program completion (McCracken, 2004).

Bocchi et al., (2004) discussed the problems associated with retaining online students. To retain virtual learners, their study provided a review of a cohort approach with a team-based learning experience. There was extensive faculty feedback and interaction that addressed isolation concerns, provided application-based content and activities, and helped students meet expectations for personal and professional growth. These were all areas found by Bocchi et al. to cause students to drop out of online courses if they were not addressed. The authors stressed the need to offer a well-managed program and highly trained faculty members who were both interested and competent in teaching in the online learning environment.

The research for the Bocchi (2004) study consisted of surveying students enrolled in the Georgia web-based Master's in Business Administration (WebMBA) cohorts. This

program had maintained an average retention rate of 89% of all four cohorts begun prior to fall of 2003. Each cohort averaged 30 students. Students were enrolled through one of five home institutions in Georgia. A Likert scale questionnaire was administered to students to examine such factors as: reason for joining the program, expectations for program, experience with online learning, experience working on a team, and critical success factors. The survey results attributed a high retention rate to the team and cohort-based approach, as well as to extensive faculty interaction including an orientation. Further findings concerning increased retention included faculty members who provided students with feedback and structured interaction to address isolation concerns, offered relevant content and activities that helped students meet their personal and professional goals, and structured applied learning experiences that effectively developed their skills. Online faculty members played a key role in all facets of a successful program and high student retention. Aspects of successful student retention factors ranged from shaping student expectations as they enter the program, to facilitating the right kind of learning environment throughout. Several demographic factors were discussed in this study. More women than men enrolled in online courses, but data were unclear as to a level of satisfaction based on gender. Typically, older students enrolled for online courses with a mean age of 30, and tended to be more satisfied with online delivery. Also, 92% of the online students had taken other online courses. The more exposure to online learning, the more satisfied students tended to be (Bocchi et al., 2004). In summary, this study demonstrated a very enviable retention rate, but within a controlled group of students. These were specifically selected and highly motivated students in a rather exclusive MBA program.

The factors cited for success by Bocchi et al. tended to reflect other research studies in online retention (Raphael, 2006). These factors mentioned: (a) good faculty interaction, (b) feedback, (d) student-to-student participation, and (e) clear outcomes within the course. These factors were similar to the factors identified in the previous section as being related to student satisfaction. Two factors indirectly related to the learning experience were identified as being related to student retention. These factors were: age and the number of prior online courses taken. Older students and students who have taken online courses in the past tended to be retained at high levels.

Retention rates were of interest to college administrators and in many cases, retention was lower in online courses than in traditional face-to-face courses (Carr, 2000). Some administrators and faculty attributed the lower retention rates in distance-education courses to factors indirectly related to the learning experience, such as noting that distance-education students were often older, and thus busier, than traditional college students. Carr described strategies used by instructors to address these indirectly related factors such as establishing some form of personal contact with students and letting them know what was required in a distance course. Successful instructors frequently gave their students, who were often overloaded with other life activities, some flexibility in assignments and testing. According to Carr, instructors were also optimistic that, as they grow more comfortable teaching online and technologies became more advanced and functional their retention rates would improve.

In summary, many of the same factors related to student satisfaction also applied to increased student retention rates. The review of literature suggested that the factors that were directly related to the learning experience and student retention were as follows: (a)

good faculty interaction and feedback to students, (b) ample student-to-student communications, (c) appropriate use of technology, and (d) a clear understanding of both course and program outcomes. Two factors indirectly related to the learning experience that influenced retention were age of the student and prior experience with online courses. The factors related to retention in online courses were used in conjunction with the factors related to student satisfaction in the development of the conceptual framework for the study and identification of potential confounding or moderating variables. The rationale for selecting student retention as the second dependent variable in the study included: (a) the large number of studies that have used student retention as a measure of quality instruction, (b) the ease of measuring student retention through access to enrollment numbers from the courses surveyed, and (c) emphasis placed on the importance of increasing student retention and perseverance numbers by administrators of higher education institutions.

Use of Faculty Peer Review of Instruction in Higher Education

The president of the American Association for Higher Education stated; "In my mind, peer review of teaching is the single most promising trend of all for the improving of teaching" (Edgerton, 1993, p. 5). The purpose of this section of the study was to explore and document the use of peer review in improvement of instructional delivery in post secondary institutions. Peer review can provide formal, administratively endorsed opportunities for professors to support one another in using technologies and new teaching techniques (Mundy & Grabau, 1999). Faculty peer review has long been accepted as a method used in institutions of higher education to ensure quality in delivery

of instruction in a traditional classroom setting. Peer review is beginning to be used to improve quality of online courses (Kane, 2005).

Ross, et al. (2002) in their study, "Quality Assurance for Distance Education: A Faculty Peer Review Process," researched peer review as a factor of quality in online courses. This study discussed the need for quality assurance in distance education, described evaluation criteria, and reported on how Ivy Tech State College, Indiana created a peer review process as a formative evaluation tool to assure the quality of its distance education courses.

The study formed a peer review faculty committee which developed a set of 19 criteria based on guidelines used in accreditation of online programs by the North Central Association of Colleges and Schools (NCA). The peer review process collected data over one semester and provided peer review and reports over a second semester. The 19 criteria were grouped into five major factors of: (a) curriculum and instruction, (b) evaluation and assessment, (c) library and learning resources, (d) student services, and (e) facilities and finance. The reviews were completed for 18 of 36 participating faculty teaching online courses at Ivy Tech State College.

By way of critique, the Ross et al. (2002) study did not present a list of definitive results. There were numerous questions that this study presented as next steps. It asked that the study be continued and become routine. The question of how to handle poor performance was left for the future, as was a question of reviewer's access to student grades. Overall, the study reinforced many of the factors that are common to quality online learning. The study lacked sufficient sample size, only 18 of 36 institutions, to be considered significant and lacked an overall finding.

While there was outstanding online teaching in the college and university setting, many researchers agree that it could be improved significantly and that the teaching of even the best faculty using the online modality could be strengthened (Keig & Waggoner, 1995). “Collaborative peer review probably should include opportunities for faculty to learn how to teach more effectively, to practice new teaching techniques and approaches, to get regular feedback on their classroom performance, and to receive coaching from colleagues” (Menges, 1985). Faculty peer observations in the face-to-face teaching environment can serve three purposes: (a) individual faculty development, (b) performance management, and (c) evidence of quality assurance.

The importance of the faculty peer review section of this study was that it served as a useful overview for the value of using faculty peers to administer a quality critique of online courses. Faculty peer review has been used effectively for many years in postsecondary education as a means of review, critique, and improvement of instruction within traditional face-to-face instruction. Faculty peer review was a rather new concept for online course improvement. The strategy of faculty peer review for online instruction was the treatment in this study and could prove valuable when applied to online instruction as a strategy to improve instructional quality.

Summary of Review of Literature

The review of literature identified several factors that were related to student satisfaction and retention in online courses that were common and recurring across several studies. Because these factors were identified frequently within the related literature, it was assumed they would be important areas of focus in the study given its purpose. These factors fall in two categories: (a) those factors directly related to the

learning experience in online courses, and (b) those factors indirectly related to the learning experience.

Factors Directly Related to the Learning Experience in Online Instruction

With reference to the category of factors related to the learning experience of online students, seven factors were selected for in-depth analysis and as the organization for the summary of the review of literature. These factors were: (1) course overview and introductions, (2) learning outcomes, (3) assessment and measurement, (4) learning resources and materials, (5) learner interactions (student-faculty and student-student), (6) course technology, and (7) learner support.

The purpose of identifying the major factors directly related to the student learning experience in online courses was to use these factors as an organizer for the conceptual framework for the questionnaire developed for this study for data collection. Each of the seven factors is described in more detail below.

1. Course Overview and Introductions

The overall design of the course, navigational information, as well as general information concerning the course, instructor, and requirements of the learner should be transparent to the student at the beginning of the course. Conrad (2002) found that learners judge instructors' competency based on how clearly and completely online course materials present the details of the course. A well-organized course with a clear overview and introduction including a clear statement of expectations, explanation of the course outline, clear timelines, and well-written course notes provides students with a good start in their course.

2. Learning Outcomes

Learning outcomes and objectives should be prominent, clearly defined, and explained. They assist the learner in focusing on learning activities. Course outcomes or objectives should be presented early in the course and assessment linked with these learning outcomes. The value of learning objectives in describing measurable outcomes had long-standing support in the literature (Bloom, 1956; Mager, 1975). Outcomes are increasingly important to accreditation organizations; "The distance learning courses and programs must have educational learning objectives and outcomes that are consistent with the program objectives and the credential awarded. The delivery method must be appropriate for the students and the curriculum" (CHEA, 2002, p. 10). Howell et al., (2003) in, "Thirty-Two Trends Affecting Distance Education," argued for a shift to accountability with a distinct trend away from theoretical and seat-based time measures toward outcomes-based or employer-based competency. Clearly designed and defined competency-based learning outcomes are essential to a quality online course, both from a student perspective and an employer point of view.

3. Assessment and Measurement

Student assessment strategies that are tied to course outcomes and are presented early in the online course are important to the value of a course to students. Kane (2005) described factors of student assessment in the Quality Matters Peer Review Rubric in the following manner. "Assessment strategies use established ways to measure effective learning, assess student progress by reference to stated learning objectives, and are designed as essential to the learning process" (¶ 5). Ross et al. (2002) in addressing their peer review process described evaluation and assessment as one of the five categories

selected to review online courses. Within their reviews of a course, assessment of student learning was utilized, but their process went beyond that, looking at student outcomes, retention, and satisfaction (See Appendix B).

4. Learning Resources and Materials

Factor four was derived from journal research that described the importance of instructional materials embedded within an online course. This instructional material, when sufficiently comprehensive to achieve course outcomes and prepared by qualified persons competent in their fields, was important to student satisfaction. Online courses frequently utilize materials and standard textbooks produced by recognized publishers. In addition to these commercial materials, best results were obtained when the instructor or instructional designers were skilled in preparing materials for online learning students. Course content was more than just an aggregation of learning resources and materials. The design of course content was an essential aspect of courses, particularly online courses. This was an issue because, as Kanuka, Collett, and Caswell (2002) found, some "experienced distance education instructors tend not to design their courses with a great deal of flexibility - even though they acknowledge that Internet communication technologies can support it" (p. 166). Literature provided conceptual support for the importance of appropriate use of additional course materials.

5. Learning Interactions

Every journal study, academic website, and quality rubric reviewed for this study identified the importance of student interaction within online courses. Moore (1989) wrote extensively about interaction within courses and defined student interaction in three venues. Students learn best when they interacted with the faculty member, other

students, and course material. Additionally, Moore described a concept called transactional distance. Moore drew the conclusion that there were two key factors in independent learning, structure and dialog. Moore defined structure as a measure of an educational program's responsiveness to a student's need. He defined dialog as the extent to which, in any educational program, learner and instructor are able to respond to each other (Moore). Structure therefore referred to the design of the instructional course, while dialog refers to the interaction through communication of the learner and the educator. If a course has ample and meaningful communication within the triangle of student, faculty, and material, the student when surveyed should reflect positive feedback.

6. Course Technology

The criteria of course design, navigation, and related technology all describe and fall within an umbrella of course technology. Course design relates to the elements, modules, sequence, and internal consistency within an online course. Research indicated that consistency of both "look and feel" along with conceptual consistency were important to students who were looking for a satisfying experience in a course and as a solid instructional design concept (Wyatt, 2005). Although navigation was a small factor within the design of a course, it was listed frequently as a source of frustration for online students. The use of instructional technology embedded within online courses was consistently cited as of critical importance to best practice. Many students who had an affinity for online learning expect a certain level of technology within the course structure. Wyatt made the argument that too much technology introduced into a course may not enhance the learning results of a course, could cause undue frustration for the

student, or simply could fail to work. In this case, research had shown that too much technology was a detriment to learning and should be eliminated or reduced.

Moore (1989) described structure as an important factor of a quality online course. Enhanced student learning is a major function of course technology that enriches instruction and fosters student interactivity. The Quality Matters rubric, developed from a federal grant in 2003, defined course design and navigation as: "The overall design of the course, navigational information, as well as course, instructor and student information are made transparent to the student at the beginning of the course" (Kane, 2005 ¶ 5). It is very likely students would perform better and rate online courses higher when the course exhibits technology that enhances learning. This occurs with clear navigation features and appealing design.

7. Learner Support

The learner support factor describes students who are effectively supported within online courses through fully accessible modes of delivery, resources, and student support. Research for this study indicated that for online learning to be effective, students need to have sufficient support available in a timely manner. Learner support takes place in three areas: (a) learners have technical support that permitted access to the online shell of their course with many institutions providing online student help desks, frequently asked questions (FAQs), or tutorials prior to students beginning the actual online course; (b) learner support is provided by the instructor giving content assistance to the student along with support for online material; and (c) online support is given to a learner in their overall connection with the institution in student services and advising opportunities. Ludwig-Hardman and Dunlap (2003) described learner support as: "the positive influence

advising can have on distance learners' ability to successfully fulfill their educational goals has been well documented" (¶ 26).

Based on the review of literature, seven quality factors directly related to the learning experience were identified as likely to be related to student satisfaction and retention (see the frequency of identified factors of quality found in online instruction in Appendix B). These seven factors formed the basis of the conceptual framework (See Figure 2.1) used in this study for development of the data collection questionnaire. Within these seven factors of quality in online courses, there were five factors that were of particular importance to this study. The rationale for eliminating "Course Overview and Introduction" and "Learner Support" from the factors addressed in the study and used to develop the data collection questionnaire is elaborated within the dependent variable sub-section of "Design of Study."

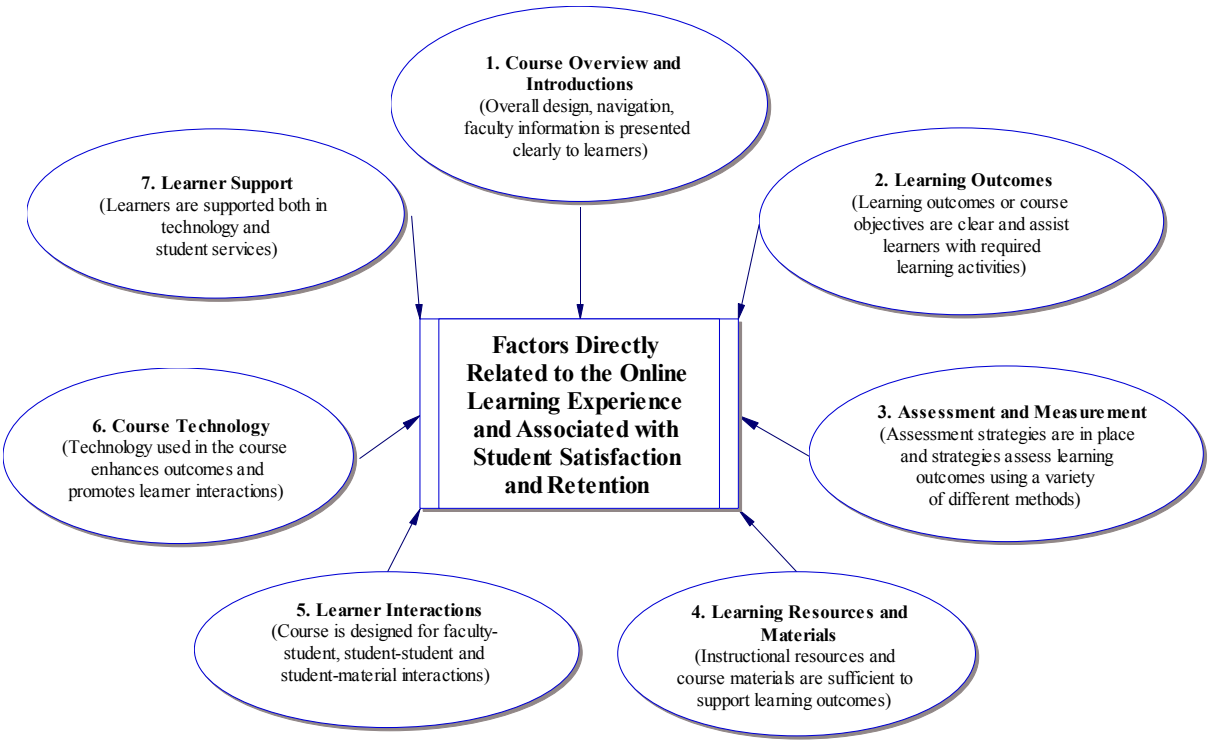

Figure 2.1 Conceptual framework of factors directly related to the learning experience in online instruction and associated with student satisfaction and/or retention. (Factors of quality online instruction selected for use in the research study included: Learning Outcomes, Assessment and Measurement, Learning Resources and Materials, Learner Interactions, and Course Technology. Factors of quality not selected for use in the research study were: Course Overview and Objectives and Learner Support).

Factors Indirectly Related to the Learning Experience in Online Instruction

Four indirect factors to the student online learning experience were frequently cited in the review of literature in the Student Satisfaction and Student Retention sections. These indirect factors were: (a) number of prior online courses, (b) student comfort with online technology, (c) gender of student, and (d) age of student. Table 2.2 describes the sources of these indirect factors to the learning experience in online courses and related to student satisfaction and/or retention. These four factors were used as the confounding variables, which may influence the relationship of the treatment of peer review on the

level of student satisfaction and retention. Figure 2.2 describes the relationship of these four indirect confounding variables to the online learning experience. These indirect factors were accounted for in the Design of the Study section of the study.

Table 2.2
Factors Indirectly Related to Learning Experience Cited by Researchers as Potentially Contributing to Student and/or Satisfaction of Online Instruction and Retention.

Source	Factors Indirectly related to the Learning Experience
Kim & Moore, 2005	(a) technology, (b) prior experience with the web, (c) age, (d) gender, and (e) learning styles
Arbaugh, 2001	(a) age, (b) gender, (c) number of international students, (d) number of prior web courses taken, (e) section size, (f) number of credit hours, (g) use of audio clips (technology), and (h) attitude toward software
Ortiz-Rodriquez et al. 2005	Technology
Bocchi et al. 2004	(a) gender, (b) age, and (c) prior experience with online courses
Fredericksen et al. 2000	Age
Carr, 2000	(a) age, and (b) prior experience with online courses

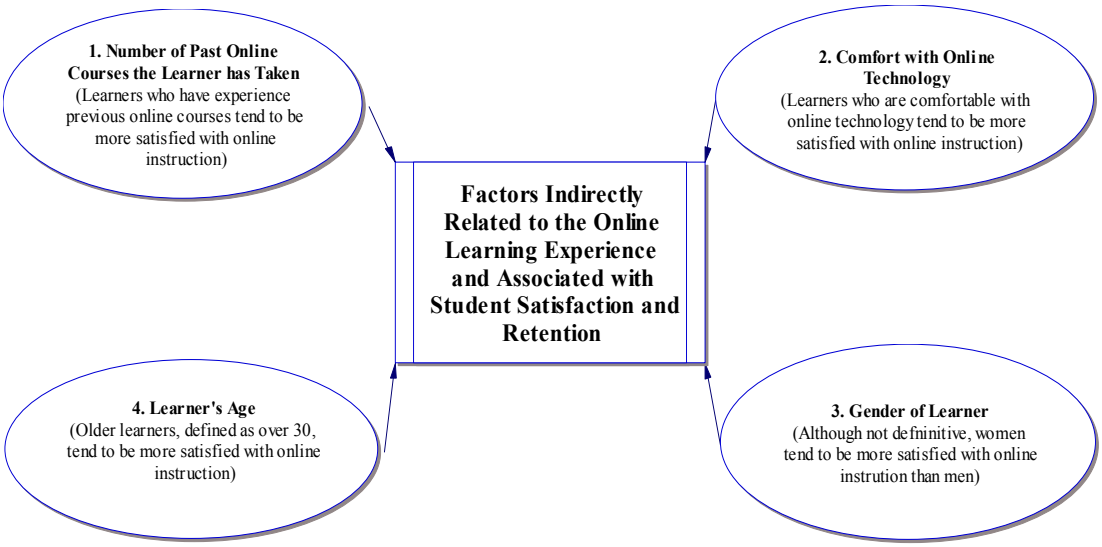

Figure 2.2 Factors indirectly related to the learning experience in online instruction and associated with student satisfaction and/or retention.

The review of literature provided a foundation for identifying factors that lead to the development of high quality online instruction in terms of student satisfaction and retention. The review of literature also provided a basis for the design of the study. The literature review consisted of three sections. The first section describes the processes, methods, and approaches utilized in searching for and selecting relevant material for the study. The second section of the review focused on five areas of research relating to the quality of online instruction. Those areas used in the review were: (a) general factors of quality found in online instruction, (b) factors used by accreditation bodies in the assessment of online instruction, (c) factors influencing student satisfaction in online instruction, (d) factors influencing student retention in online instruction, and (e) use of faculty peer review in higher education. Within section two, the subsections of the review of literature related to general factors of quality, factors used by accrediting bodies in assessment, and satisfaction and retention, were all used to develop the conceptual

framework shown in Figure 2.1. Section two also described the process for selection of possible confounding variables shown in Figure 2.2. Section three of the review of literature was a review and synthesis of the factors directly related to the online learning experience and factors indirectly related to the learning experience in online instruction.

CHAPTER 3: DESIGN OF STUDY

> *The social science approach to answering questions about the social world is designed to reduce greatly these potential sources of error in everyday reasoning. Science relies on logical and systematic methods to answer questions, and it does so in a way that allows others to inspect and evaluate its methods. (Schutt, 2004, p. 8)*

Chapter 3 of the study describes the philosophical approach, method, and techniques to be utilized in addressing the purpose and research questions of the study. It also offers a rationale for the selected approaches. The design of study also addresses the research data needed, selection of study participants, site selection, data collection, statistical analysis, strategies to ensure the soundness of the data, and the means to protect human subjects.

Philosophical Approach

This subsection of the design of study describes and offers a description for the philosophical approach used for the study. The philosophical approach selected for this study was postpositivistic utilizing a quasi-experimental method, and a web-based questionnaire as the primary technique to gather data. This section compares and contrasts positivism with postpositivism, addresses the basic assumptions, rationale for philosophical approach selection, criteria for truth, and design implications inherent with using a postpositivistic philosophical orientation to the study. "Philosophically, researchers make claims about what is knowledge (ontology), how we know it (epistemolology), what values go into it (axiology), how we write about it (rhetoric), and the processes for studying it (methodology)…" (Creswell, 2003, p. 6). Postpositivism, as a philosophical view, modifies the positivist premise by recognizing its complexities and limitations (Schutt, 2004).

Positivism

Positivism, as a philosophical approach, has dominated science and social science for hundreds of years. The emphasis is on logical and methodological rigor, on greater mathematical sophistication, and better experimental or correlational control (Bredo & Feinberg, 1982). Positivists believe that there is real world truth that transcends beyond an individual's body. That truth can be discovered, known, and described. “Positivists strive to use valid and reliable methods to describe, predict, and control human behavior” (Plack, 2005, p. 226). All conclusions about reality should be based on empirical observations that can be scientifically verified through the senses. In a positivist view of the world, science is seen as the way to discover truth (Denzin & Lincoln, 1994). The purpose of research is to understand the world well enough that events can be predicted and controlled. The world and the universe are deterministic. They operate by the laws of cause and effect. “They (positivists) believe reality exists independent of social context and can be discovered through objectively designed and applied research” (Plack, p. 226). These laws can be understood through application of the scientific method. Science is largely a mechanistic or mechanical affair. Deductive reasoning can be used to postulate theories that can be tested (Trochim, 2004).

Positivists believe in naïve realism, essentially that natural laws are predictable. Positivism maintains attributes of being experimental, manipulative, and includes the verification of hypotheses. “The aim of research is to collect evidence to formulate generalisations or laws that govern human behaviour. Thus, human behaviour can be predicted and controlled” (Schulze, 2003, p. 9). Schulze continued to describe validity for a positivist researcher as being determined by the scientific procedures of the method.

The researcher is an objective outsider and through the use of random sampling can predict the characteristics or behaviors of given populations.

Opposition to positivism in social science came from advocates of the interpretive or qualitative approaches, arguing for more openness to conceptions and understandings of individuals or groups being studied (Bredo & Feinberg, 1982). Criticism of positivism can be encapsulated in the following points: (a) positivistic research has not led to an improved understanding of social problems, (b) positivistic research is disconnected from the context in which it was studied, and (c) there is an inherent failure to accommodate human subjectivity in positivistic inquiry (i.e., the role of meaning in behavior, development, or social life) (Schulze, 2003).

Postpositivism

Postpositivism is an emerging epistemology that has evolved from the well-established positivist approach. The reason this philosophical approach has emerged was because researchers view positivism as too rigid and too absolute. Postpositivism provides for many of the aspects of positivism and yet accounts for many of the inherent flaws when positivism is applied to the social sciences.

Postpositivism was defined by Schutt (2004) as: "The belief that there is an empirical reality, but that our understanding of it is limited by its complexity and by the biases and other limitations of the researcher" (p. 73). Postpositivism takes into account the changeable nature of humans and tries to soften the hard line attributed to the positivist approach, that of a scientific method use to handle social science issues (Neuman, 2000). The postpositivist perspective is a converted version of positivism that addresses criticisms made by various schools of thought, but preserves the basic

assumptions of positivism. Postpositivism uses the ontology of critical realism, essentially reality that is imperfect and probabilistically apprehendable (Denzin & Lincoln, 1994). Examples of basic assumptions held within a postpositivist perspective include the possibility of objective truth and the use of an experimental method (Onwuegbuzie, 2002). A postpositivist approach to truth, realism, and experimental method is a common approach in the social sciences for both practical and conceptual reasons (Creswell, 2003). Practically, it is often impossible to use the kind of carefully controlled laboratory studies characteristic of natural science to describe social science situations and human interactions.

> Post-positivism represented a modified dualism, inasmuch as post-positivists believed that reality is constructed and that research is influenced by the values of investigators. However, at the same time, they believed that some lawful, reasonably stable relationships among social phenomena prevail. Notwithstanding, proponents of this school of thought tended to emphasize deductive logic, with much of their research being influenced by theory/hypothesis, which was reflected in a predominantly formal writing style using the impersonal voice. (Onwuegbuzie, 2002, ¶ 10)

Like positivists, postpositivists seek generalizations to explain behavior of humans. However, postpositivists are also interested in explaining how and why individual differences between humans occur (Schulze, 2003). The underlying assumption of postpositivism is that physical laws operate according to strict and logical reasoning. The rationale for selecting a postpositivist epistemology for this study was the need to be predictive, with a purpose of selecting actions that permit replication in online learning. Researchers, with a positivistic orientation, strive for objectivity. While conceding that true objectivity is difficult to achieve, postpositivists contend that one can approach the goal of objective research through careful attention to research methods and techniques (Creswell, 2003). Postpositivists admit that researchers are necessarily influenced by their

own subjective natures within their research. Conclusions about reality therefore reflect the viewpoints of both the investigator and the investigated. In many cases, postpositivist researchers admit their own biases in an attempt to provide more objectivity to their research (Schulze). From a postpositivist researcher perspective, a research study exhibits validity if the research: "… (a) generates or tests theory; (b) is based on empirical, logical evidence; (c) produces results that can be generalised to other contexts, and (d) acknowledges the influence of the researcher or the research methods on the results" (Schulze, p. 8).

Critics of a postpositivist philosophical approach contend that the approach fails to explain the unpredictable nature of humans. Conceptually, it is often noted that unlike the subjects of natural science, people are reflexive. Humans may alter their behavior based on the presence or findings of the researcher (Onwuegbuzie, 2002). Within a social science context, truth is not always about certainty, but about confidence. The questions are not always how true the conclusions are, but how much we can rely on them and make use of them within the body of knowledge in social science. Critics claim postpositivism applies to some purposes of social science such as identifying patterns, testing theories, and making predictions, but social science is also intent on interpreting culturally and historically significant phenomena, exploring diversity, giving voice, and advancing new theories. The postpositivistic perspective is very limited in its capacity to address the latter questions (Ragin, 1989).

Criteria for Truth

Theories can be derived from logic, deductive thought, and causal relationships. People, although not always predictable, tend to be self-interested and manage personal

affairs in a rational manner (Neuman, 2000). With regard to the criteria for truth, postpositivism asserts that science can be essentially value-free and logically connected to truth. Valid evidence is based on precise observations that are repeatable. Postpositivists believe that reality can be portrayed by means of linguistic, mathematical, and graphic descriptions that can be generalized to similar groups (Schulze, 2003). In addition, the researcher does not claim complete objectivity, but acknowledges personal biases in the selection of places and people to study (Trochim, 2004).

In evaluating the trustworthiness of research and research findings, postpositivists look to traditional criteria for evaluation. These criteria for trustworthiness include: internal validity and external validity. Internal validity relates to the truth-value or whether the findings of the research are consistent with reality. External validity relates to the ability to generalize the results to other situations beyond those addressed in the research.

Rationale for Use of Postpositivism Approach

The postpositivist philosophical approach was selected for this study because many institutions of higher education are strategically interested in the success of their online programs, whether course-by-course or as a program or degree. Based on the review of literature, many academic institutions and departments are presently making decisions to employ methods of quality improvement to their online courses. Research conducted under the postpositivist approach can provide evidence of what works. It is desirable in the defense of funding for new projects. Institutions when reviewing potential instructional quality initiatives would base initiation of new initiatives and

expenditures of funds on data driven decision-making which can provide evidence of effectiveness and replication.

This study was designed with a postpositivist philosophical approach together with a quasi-experimental method. This strategy was designed to produce objective and defensible evidence concerning the effectiveness of peer review processes in ensuring quality of online courses. Results provide evidence for institutions considering future use of peer review techniques for online course improvement. The postpositivist approach was suited to research that required tests of theory, use of surveys, relationships of variables, use of standards of validity and reliability, and measures of numeric information (Creswell, 2003). With regard to the study, this approach permitted contribution to the research community's current understanding of quality in online course delivery.

Researcher Background

This subsection of the design of study describes the experiences and personal views of the researcher in relationship to the focus of the study. The positivist tradition calls for complete separation between research and researcher. A postpositivistic tradition, selected for this study, permits some relationship between the researcher and research conducted. Schulze (2003) stated that the postpositivist may "… acknowledge the influence of the researcher or the research methods on the results" (p. 10).

When this study was initially prepared, I managed the Distance Learning Program for Portland Community College located in Portland, Oregon. I had been an online instructor for over 10 years. I had personally taught close to 50 online courses plus an array of traditional classroom based courses. Additionally, I designed, developed, and

deployed multiple online courses and had created a peer review process for Ecampus at Oregon State University. I had worked with Quality Matters; a process used in peer review training developed through a federal grant by Maryland Online. I had become a certified peer reviewer for that process. I had several consulting opportunities with two community colleges in Maryland in the areas of online learning and had delivered several presentations of online learning at professional conferences. Subsequently, during the completion of this study, I accepted a position of Associate Vice-President of Instruction at College of Western Idaho. One of my responsibilities in this role is the development and delivery of online courses within this institution. I had been involved with a peer review process for online courses at Portland Community College and now at College of Western Idaho. I am knowledgeable on the topic of online instruction and have both personal and professional reasons to be interested in the topics addressed in this study. I entered into this study with the view that a systematic faculty peer review would have a positive effect on student satisfaction and would increase student retention in online course delivery. Based on this perspective, a one-tailed test was utilized in Chapter 4 for several statistical analyses. This study aimed to validate or refute this view. My epistemological perspective favors a reformed iteration of positivism, the postpositivist philosophical approach. Operating under this approach, researchers must ensure rigor and a transparency of methods that enables the reader to fully appreciate the methods, analysis, and interpretations drawn from the research.

Method

The method subsection of the study describes the rationale for selecting the nonequivalent, quasi-experimental, posttest only design of the study along with the data

collection techniques of an online questionnaire. This section includes a description of study variables including independent variable, dependent variables, and possible confounding variables.

Quasi-experimental Design

The process for conducting this quantitative research study involved the principles of experimental design described by Creswell (2005). The Creswell true experimental model consists of the following central ideas: (a) random assignment, (b) control over extraneous variables, (c) manipulation of treatment conditions, (d) outcomes measurements, (e) group comparisons, and (f) threats to validity. Experimental design is a research approach in which the researcher has control over the selection of participants in the study, and these participants are randomly assigned to treatment and control groups (Creswell). The experimental design method is appropriate according to Creswell "…when you want to establish possible cause and effect between your independent and dependent variables" (p. 283). If all variables that might influence the dependent variable are controlled, then it can be said that the independent variable caused or probably caused the dependent variable. True experimental design must meet two criteria: (a) random assignment of participants to groups, and (b) manipulation of an internal variable.

Within the overall category of experimental design, there is a sub-category of quasi-experimental design. True experiments comprise the most rigorous of experimental designs due to equating groups through truly random assignment. Creswell (2005) described the need and value in utilizing intact groups within the social science setting. Education in particular offers challenging situations that can make the random assignment of participants to an experiment impossible. An example germane to this

study was the fact that specific academic courses were populated with students who "self-select" into sections. In those cases, a quasi-experimental approach must be utilized. Schutt (2004) defined quasi-experimental design as: "…one in which the comparison group is predetermined to be comparable to the treatment group in critical ways, such as being eligible for the same service or being in the same school cohort" (p. 204). Campbell and Stanley (1963) defined a quasi-experimental approach, referred to as Static Group Comparison Design, as a design that uses a comparison group that is similar in terms of a set of pre-defined characteristics. In the case of this study, participants in a faculty peer-reviewed course were compared with participants in a non-peer reviewed course of an equivalent type. This matching or paired strategy is called nonequivalent group design. The research study utilized a non-equivalent, quasi-experimental design approach because subjects could not easily be assigned randomly to groups, but comparison groups did meet specific criteria (Schutt, 2004).

In the posttest-only control group design, Creswell (2003) argued the advantages of the quasi-experimental approach. "This design controls for any confounding effects of a pretest and is a popular experimental design. Participants are randomly assigned to groups, a treatment is given only to the experimental group, and both groups are measured on the posttest" (p. 170). Quasi-experimental methods include assignment, but not random assignment to groups. A disadvantage of the quasi-experimental approach is that more threats to internal and external validity may be introduced. By definition, there is not random assignment of participants to groups; hence potential threats exist to validity (Creswell, 2005). Both the internal and external threats to validity are addressed in the subsection of strategies to ensure soundness of data.

Treatment Group	X O

Matched Control Groups	O

This strategy calls for the peer reviewed treatment group (X) to be followed by an observation (O), which was made through an online questionnaire. The control group was a paired, non-peer reviewed group. Phase One of the study consisted of treatment and control groups selected at Quality Matters affiliated colleges. These Phase One colleges all accepted Quality Matters as a faculty peer review process. There was no treatment administered to the control group, but an observation (O) was made through the same online questionnaire. The assumption was that the treatment group and the matched control group were the same except for the effects of the treatment. This assumption was, in turn, dependent on the relevance of the characteristics used to match the two groups.

During the initial phase of the study, it was determined from several preliminary evaluations of student questionnaires that institutions that accepted Quality Matters standards may allow the Quality Matters involvement in some courses to influence all online courses in that institution. With this preliminary finding in mind, a Phase Two level of control courses was added by including paired online courses from colleges that were not involved with Quality Matters. The study compared student satisfaction levels between the Quality Matters treatment groups and both control groups at Quality Matters and Non-Quality Matters colleges. These three groups of courses were defined as: "Reviewed" courses, "Non-Reviewed" courses, and "No Review." These three groups of courses are defined as follows:

1. "Reviewed" Courses – Treatment online courses offered at Quality Matters affiliated colleges that had been peer-reviewed meeting Quality Matters standards.

2. “Non-Reviewed” Courses – Control online courses offered at Quality Matters affiliated colleges that were paired by discipline and level with treatment courses.
3. “No Review” Courses – Control online courses offered at Non-Quality Matters affiliated colleges that were paired by discipline and level with treatment courses.

The design for the study utilized the quasi-experimental, nonequivalent group approach as described in Table 3.1.

Table 3.1 Quasi-experimental Study Design using Posttest-Only		
Selection of Treatment Courses at a Quality Matters College. (Phase One Colleges)	Treatment Courses	Posttest
Selection of online courses included those that had been peer-reviewed meeting QM standards, referred to as "Reviewed" Courses.	Courses had been faculty peer-reviewed using Quality Matters standards.	Online questionnaire administered to students enrolled in treatment courses.
Selection of Control Courses at a QM College. (Phase One Colleges)	Control Courses	Posttest
Selection of paired online courses as parallel in discipline and level to treatment group, referred to as "Non-Reviewed" Courses.	Courses had no treatment applied.	Same online questionnaire as used with treatment courses.
Selection of Control Group at a Non-QM College. (Phase Two Colleges)	Control Group	Posttest
Selection of paired online courses as parallel in discipline and level to treatment group, referred to as "No Review" Courses.	Courses had no treatment applied.	Same online questionnaire as used with treatment courses.
NOTE: The Treatment Courses were selected from QM (Quality Matters) affiliated colleges. Two types of Control Courses were selected, one from the QM colleges ("Non-Reviewed"), the other from Non-QM colleges ("No Review"). Comparisons for this study were made between the Treatment Courses and Control Courses consisting of "All Others" (All Other Control Courses included from both "Non-Reviewed" and "No Review").		

Independent Variable

Creswell (2003) describes independent variables as variables that probably cause, influence, or affect outcomes. These variables are also described as treatment, manipulated, or predictor variables. In the case of this study, the single independent variable was faculty peer review of online courses using a systematic best practices rubric. Based on the review of literature, there were seven factors described in the conceptual framework (see Figure 2.1) that were found in quality online instruction. These factors were expected to be important to both student satisfaction and student

retention. Additionally, the review of literature described the value of faculty peer review when applied to traditional classroom based instruction. The treatment used in this study was a process of faculty peer review using a rubric containing five of the quality online instruction factors. It was hypothesized this treatment would result in higher student satisfaction and an elevated percentage of student retention.

To provide added consistency and credibility to the treatment in the study, the treatment (independent variable) was defined as a course created and delivered by a faculty member who has completed the Quality Matters Peer Reviewer Training. The course was considered to have adequate treatment if it attains a Quality Matters faculty peer rating of 85% or greater when reviewed. An 85% Quality Matters rating was awarded through the assignment of 80 possible points within eight best practice categories found in the Quality Matters scoring rubric. The course must have attained an aggregate of at least 68 of the possible 80 points to attain the 85% from three faculty peer reviewers before being considered as meeting standard (Quality Matters, 2006). The treatment group came from what the study referred to as Quality Matters colleges. The study used two control groups, one set from the study's Quality Matters colleges (did not receive peer review as the treatment group), and the other set from Non-Quality Matters colleges. Control groups were referred to as "All Other" for the purposes of the study.

Dependent Variables

Dependent variables rely upon the independent variables; they are the outcomes or results of the influence of the independent variables (Creswell, 2003). There were two dependent variables in the study: (1) student satisfaction ratings of specific online courses

as measured by an online questionnaire and (2) retention rates of students enrolled in the same courses, measured between the end of week one and the end of course.

With respect to the dependent variable of student satisfaction ratings, the data set consisted of student rating of satisfaction with the selected online courses. The satisfaction measures for this study were: (a) overall student satisfaction with the course and (b) satisfaction with each of the five factors that were identified in the review of literature and resulting conceptual framework as being related to overall satisfaction. These factors of quality online instruction were: (a) learning outcomes, (b) assessment and measurement, (c) learning resources and materials, (d) learner interactions (student-faculty, student-student, student-materials), and (e) course technology (see Figure 2.1).

There were initially seven factors of best online practice identified and analyzed in the review of literature section of the study. Two of these seven factors were judged to be of less importance in measuring student satisfaction in an online course. The first factor of less importance was "Course Overview and Introductions" (see Appendix B). This factor was cited in only three of the ten studies used in the review of literature. It served a minor role in overall online course functions and frequently would be included in non-reviewed online courses. Due to the fact that it appeared in both peer reviewed and non-peer reviewed courses, this factor was judged to not serve as a factor to differentiate the two, thus would not be a factor that greatly differentiates peer review with non-review. The second factor of the initial seven judged to be of less importance was "Learner Support." Although learner support was cited in seven of ten studies, it was frequently a factor outside the control of the faculty member. Learner support consisted of support for the learner both from a student services and non-course related, technical

perspective. It may not be consistently under the control of faculty and cannot reliably be associated with student success in course material. Additionally, many colleges control learner support from a systems level, and not a faculty level. Although “learner support” is an important factor, it was deemed as extraneous to the study, as it would likely appear in both peer reviewed and non-peer reviewed courses. The final reason in selecting only five factors in the measurement of student satisfaction had to do with the construction of the questionnaire design and techniques to control non-response bias. Thirty questions are at the recommended higher number of acceptable questions a respondent would desire to answer (see sub-section on “Construction of Questionnaire”). More questions could increase non-response bias due to the length of the questionnaire. Adding two more factors would bring the total number of questions beyond that comfort level. The definition and measurement of the variables for this study are listed in Table 3.2.

Table 3.2
Definition and Measurement of Variables

Independent Variable	Definition	Measurement
Faculty Peer Reviewed Online Course	Online course that has been reviewed by at least three faculty peers, using a rubric of best practice, and scoring a minimum of 85% in the Quality Matters process.	Yes/No
Dependent Variables		
Student Satisfaction - "Outcomes"	Level of student satisfaction with presence of learning outcomes or course objectives in the online course.	Mean score of "outcomes" related questions.
Student Satisfaction - "Assessment"	Level of satisfaction with methods of assessment and approach to be used in the evaluation of course outcomes. Methods for assessment are clearly described in the course.	Mean score of "assessment" related questions.
Student Satisfaction - "Learning Resources and Materials"	Level of student satisfaction with the type and variety of learning resources selected for use within the online course.	Mean score of "learning resources and materials" related questions.
Student Satisfaction - "Interactions"	Level of satisfaction student has with the number of opportunities to interact with instructor, other students, and course material.	Mean score of "interactions" related questions.
Student Satisfaction - "Course Technology"	Level of satisfaction student has with course design in the integration of appropriate and effective technology within the online course.	Mean score of "course technology" related questions.
Student Satisfaction - "Overall Satisfaction with Course"	Level of student's overall satisfaction with the online course.	Mean score of student "course satisfaction" question and mean score of all "student satisfaction" scores.
Student Retention - "Percent of Students Retained through the End of Course"	Difference between students enrolled in an online course at the end of week one and the number of students remaining enrolled in the same course at the end.	Percent of students "retained" at the end of course.

Confounding Variables

Confounding or moderating variables are described as attributes or characteristics that the researcher cannot directly measure because their effects cannot be easily

separated from other variables. Confounding variables may influence the relationships between independent and dependent variables (Creswell, 2005). The review of literature indicated that there were four factors indirectly related to the learning experience that research studies had shown to relate to student satisfaction and/or student retention in an online course. These factors (variables) were: (a) student age -- older students tend to rate online courses higher (Arbaugh, 2001; Bocci et al. 2004; Fredericksen et al., 2000; Kim & Moore, 2005; Ortiz et al., 2005), (b) student's gender -- although inconclusive from the literature, men tend to perform better in online courses, but women tend to enroll at higher numbers, and appear to be more satisfied with online courses (Arbaugh, 2001; Kim & Moore, 2005), (c) number of prior online courses taken -- students who have taken online courses in the past rate online learning higher (Arbaugh), and (d) student level of comfort with online technology -- students who are comfortable with technology tend to rate online courses higher (Arbaugh; Kim & Moore). These four factors were indirectly related to the learning experience and not under the control of the instructor (see Figure 2.2). The approach of course matching was used to mitigate the effects of these variables. Given their importance in the literature on student satisfaction and retention, they were examined more specifically in this study.

Data Needed

This subsection of the study describes data collected to address the four research questions. It illustrates data needed regarding the independent variable of faculty peer review, the dependent variables of student satisfaction (and its five factors), student retention, and the four confounding variables described earlier. This subsection describes:

data collected; data collection strategies; site selection, course selection, data collection processes; issues of instrument validity, reliability; and pilot testing.

Data Collected

The data collected for the dependent variables consisted of two categories: student satisfaction and student retention. Student satisfaction was collected from individual students enrolled in specific courses via a questionnaire in the form of answers to questions in each of five factor categories: learning outcomes, assessment and measurement, learning resources and materials, learner interactions, course technology, plus one question regarding overall satisfaction with the course. Student retention data was collected at the course level, in the form of percent of students retained in online courses between the end of week one and end of course. Data regarding retention consisted of enrollment counts for each of the "Reviewed," "Non-Reviewed," and "No Review" courses. Student enrollment data were collected and compared between the end of week one and at the end of the course for both the treatment and control groups. End of week one was used because it was a definitive last day to drop for most academic colleges. Students who found themselves misplaced in an online course for any reason normally dropped at this point. This approach provided a consistent beginning of course student count for both "Reviewed," "Non-Reviewed," and "No Review" courses. A comparison was made relating end of week one student count with end of course student count. In an attempt to account for students who register and begin after week one, faculty were asked to account for any late starts. Late starts that were identified were counted as week one starts. A late start should not adversely affect the student's ability to assess the satisfaction of the course. End of course counts are used in most states as the

total for any funding reimbursement to colleges. Values were reported in this study based on student head count and not Full-Time Equivalents (FTE). FTE values were calculated differently depending upon the state; headcount was reported more consistently. The request was for simple aggregate counts of students within the paired sections: end of week one and end of class.

Data Collection Strategies

Phase One of the study consisted of collecting student satisfaction data from colleges that were formally affiliated with the Quality Matters certification. Site selection for the study began with a population of colleges and courses that had a Quality Matters treatment applied. Within these study colleges, courses were selected that paired "Reviewed" with discipline similar control courses termed "Non-Reviewed." Students were provided with the online questionnaire within both these treatment and control courses. Phase Two of the study consisted of gathering student satisfaction data from additional "No Review" control courses at colleges that had no affiliation with Quality Matters. Ultimately, the study compared "Reviewed" courses with "All Other" courses. The purpose of the study was to compare the affect of online courses with formal faculty peer review with online course that did not have formal faculty peer review.

Site Selection

Site selection for the study was based on colleges that actively utilized Quality Matters as a formal peer-review process of online courses. The review of literature suggested that there are seven primary factors of quality consistently found in online instruction. An academic process that incorporated these seven areas of quality focus was Quality Matters. Quality Matters met the study requirement to include the factors

highlighted in the review of literature as a faculty peer-review process. Additionally, the Quality Matters review rubric matched the factors found in the "Conceptual Framework" of the study (see Figure 2.1). Quality Matters was adopted at 109 colleges, and there were 430 peer reviewers trained. Although adopted, most of the colleges had not done formal Quality Matters reviews of courses. Most of the Quality Matters institutions were community colleges. Selection for the study was based on being a community college.

The population for this study was online courses that had the characteristics of being: (a) faculty peer reviewed, and (b) reviewed using a rubric in the faculty peer review process that included at least the factors found in the conceptual framework (see Figure 3.1). The target population for the study was courses that had a Quality Matters designation as described previously. The sampling frame was the actual list of courses that had the Quality Matters designation in 2006 from across the U.S. (see Table 3.3). The sample for this study was a subset of colleges in the sample frame as described earlier in this section. Figure 3.1 depicts the sampling frame of the study.

Table 3.3
Target Population Colleges with Quality Matters Certified Courses

College	QM Reviewed Courses
Anne Arundell CC (MD)	17
Allegany CC (MD)	16
Carroll Community College (MD)	4
College of Southern Maryland (MD)	7
Harford CC (MD)	3
Montgomery CC (MD)	4
Portland Community College	4
Total QM Reviewed Target Courses	55

NOTE: These institutions were considered Phase One Colleges. Not all courses were used in the study.

There were nine community colleges used in the study for both Phase One and Two. Half of the colleges were from the east coast, located in Maryland, the other half on

the west coast located in Oregon. Specific Phase One colleges were selected from a target population of active Quality Matters Colleges. The sample included colleges that responded positively to a request to participate in the study. Phase One colleges in Maryland consisted of: Anne Arundel, Allegany, College of Southern Maryland, Carroll, Harford, and Montgomery Community Colleges. The Phase One College in Oregon with an active Quality Matters certification was Portland Community College. Phase Two colleges with no affiliation with Quality Matters and no formal peer review process were from Oregon. These colleges were: Clackamas and Southwestern Community Colleges.

Course Selection

As mentioned previously, there were three types of courses selected for the study. The courses were described by "type" as follows (see Table 3.4):

Type I: courses that were formally reviewed using Quality Matters criteria and received formal recognition from Quality Matters. These courses were referred to as "Reviewed."

Type II: courses that were matched to Type 1 course within the same Quality Matters college, but had no formal review using Quality Matters criteria. These courses were referred to as "Non-Reviewed."

Type III: courses were from Phase Two colleges and had no formal affiliation with Quality Matters and had no form of faculty peer review. These courses were referred to as "No Review."

Table 3.4 Type One, Two, and Three Courses in Study			
	Type I "Reviewed" Courses	Type II "Non-Reviewed" Courses	Type III "No Review" Courses
Phase One Colleges	Quality Matters affiliated college - course was Quality Matters reviewed.	Quality Matters affiliated college - course was non-Quality Matters reviewed.	
Phase Two Colleges			Non-Quality Matters affiliated college – course had no Quality Matters review.
NOTE: Type I courses affiliated with Quality Matters Certifications. Type II courses had no formal peer review process. Type III courses had no affiliation with Quality Matters.			

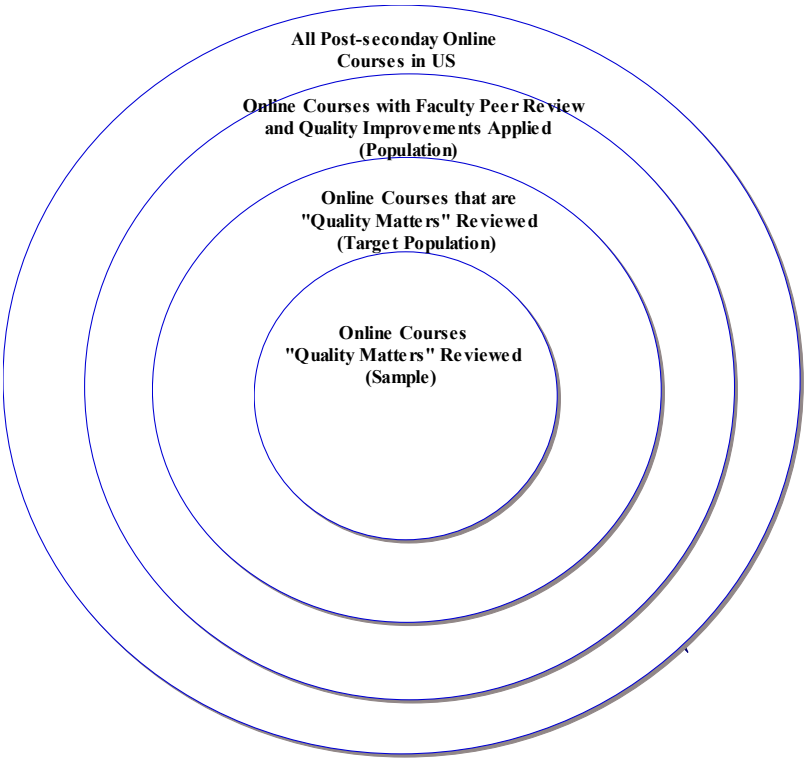

Figure 3.1 "Phase One" population, target population, and sample for research study. NOTE: "Phase Two" of the study consisted of all post-secondary online courses in the U.S.

Data Collection Processes

Data collection addressed the three categories of variables describe in the previous section: (1) student satisfaction with online courses (overall course satisfaction and five study identified satisfaction factors), (2) four confounding variables, and (3) student retention in online courses. Student satisfaction and the four confounding variables were collected through administration of a posttest only, online questionnaire of participants in paired online courses that are either faculty peer reviewed or non-peer reviewed. Faculty peer-reviewed courses acted as treatment and were selected from a collection of eligible courses based on two factors: (1) faculty teaching the course had completed the Quality Matters Reviewer Training, and (2) courses had been Peer Reviewed using the Quality Matters rubric and received a composite score of 85% or more. Non-peer reviewed courses were used as control courses, and were paired against the faculty peer-reviewed courses. The control courses were selected from a population consisting of: (a) courses where faculty have indicated that no formal faculty peer review process has been applied to the course, and (b) courses that parallel the discipline and level of the peer reviewed course. Discipline denotes course topics such as: mathematics, writing, science, and sociology, see Figure 3.1. Level denotes the course sequence such as: Mathematics 100, Mathematics 201, or Writing 121, Writing 221.

The questionnaire was administered via the web to students sometime after the course midpoint and prior to last week of the course. The period for administration of the questionnaire was selected after the midpoint of the course to ensure students were comfortable with the online course technology, format, content, and instructor. Students would have had some exposure to course assessments by that time. The end point of

questionnaire administration was prior to the last week of course, generally reserved for final examinations. The last week of a course was not used because students are normally preoccupied with final examinations and may not complete the questionnaire, potentially adding to non-response bias. See Appendix C for the list of questions that made up the questionnaire.

Each online course instructor was contacted and provided with a written overview describing the purpose of the questionnaire and a web-link to the survey tool. This procedure aided in reducing non-response bias, described later. Each questionnaire was open to potential study respondents for a period of at least 2 weeks (normally longer), beginning after the mid-point of the course and ending prior to the last week of the course. Answers were locked in after the form was submitted. Student identity was anonymous; students were apprised of this fact.

Student course retention data were collected from the group of surveyed courses, and measured the number of students initially enrolled in the course and the number of students active at the end of courses. Results were reported in the form of percent of students retained. Although the individual responses to each question were anonymous, the discipline and level of the course was tracked along with the number of respondents in each course.

Study Phases

The study was conducted in two phases. Phase One consisted of colleges that were affiliated with Quality Matters. Phase Two consisted of colleges with no affiliation with Quality Matters.

Phase One of Study

Phase One site selection for the study consisted of colleges and courses that have had a quality review treatment applied. The study used seven colleges that have a large number of Quality Matters reviewed courses. The primary reason for using these seven colleges was a willingness by collegial administration to permit the study. The additional rationale for selecting these seven community colleges for the pool of eligible colleges was the ability to focus on fewer colleges while yielding high numbers of Quality Matters reviewed courses. These peer "Reviewed" courses were paired with other similar, "Non-Reviewed" courses within the same college in terms of discipline and level to the greatest extent possible.

The approach for course selection for the questionnaire process consisted of locating treatment or control courses at specified Quality Matters colleges. Study treatment courses were selected from the 66 courses available through Quality Matters. The paired courses were selected based on a discipline and course level match with the paired course. Treatment courses were selected from the group of courses at the colleges indicated. Control courses were selected from the same college and as close as possible to the treatment course in terms of discipline and level. The course selection was also predicated on a willingness of the faculty members in the control and treatment courses to participate in the study.

Student participants for the questionnaire consisted of those enrolled in either treatment courses or the paired control courses. The treatment course group was selected from colleges who had participated in Quality Matters training. The faculty member delivering the course had completed the Quality Matters faculty training and the course

had earned the Quality Matters designation. The control course group consisted of designated faculty teaching online courses that had no formal peer review applied. This was determined during the initial contacts with colleges and faculty asking for participation. The control groups of students were enrolled in non-peer reviewed courses of similar discipline and level as treatment courses. Combining the treatment and control courses in Phase One provided 25 courses included in the study. Total student participation in Phase One consisted of 450 students who completed a questionnaire.

Phase Two of Study

Phase Two of the study was added after several prototype questionnaires administrations were delivered and analyzed. It was concluded that colleges that were affiliated formally with Quality Matters may have experienced diffusion of treatment. The interaction of faculty may have spread Quality Matters best practices to non-reviewed courses. It was decided to select two additional colleges to serve as an additional control group to the Quality Matters colleges. The two colleges selected for this population were Southern Oregon Community College (SOCC) and Clackamas Community College. Both colleges were mature in the delivery of online courses, both had courses that could be paired with Phase One courses, and neither college had any formal connection with the Quality Matters Rubric, nor any formal peer review process for online courses. The courses in Phase Two of the study were termed "No Review" courses.

In summary, the study sample consisted of nine participating colleges, seven in Phase One and two in Phase Two. There were 41 courses in the study sample. Of those, 14 courses that were "Reviewed" and 27 courses that were "All Other," both "Non-

Reviewed" and "No Review." There were 554 students who participated by completing a questionnaire of which 211 students were in "Reviewed" courses and 344 students in "All Other" courses.

Development of Questionnaire

The study utilized an online questionnaire for the purpose of comparing the student satisfaction levels of peer reviewed online courses with non-peer reviewed courses. The review of literature did not identify an existing appropriate survey tool, although a number of related survey instruments did exist. Therefore, a unique questionnaire was developed as part of the study.

The review of literature in this study indicated there were seven factors related to quality in online courses. As noted earlier in the design section of the study, only five factors were addressed in this study: (1) Learning Outcomes, (2) Assessment and Measurement, (3) Learning Resources and Materials, (4) Learner Interactions (student-faculty, student-student, student-materials), and (5) Course Technology. These five factors were incorporated into the performance aspect of the questionnaire with three or more questions devoted to each factor.

Questions for each factor within the questionnaire were designed with two characteristics in mind: (1) importance of factor to the student, and (2) student satisfaction with the factor within their course. Importance established a general, student reported, benchmark for the value placed on each of the factors. Importance was measured by one general question for each factor. Satisfaction questions measured the student's level of approval for that specific factor with the online course. Students were asked how important a best practice was to their ability to learn, then specifically how

satisfied they were with the performance found within their current course (see Table 3.5 for breakdown of questionnaire).

Table 3.5
Study Questions and Satisfaction Factors

Area of Focus	Questionnaire	Types of Question
Confounding Variables	Questions 1, 27, 28, 29	General – age, gender, # of prior online courses, and comfort with technology
Background Information	Questions 2-4	Background
Learning Outcomes	Questions 5-8	Importance and Satisfaction
Assessment and Measurement	Questions 9-13	Importance and Satisfaction
Learning Resources and Materials	Questions 14-18	Importance and Satisfaction
Learner Interactions	Questions 19-22	Importance and Satisfaction
Course Technology	Questions 23-26	Importance and Satisfaction
Overall Course Satisfaction	Question 30	Satisfaction

The study utilized a questionnaire technique incorporating an ordinal scale. Tuckman (1972) described ordinal scales as ordered, ranked items. The tool selected for this ordinal questioning approach was the multiple-choice Likert scale. The Likert tool provided a sequential five point scale separated by intervals assumed to be of equal distance. This was formally termed an equal-appearing interval scale. This scale allowed subjects to register the extent of their agreement or disagreement with a particular statement of an attitude, belief, or judgment (Tuckman). Ranges in the questionnaire were *1(strongly disagree)* through *5(strongly agree).* This questionnaire was designed to employ a midpoint that permits a respondent a truly neutral response. It did not force an expression of an opinion when one may not exist. Strengths of the Likert scale for this study included: (a) Likert scaling was a bipolar scaling method, measuring either positive

and negative response to a statement -- it permits comparing and contrasting paired courses; (b) the scale provided the shades of preference that may not be discernable from only a "yes" or "no" response scale; (c) it was easy for the students to complete; and (d) as a web delivered tool, it was easy to score (Babbie, 1995). Weakness of the Likert scale included: (a) no room for answers beyond the response selections provided, and (b) Likert scales rarely provided a specific context.

The process for cataloging data of students who displayed factors within the confounding variables area included using questions: 1, 26, 27 and 28 to gather data related to these confounding variables. Data for student age were collected by asking for the student's age. The mean age was calculated for each sample group. Students reporting age of 30+ may have a preference for online instruction (Arbaugh, 2001). Male and female student ratio was computed as a percent of female for each course. Students were asked a gender question with "M" and "F" as selections. Students were asked how many courses they have completed. The mean number of prior courses was calculated for the sample. Students who had completed online courses in the past tended to be more satisfied with online instruction (Arbaugh). Students were asked from "strongly agree" through "strongly disagree" if they are comfortable with online technology. Students who expressed comfort with online technology may be more satisfied with online instruction (Arbaugh; Kim & Moore, 2005). A mean score was established for student preference for online instruction by using a numerical value.

Methods to Achieve High Rates of Institutional Sponsorship for the Questionnaire

Birdie and Anderson (1974), in *Questionnaires: Design and Use*, suggested that one method to ensure good return of questionnaire responses was through sponsorship.

"Most investigators agree that impressive sponsorship for a study has a major effect on the attitude of questionnaire recipients toward the study, and adequate sponsorship can be helpful in achieving a high response rate" (p. 29). Administrative sponsorship for this research study was secured through a request to the Board of Directors of Quality Matters. The Board was willing to make a direct appeal through email and personal contact at Quality Matters meetings to selected colleges in support of the efforts of this study. The credibility of the organization sponsoring the questionnaire can have a very positive effect on participation rates. Faculty acceptance of the project was essential for high student response rates (Muijs, 2004). Another method to assist in greater response rates by online students was to directly contact faculty of targeted sections asking for support and assuring faculty of the anonymous nature of responses. The faculty member had an electronic script describing the purpose of the study along with a web-link to the questionnaire. Finally, results of this study were thought to be important to faculty and administration in determining the value of peer review techniques applied to online courses, this perspective was used as a positive factor in eliciting help with deployment.

Methods to Achieve High Rates of Student Response in Questionnaire Completion

Manfreda, Batagelj, and Vehovar (2002), in "Survey Design Features Influencing Response Rates in WebSurveys," described a meta-analysis of several studies on response rates to web-based surveys. These response rates studied varied greatly. In one case, they described "Overall completion rates, referring to partial and complete respondents, range from 1% to 95% (average 42%) for 89 reported cases" (p. 13). In many cases, the most important reasons causing refusal to participate in a questionnaire were the length of the questionnaire, annoying or boring questionnaires, difficult or

sensitive questions, or low data transfer rates during webpage download (Manfreda, Batagelj, & Vehovar, 2002). Response rates for the purposes of countering the internal validity threat of mortality through non-response bias should approach 80% response rate (Tuckman, 1972). Several methods were utilized in the study to counter non-response bias (mortality): (a) The questionnaire avoids use of open-ended questions and "difficult to answer" questions -- most questions were Likert scale responses, (b) the questionnaire was relatively short in length (30 questions), reducing the time and complexity burden on respondents, (c) the researcher provided a pre-notification letter to faculty members describing the purpose of the study and increase respondent confidence in the validity of the study (which could be forwarded to students), (d) the researcher enlisted sponsorship from academic leadership in the six colleges and universities prior to the survey, (f) multiple contacts with students were attempted if response rates appear low, and (g) non-response checking might be utilized if possible and if return rates are low (below 80%), in an attempt to compare responders with non-responders.

Validity of the Questionnaire

Validity refers to the degree in which a test or other measuring device is truly measuring what it was designed to measure. There are four types of validity associated with questionnaires: (1) content, (2) construct, (3) predictive, and (4) concurrent validity. Of these four types of validity, only content and construct validity were applicable to address in developing the questionnaire for this study.

Content validity is the extent to which the content of the test (or questionnaire) adequately represents all that is required of the test (Creswell, 2005). It is the degree to which a measurement reflects the specific intended domain of content. Content validity

can be ascertained through evidence obtained by looking for agreement through judgment by experts in the area of the content (Schutt, 2004). In the case of this study, the draft questionnaire was reviewed preliminarily by a panel of experts in either online learning or Quality Matters. This group provided multiple suggestions. The list of questions was revised at least eight times based on this expert feedback and preliminary testing. This process provided suggestions and served to create a prototype questionnaire that was pilot tested on two treatment and two control groups. After adjustments to the instrument were made a questionnaire similar to the study questionnaire along with a check-sheet of criteria was provided to a second panel of six experts. Individuals who reviewed the study questionnaire were: John Sener, Sener Learning Services; Professor Jurgen Hilke, Director of Distance Learning, Frederick Community College; Ron Smith, Senior Analyst, Institutional Effectiveness, Portland Community College; John Sneed, Director of Distance Learning, PCC; and Mary Wells, Co-Director, Quality Matters and an online student from PCC. The input from this panel was the basis for the final study questionnaire found in Appendix C.

The second method utilized to check validity of the questionnaire was through construct validity. In social science, construct validity refers to whether a test measures the unobservable social construct that it purports to measure (Schutt, 2004). The review of literature was used to develop the conceptual framework of factors found in previous research to relate to student satisfaction and retention in online instruction. Construct validity was addressed in developing the questionnaire by structuring questions around the constructs in the conceptual framework (see Figure 2.1). A principal component factor analysis was run on the questionnaire based on five factors of quality instruction.

The results found in Appendix D indicated a strong positive correlation between variables in each factor.

Reliability of Questionnaire

Creswell (2005) defines reliability for an instrument as having the characteristics of being stable and consistent. Scores should be nearly the same when researchers administer the instrument at different times. Test-retest comparisons can be used as an indicator of stability of questionnaire results over time. Stability of responses to the questionnaire used in the study was checked with a test-retest procedure. Several informal pilot tests were performed before the full study began. Approximately ten online courses had prototypes of the current questionnaire administered. The primary purpose of these pilot tests was to refine the set of questions. Initial reaction to these prototypes was that the test questions appeared stable and clear, there were good response rates, faculty had no trouble in administering the instrument, and there was an initial indication that there was variation in student satisfaction between "Reviewed" and "Non-reviewed" online courses.

Two treatment courses and two control courses were selected based on convenience sampling methods to have a test-retest performed. The same questionnaire was administered a second time. The initial questionnaire was administered at the midpoint of the course. The second questionnaire was administered the week prior to final examinations. This test-retest approach checked response stability over 4 weeks of time. The results were compared, and the results were found to be stable.

A method to address internal consistency was checked by using Cronbach's alpha procedure. Cronbach's alpha measures how well a set of items (or variables) measures a

single latent construct. When data have a multidimensional structure, Cronbach's alpha would usually be low. Technically speaking, Cronbach's alpha is not a statistical test - it is a coefficient of reliability or consistency (Trochim, 2005). Alpha coefficient for Cronbach's range in value from 0.0 to 1.0 and may be used to describe the reliability of factors extracted from multi-point formatted questionnaires. In the case of this study the rating scale was: *1(strongly disagree)* through *5(strongly agree).* The higher the score, the more reliable the generated scale. Nunnally (1978) indicated 0.7 to be an acceptable reliability coefficient. The mean Cronbach alpha for the study, measuring student satisfaction with the five factors of quality instruction, was .84 (see Table 5.3).

Another method of showing that the variables that make up the factor move together is by using the eigenvalue derived from a Principal Component Factor Analysis. In each of the five separate analyses there should only be one eigenvalue with a value above 1. If more than one eigenvalue were to have a value above 1, it means that some of the variables within that factor should have been separated out as their own factors. See the factor analysis results shown in Appendix D.

Pilot Testing of Questionnaire

The questionnaire was pilot tested prior to its use as part of this study. Pilot testing was a multistage and cumulative process. A pilot test can uncover a variety of flaws in a questionnaire.

> Most studies benefit substantially from the precaution of running pilot tests on their questionnaires, leading to revisions based on the results of the tests. A pilot test administers a questionnaire to a group of respondents who are part of the intended test population but who will not be part of the sample. In this way, the researcher attempts to determine whether questionnaire items achieve the desired qualities of measurement and discrimination. (Tuckman, 1972, p. 256)

The pilot test could reveal a preponderance of inappropriate responses to an item leading to further examination it for ambiguity or otherwise poor wording. If all

respondents reply identically to any one item, that item probably lacks discrimination and would need some further examination. Poor instructions and other administrative problems can become apparent with a pilot test, as do areas of extreme sensitivity. Should respondents refuse to answer certain items, rewording may desensitize the item. Thus, pilot tests enable researchers to improve their questionnaires by diagnosing and correcting these failings. Creswell, (2003) stated, "This testing is important to establish the content validity of an instrument and to improve questions, format, and the scales" (p. 158).

Several informal pilot tests were accomplished before the full study began. Approximately, ten online courses had prototypes of the current questionnaire administered. The primary purpose of these pilot tests was in refining the question set, Likert response scale, stability of the online survey tool, and general analysis of peer reviewed verses non-peer reviewed courses. Initial reaction to these informal tests were that the test questions appeared stable and clear, there were good response rates, faculty had no trouble in administering the instrument, and there was an initial indication that there was a variation in student satisfaction levels between peer reviewed and non-peer reviewed online courses.

Pilot testing was accomplished with two treatment courses and two control courses paired by discipline and level. Pilot test instructors were given information prior to administration of the questionnaire. They understood this process was a pilot test and the purpose of the process. The instructors each provided the questionnaire overview and instructions to students in their courses along with the web-link to the questionnaire. The pilot test questionnaire was slightly modified with the addition of one question asking the

respondents to comment on any aspect of the questionnaire that was vague, poorly worded, or difficult to understand. Consistency of questionnaire administration existed as all instructions and the instrument itself were handled online. The opportunity for researcher or administrative bias was minimized. Data were collected over a two week period and was analyzed to the extent possible with the sample size based on the statistical approaches described in Table 3.6. Several aspects of the questionnaire process that were assessed with the pilot test included: (a) response rates, (b) question construction and wording, and (c) initial statistical analysis.

Data Analysis Procedures

This subsection outlines the statistical analysis that was performed, the statistical tools that were used, and the summary was generated for each of the research questions. Capabilities of the statistical tools were highlighted. The study used inferential statistics to draw conclusions and make inferences from the data collected and establish the statistical significance of the results (Schutt, 2004). In statistics the word "significance" has specific meanings. A significant difference means a difference that is unlikely to have occurred by chance. A significance test shows differences unlikely to occur because of a purely random variation (Schutt).

The four research questions for this study address the influence of faculty peer review on student satisfaction and retention rates of students in online courses. Data were collected through the technique of an online questionnaire, examining student reported satisfaction with an online course. Retention data were compiled from end of course reports for each group surveyed.

To analyze the two-group, posttest-only, experimental design, Trochim (2005) argued the analysis must meet the following requirements: (a) has two groups, (b) uses a posttest-only measure, (c) has two distributions (measures), and (d) each has a mean and variation.

The inferential statistical processes of *t*-Test and Analysis of Variance (ANOVA) were used to determine if there were a significant difference in scores between the treatment and control groups. Trochim (2005) described the two-group, posttest only experiment: "In this design, we are most interested in determining whether the two groups are different after the program. Typically we measure the groups on one or more measures and we compare them by testing for the differences between the means using a *t*-Test or one-way Analysis of Variance (ANOVA)" (¶ 3). In the context of this study, conclusions then were made as to the effect of faculty peer review on student satisfaction (overall and for each factor of quality) and student retention when comparing online courses.

Measures of central tendency and standard deviation for each satisfaction factor were calculated and became part of the descriptive data presentation for the study. The *t*-Test and Analysis of Variance (ANOVA) statistical procedures were employed to determine statistical significance. The *t*-Test is a process for determining if there is a statistically significant difference between the means of two independent samples. *t*-Tests are used when: (a) dependent variables are continuous, (b) compare only two groups, and (c) samples are randomly selected (Muijs, 2004). Analysis of Variance was used to test for differences among three or more sample mean scores. ANOVA tests are utilized when: (a) group comparisons are needed; (b) data were nominal or ordinal; (c) data sets

contains one dependent variable; and (d) one or more independent variables are used (Muijs). Calculations must be accomplished to ensure that there is a sufficient sample size to properly administer the ANOVA method (see Table 3.6).

Table 3.6
Research Questions with Statistical Approach for Analysis

Research Question	Data Needed	Statistical Approach for Analysis
1. Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses?	(a) Mean scores from student satisfaction questionnaire in five areas of focus and overall student satisfaction (b) Mean scores from four student confounding variables of: "number of prior online courses," "comfort with online technology," "gender," and "student age."	(a) *t*-Test analysis comparing "Reviewed" and "All Other" courses within the five areas of quality instruction and overall student satisfaction. (b) One-way ANOVA analyzing four confounding variables of: "number of prior online courses," "comfort with online technology," "gender," and "student age."
2. Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses?	(a) Percent of students retained in "Reviewed" verses "All Other" courses comparing end of week one and end of course. (b) Mean scores from four confounding variables of: "number of prior online courses," "comfort with online technology," "gender," and "student age."	(a) *t*-Test analysis comparing percent of students retained in "Reviewed" vs. "All Other" courses. (b) One-way ANOVA comparing retention data with the four confounding variables of: "number of prior online courses,"

		"comfort with online technology," "gender," and "student age."
3. Which factors of quality instruction most directly relate to increased levels of student satisfaction in online courses?	(a) Mean scores from student satisfaction questionnaire in five areas of focus. (b) Mean retention scores. (c) Mean scores from four confounding variables of: "number of prior online courses," "comfort with online technology," "gender," and "student age."	(a) Correlation/Regression analysis comparing five areas of quality instruction in student satisfaction. (b) Correlation Regression Analysis comparing five areas of quality instruction with course retention.
4. Which factors of quality instruction most directly relate to increased levels of student retention in online courses?	(a) Mean scores from student satisfaction questionnaire in five areas of quality instruction. (b) Mean retention scores. (c) Mean scores from four confounding variables of: "number of prior online courses," "comfort with online technology," "gender," and "student age."	(a) Correlation/Regression analysis comparing five areas of quality instruction in student satisfaction. (b) Correlation/Regression analysis comparing five areas of quality instruction with course retention.
Note: "All Other" courses reflects a combination of both "Non-Reviewed" Phase One courses and "No Review" Phase Two courses.		

Analysis for Research Question One

Question One of the study asked, "Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer

review process compared with non-peer reviewed?" The approach for answering this question consisted of data collection generated via the questionnaire, and analysis of the mean satisfaction scores between peer reviewed and non-peer reviewed courses using a *t*-Test analysis. The *t*-Test assessed whether the means of two groups are statistically different from each other. This analysis is appropriate when a researcher desires to compare the means of two groups, and especially appropriate as the analysis for the posttest-only, two-group experimental design (Trochim, 2005).

A second process analyzed the four confounding variables of: "number of prior online courses," "comfort with technology," "gender," and "student age" compared with student satisfaction scores for "Reviewed" and "All Other" courses to determine if there is a relationship with these factors. This was accomplished through the use of One-way ANOVA (Analysis of Variance).

One-way ANOVA is the method used when there are two separate factors that may be influencing a result. One-way ANOVA can test the significance of each of two variables with respect to the response. In One-way ANOVA, researchers ask the following question: Is there a significant interaction between the two factors, in this case the treatment and possible confounding variables? The purpose of this analysis was to determine if the identified confounding variables affect student satisfaction scores and had any influence on the study findings.

Analysis for Research Question Two

Question Two of the study asked: "Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses?" The method to answer this

question consisted of gathering data from the retention percentages reported for "Reviewed" and "All Other" courses. A *t*-Test analysis was used to determine if mean retention rates were significantly influenced by the treatment of faculty peer review.

A second analysis was done comparing the four confounding variables of: "number of prior online courses," "comfort with technology," "gender," and "student age" with retention percentages to determine if a relationship exists with these factors and retention using an ANOVA.

Analysis for Research Question Three

Question Three of the study asked: "Which factors of quality instruction most directly relate to increased student satisfaction levels in online courses?" Research Question Three employed a correlation and regression method of analysis for the purpose of determining a relationship between overall student satisfaction and the five factors of quality in online courses.

> Correlational designs provide an opportunity for you to predict scores and explain the relationship among variables. In correlational research designs, investigators use the correlations statistical test to describe and measure the degree of association (or relationship) between two or more variables or sets of scores. (Creswell, 2005, p. 325)

According to Creswell (2005), correlational statistics: (a) aim to measure or predict the relationship between two or more variables, (b) study a single group of individuals (rather than two or more as in an experiment), and (c) are used when it is not possible or desirable to provide an intervention. When applying Creswell's approach to the study, relationships were measured using only treatment groups of courses.

In the case of Question Three, correlationial design was used to determine the relationship among the five factors of quality instruction (as measured through proxy, by

way of student satisfaction) with the factor of overall level of student satisfaction. The correlational study provides a degree of association between the variables as measured between -1.00 through +1.00 with 0.00 indicating no linear association (Creswell, 2005). The measure of correlation was placed into a correlation matrix. Another method to measure relationships among the five factors of quality online instruction was through a regression analysis. A linear regression analysis of the relationship between one dependent variable and one or more independent variables was employed (Muijs, 2004). The regression analysis is utilized to model relationships between variables, determine the relative magnitude of the relationships between variables, and make predictions. In the case of the study, a regression analysis was used to determine the relative importance of the five factors in predicting overall satisfaction and retention. In doing this analysis, it was understood that the factor measures are not direct measures of the presence of the factors in the treatment group of online courses. Rather, these measures were indirect and based only on the student's perceptions of what the factors mean and the degree to which they were present.

Analysis for Research Question Four

Question Four of the study was similar to Question Three, asking: "Which factors of quality instruction most directly relate to increased student retention levels in online courses?" Research question four employed the same correlation and regression method of analysis as Question Three. This was employed for the purpose of determining a relationship between student retention and the five factors of quality in online courses.

In summary, this subsection of the study reviewed approaches to statistical analyses used for the four study questions. Question One, dealing with student satisfaction,

utilized *t*-Tests and ANOVA analysis to determine if there was a significant difference between peer reviewed and non-peer reviewed online course. Question Two, explored student retention and utilized *t*-Tests and ANOVA analysis to compare percentages of students retained. Question Three, explored the relative importance of the quality factors in relation to student satisfaction. Question Four explored the importance of the quality factors in relation to retention. Questions three and four utilize correlation and regression methods for the analysis. Finally, analysis was performed on the four potential confounding variables to determine if they had any effect on the study findings.

Strategies to Ensure Soundness of Data

This subsection describes approaches that were employed to ensure that data collected and the resulting analysis were valid. It addressed the major internal and external threats to validity. Internal threats to validity included: participant, treatment, and procedure. External threats to validity that are addressed included: selection, setting, and history threats.

Response to Threats of Internal Validity

Campbell and Stanley (1963) defined internal validity as the basic requirements for an experiment to demonstrate cause and effect, while external validity addresses the question of generalizability to ensure the results may be applied to other circumstances. According to Creswell (2005) there are several threats to internal validity in an experimental design; these threats can be divided into those related to participants, treatment, and procedures. Possible threats related to participants are: (a) history – events outside the treatment that might effect the dependent variable measure during the course of the experiment, (b) maturation – naturally occurring development of the participants

that might effect the dependent variable measure, (c) regression – effects on the dependent variable measure that might be caused by the initial selection of participants based on extreme characteristics (that is the likelihood that they would move more toward the mean regardless of the treatment), (d) selection – effects on the dependent variable measure that might be caused by lack of random assignment to treatment and control group, (e) mortality – effects on the dependent variable measure that might be caused by loss of subjects (i.e., dropped out of experiment, do not respond), and (f) interactions with selection – effects on the dependent variable caused by the relationship between selection and the other threats to internal validity.

Possible threats related to treatments within an experimental study were: (a) diffusion of treatments – effects on the dependent variable measure that might be caused by the treatment never being fully administered, or being administered to both the treatment and control group; (b) compensatory equalization – effects on the dependent variable measure by a compensatory treatment that is administered to the control group which is designed to give benefits similar to that of the treatment; (c) compensatory rivalry – effects on the dependent variable measure of rivalry that may develop between the treatment and control group; (d) resentful demoralization – effect on the dependent variable measure that may be casual when the control group feels they have received a treatment that is less desirable than the treatment group (see Table 3.7).

Possible threats related to procedures within an experimental study are: (a) testing – effects on the dependent variable measure that might be caused by taking the measurement twice (i.e., pre and post measures; participants learn from the first measurement), and (b) instrumentation – effects on the dependent variable measure that

might be caused by changes in how the question is measured among participants (i.e., changes in the questionnaire, scoring procedures).

Table 3.7
Threats to Internal Validity and Response Where Needed

Internal Threat	Quasi-Exper-imental Method	Response to Threat
Participant Threats		
History	No threat	Both treatment and control groups surveyed were assumed to have the same history context; therefore this threat was judged to not be significant.
Maturation	No threat	Both treatment and control groups surveyed were assumed to be at the same educational development, given the matching criteria; therefore this threat was judged to not be significant.
Regression	No threat	Both treatment and control groups were not selected on the basis of extreme characteristics; therefore this threat was judged to not be significant.
Selection	Potential threat	Although random assignment was not done, treatment and control groups were selected from the same college and were matched by discipline and level of course. Therefore this threat was judged to not be significant. It was possible to do checking on the equivalence of treatment and control groups using the confounding variables.
Mortality	Potential threat	The major aspect of this threat was non-response by either or both the treatment and control groups. The procedures used to ensure a high level of response (and checks made if the response rate was lower than needed) were described earlier in this section.
Interactions with Selection	Potential threat	Since selection was not judged to be a significant threat to internal validity, the interaction of other threats with selection was also not judged to be a significant threat.
Threats Related to Treatments		
Diffusion of Treatment	Potential threat	This threat occurs when the treatment and control groups can communicate. The treatment (faculty peer review using the Quality Matters process) was previously described and its complete administration was ensured by Quality Matters. The online procedures used for data collection was assumed to alleviate communication between treatment and control student groups. Diffusion was a potential threat because faculty from "Non-Reviewed" courses in Quality Matters affiliated

		colleges (Phase One colleges) may have received some level of best practice due to proximity with Quality Matters processes. To mitigate this threat, paired courses were selected at two Non-Quality Matters colleges (Phase Two colleges) to serve as additional control courses. The combination of these non-reviewed courses was referred to as "All Other."
Compensatory Equalization	No threat	This threat occurs if the control group was administered a compensatory treatment (to the faculty peer review). This was not the case. One of the criteria for selection of the control group was that the faculty teaching a control course was not involved in a peer review process. Therefore this threat was judged to be not significant.
Compensatory Rivalry	No threat	Public announcements of the study and assignments to control and treatment groups were not made. Treatment and control groups were not aware of each other. Therefore this threat was judged to not be significant.
Resentful Demoralization	No threat	Public announcements of the study and assignments to control and treatment groups were not made. Treatment and control groups were not aware of each other. Therefore this threat was judged to not be significant.
Procedural Threats		
Testing	No threat	This threat only occurs in designs that involved multiple measurements with the same instrument – that was not the case in this study – only a post measurement was used; therefore this threat was judged to not be significant.
Instrumentation	No threat	Careful attention was given to ensuring that the data collection and analysis procedures were consistent for both the treatment and control groups – see earlier description of the data collection and analysis procedures; therefore this threat was judged to not be significant.

Given the analysis of threats to internal validity described in Table 3.7, it was assumed that two serious threats exist in the design. These internal threats were non-response bias and diffusion of treatment. The procedures that were used to address these concerns were presented previously.

Response to Threats of External Validity

Threats to external validity are factors that can affect how well results based on the sample of online course and participants can be applied to the study populations of online courses with faculty peer review and improvements applied (see Figure 3.1). Can results drawn from this experiment be generalized with confidence to this population? External validity is threatened whenever the sample is not representative of the population. According to Cook and Campbell (1979) there are three threats to external validity: (a) interaction of selection and treatment – the threat involves the inability to generalize beyond the groups in the experiment, in this case the online courses selected to be included and the participants in those courses, both faculty and students; (b) interaction of setting and treatment – the threat involves the inability to generalize beyond the setting where the experiment took place, in this case the higher education colleges affiliated with Quality Matters; and (c) interaction of history and treatment – the threat involves inability to generalize to past and future effects of the treatment. In the case of the study, faculty peer review involved the reviewers who had been trained by Quality Matters and the courses that received an 85% composite score. The three interactions between the treatment and selection, setting, and history are addressed in Table 3.8. There was an assumption that historically (dealing with past and future effects of peer review) the treatment holds true. The time setting of the study did not have an effect on the study, therefore history was not considered a threat. Interactions with treatment and the selection process and the setting of the higher education study populations were considered potential threats with remedy or controls described below.

Table 3.8
Threats to External Validity and Response Where Needed

External Threat	Quasi-Experimental Method	Remedy or Control Factor
Interaction of selection and treatment	Potential threat	Assumption that courses selected for treatment were representative of all online courses with faculty peer review and quality improvements applied (see Table 3.1). Population has been qualified to respond to this treat. Use of Phase One and Phase Two colleges.
Interaction of setting and treatment	Potential threat	Assumption that the colleges selected for the study were representative of all higher education colleges in the study population.
Interaction of history and treatment	No threat	Assumption that the past and future effects of the treatment, peer review of online courses, held true for both for the past as well as the future. Time setting had no effect on findings.

One method to control external threats to validity is by random sampling models. In the case of this study, random sampling from the study population was not feasible. Muijs (2004) pointed out that quasi-experimental research designs do have one clear advantage over pure experimental designs, that being "… they are studied in natural educational settings. If we find programme effects we can at least be confident that these work in real schools and classrooms with their complexity rather than just in the laboratory" (p. 29). He continued to point out that quasi-experimental research is a good way of evaluating new initiatives and programs in education because groupings take a natural form of classes and sections. Additionally, the treatment is administered within the natural environment and not an artificial setting. In the case of this study, the

assignment of students to treatment or control groups, although not random were not arbitrary by the researcher either. The determinant of lack of true random sampling was assumed to be made up for by the strength of intact treatment and control groups. These groups were studied in their naturally occurring settings of online course sections.

In the case of this study, the major threats to external validity had to do with selection and setting. Selection was controlled by delimiting the study population to only online courses that had undergone faculty peer review and had made quality improvements in the course based on the results of the peer review. It was recognized that the study target population consisted of courses that had a relatively deluxe version of the faculty peer review treatment as available through the Quality Matters process. (See Appendix A for an example of a high quality faculty peer review process). Therefore, it was likely that the findings may tend to overestimate the effects of peer review process in online courses. With respect to the threat to external validity caused by setting, this was controlled by selecting a variety of postsecondary institutions from community colleges. There was little reason to believe that geographic location of setting had any serious relationship to the treatment.

Strategies for Protection of Human Subjects

This study complied with the standards established by the National Institutes of Health (NIH) for the protection of human participants in research. The Institutional Review Board (IRB) of Oregon State University was the body responsible for ensuring that the NIH standards were met for this study.

The National Institutes of Health Human Participants Protection Education for Research Test was completed through an online course and examination in June 2005.

The Oregon State University Human Subjects policy was followed closely in this research project and approval was granted from the Institutional Review Board (IRB) before undertaking this study. The standards of the IRB were followed closely in conducting this study. A post-treatment online questionnaire was utilized to collect data. IRB required that participants be informed of the study; however, a signed consent form typically was not required given the data collection procedures for the study (Human Protections Administrator, Institutional Review Board, Oregon State University, personal communication, October 29, 2005). By completing the online survey, participants were giving their consent to participate. Information about the study was posted at the survey website and did include the purpose of the study, the nature of the procedures, risks to participants, and the potential benefits of the research. Participation in the study was voluntary. There was a stipulation that participants may opt out at any time without penalty. In addition, the anonymity of the colleges, instructors, and the participants was protected. The researcher and the researcher's major professor did know the colleges, sections, and faculty members. The individual student responses were collected anonymously. The identities of the specific sections and faculty participants were not released.

Summary of Design of Study

The purpose of the design of the study was to describe the process and rationale for the approach to this study. Ultimately, this study was designed to enhance the body of knowledge in the area of improved quality of online instruction through systematic peer review of courses. This was accomplished by comparing satisfaction and retention of students enrolled in peer reviewed online courses with similar, "Non-reviewed" courses.

The design of the study employed a postpositivist philosophical approach selected as compatible with the quantitative approach of this research study. Criteria for truth emanated from evidence-based practice, providing measured observations that may prove repeatable. The study utilized a nonequivalent, quasi-experimental method to answer four research questions: (1) Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses? (2) Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer reviewed process compared with non-peer reviewed online courses? (3) Which factors of quality instruction were most important in terms of increased student satisfaction? and (4) Which factors of quality instruction were most important in terms of increased student retention levels in online courses? The review of literature identified seven important factors of quality in online courses. Rationale was provided to justify the use of five of these factors in the development of the study questionnaire.

A web-based questionnaire technique was used to collect data and was designed using a Likert scale format. The same questionnaire was used to gather student satisfaction levels in both faculty peer reviewed (treatment) and non-peer reviewed (control) online courses. The question regarding student retention was investigated with data gathered to compare end of first week student counts with end of course counts to measure percent of student retention. Statistical analysis tools of: *t*-Test, ANOVA, correlation analysis, and regression analysis were utilized to compare the statistical mean and standard deviations of questionnaire results in order to determine if there were a statistically significant difference between student satisfaction with courses that have had

a treatment of systematic faculty peer review with those that serve as a control group with no peer review. Both internal and external threats to validity were addressed, as well as the protection of human subjects. The analysis of results from the research questions was available to inform post-secondary institutions in their decisions making processes in selection of faculty peer review models used in influencing factors of quality in online courses.

CHAPTER 4: RESULTS

Chapter 4 provides results from data gathering and analysis done in conjunction with this study. The four research questions that guided this study were: (1) Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses? (2) Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses? (3) Which factors of quality instruction most directly relate to increased levels of student satisfaction in online courses? (4) Which factors of quality instruction most directly relate to increased levels of student retention in online courses? This chapter includes the following sections: (a) study variables and descriptive statistics, (b) population and demographic characteristics of participants and colleges, (c) findings for each research question and (d) threats from both internal and external validity, and (e) summary of results.

Study Variables

Variables for this study were separated into three categories. These variables were: independent, dependent, and confounding.

Independent Variable

The single independent variable for this study was faculty peer review of online courses using a systematic best practices rubric. Quality Matters certification served as the treatment applied to the reviewed courses and served as the independent variable. Control courses for this study were all the courses not formally peer reviewed using Quality Matters standards. These control courses were paired against treatment courses.

Dependent Variables

There were two dependent variables for the study: (a) student satisfaction ratings of selected online courses and (b) retention rates of students enrolled in selected online courses.

Student satisfaction. There were two measures used for the dependent variable of student satisfaction ratings of selected online courses. The first was a measure of overall student satisfaction as indicated by the mean response to Question 30 on the study questionnaire (see Appendix C for complete questionnaire). Question 30 asked study participants to rate their overall satisfaction with their specific on-line course and was worded as follows: "Overall, I am satisfied with this online course." This satisfaction measure relied on the student response to a single question. This variable was labeled "Overall Satisfaction" for study purposes. The "Overall Satisfaction" mean for the study was 4.21, (*SD* = .96) on a rating scale *1(strongly disagree) through 5(strongly agree)*, see Table 4.1.

The second method of calculating student satisfaction was determined by the mean of the quality factor means. This calculation used the mean of a small set of questions related to each of the five quality factor means: (a) Outcomes, (b) Assessment, (c) Resource Materials, (d) Interaction (Instructor-Student plus Student-Student), and (e) Technology (see Appendix C for study questions). These are the factors that were drawn from the study's conceptual framework (see Figure 2.1). This calculation was labeled "Mean of Factor Means." The "Mean of Factor Means" for the study was 4.02, *SD* = .60 on a rating scale of (1 - *not satisfied through* 5 - *very satisfied*), see Table 4.2.

Table 4.1
Descriptive Statistics for "All Study Courses" Measuring Satisfaction for "Overall Satisfaction" and "Mean of Factor Means"

	N	Min	Max	Mean	Std Dev
Overall Satisfaction	553	1.00	5.00	4.21	0.96
Mean of Factor Means	554	1.00	5.00	4.02	0.60

Note: Measure for "All Study Courses"
"Overall Satisfaction" was measured by mean responses to Question 30 - "I am satisfied with this online course." "Mean of Factor Means" was measured by mean of 17 questions making up the five quality factor means.

Table 4.2
Descriptive Statistics for "All Study Courses" Factors of Quality Used to Calculate the "Mean of Factor Means"

Quality Factor	N	Min	Max	Mean	Std. Dev
Outcomes	554	1.00	5.00	4.24	0.69
Assessment	554	1.00	5.00	4.08	0.71
Resource Materials	552	1.00	5.00	4.12	0.73
Interaction	552	1.00	5.00	3.93	0.84
Technology	554	1.00	5.00	4.05	0.77
Mean of Factor Means		1.00	5.00	4.08	0.75

Note: Interaction is made up of Instructor-Student plus Student-Student interaction.
"Mean of Factor Means" was measured by calculating the mean of the five quality factors means.

Student retention. The second dependent variable for the study was student retention. Student retention was measured by the retention rate, defined as the percent of students retained in each online course comparing student enrollment between week one and the final week of the term or semester (see Table 4.3). There were 41 online courses used in the study for the purpose of determining student retention. There were 14 "Reviewed" courses and 27 "All Other." These 41 online courses were obtained from nine participating community colleges (see Appendix G).

Table 4.3
Descriptive Statistics for Dependent Variable of "Student Retention"

	N	Min	Max	Mean	Std Dev
Retention Rates	41	0.40	1.00	0.74	0.17

Note: Sample contained 41 study courses from nine community colleges.

Confounding Variables

There were four confounding variables used in the study: (1) comfort with distance learning, (2) age of student, (3) gender (measured as the percent female), and (4) number of prior distance learning courses taken. These confounding variables were selected from the Review of Literature found in Chapter 2 and were factors that could possibly influence the satisfaction and retention of students taking online courses (see Figure 2.2). Data for these variables were collected from questions: 1, 27, 28, and 29 of the study questionnaire (see Appendix C for complete questionnaire). These variables were labeled as follows: (a) "Mean Comfort with Distance Learning" (question 1), (b) "Mean Age of Student" (question 29), (c) "Gender" (% Female: question 27), and (d) "Mean Prior Experience with Distance Learning" (question 28). Descriptive statistics for these confounding variables were described in Table 4.4. The mean level of comfort for students participating in the study was 3.85 (*SD* = 1.23) on a rating scale of: *1(strongly disagree) to 5(strongly agree).*The mean age of all students within the survey was 28.9 (*SD* = 10.39) with the youngest participant being age 18 and the oldest age 62. The sample consisted of 74% female and 26% male (*M* = .74, *SD* = .44). The final confounding variable for the study was the prior number of distance learning courses the student had taken in the past. The mean for this variable was 4.09 (*SD* = 4.08) distance

learning courses taken in the past resulting from a range of 1 to 28 courses (see Table 4.4).

Table 4.4
Descriptive Statistics for Confounding Variables: Mean Comfort with DL, Mean Age of Student, Gender (% Female), and Prior Experience with DL

Confounding Variables	N	Range	Min	Max	Mean	Std Dev
Mean Comfort with DL	553	4.0	1.0	5.0	3.85	1.23
Mean Age of Student	500	44	18	62	28.88	10.39
Gender (% Female)	550	1	0	1	0.74	0.44
Mean of Prior Experience with DL	554	27	1	28	4.09	4.08

Note: N = 550 for gender, N = 408 for female 74%, and N = 142 for male 26% (four responses missing).

Study colleges

Nine community colleges were used in this study. These colleges were selected from Phase One and Phase Two colleges as described in Chapter 3. Phase One colleges were selected from a target population of active Quality Matters Institutions. The study sample consisted of seven institutions that responded positively to a request to participate in the study. Phase One colleges in Maryland consisted of: Anne Arundel, Allegany, College of Southern Maryland, Carroll, Harford, and Montgomery Community Colleges. The Phase One college in Oregon was Portland Community College. Phase Two colleges were defined in Chapter 3 as having no affiliation with Quality Matters and no formal peer review process. These colleges were from Oregon. The Phase Two colleges were: Clackamas and Southwestern Community Colleges. Appendix E provides descriptive statistics for the nine study colleges related to confounding variables. A demographic breakdown of study colleges and students is available in Appendix F.

"Reviewed" verses "All Other" Courses

This study was concerned with the effect of formal faculty peer review on student satisfaction and retention. The study was initially developed using only Phase One colleges. Phase One colleges were affiliated with Quality Matters and contained courses that were formally peer reviewed, labeled "Reviewed," paired with "Non-Peer Reviewed" courses. Early in the study, some preliminary analysis was done that showed very little difference in the mean of satisfaction ratings of "Reviewed" and "Non-Peer Reviewed" courses from these Phase One colleges. This early analysis showed similar means for "Reviewed" courses ($M = 4.20$, $SD = .76$) and "Non-Reviewed" courses with ($M = 4.16$, $SD = .68$). The t-Test indicated [$t(28) = .39$, $p = .35$] (one-tail test). There was no significance indicated between "Reviewed" and "Non-Reviewed" in the preliminary analysis. Given these early results, there was concern that one of the threats to internal validity was present – that of diffusion of treatment (see Table 3.7). More specifically there was concern that at Quality Matters colleges, instructors in "Non-reviewed" courses were being affected positively by the review process (diffusion of treatment) that was being applied by instructors whose courses were undergoing formal peer review. This would imply that many of the five factors for quality online courses were embedded in non-formally reviewed courses as a matter of individual faculty practice simply because of proximity to the formal Quality Matters faculty.

Given this hunch, it was decided to attempt to control for this potential threat of diffusion of treatment by adding colleges with no affiliation with Quality Matters as additional control groups. Within Phase Two colleges, the focus remained on "paired" online courses similar to "Reviewed" treatment courses. These paired courses in non-

Quality Matters colleges were labeled "No Review." During final data analysis, the study specifically compared Quality Matters "Reviewed" courses with all other paired courses from both Phase One and Phase Two colleges. The decision to include control courses from non-Quality Matters colleges into the final data set of the study was done for the following reasons: (a) it increased the total number of study courses from 30 to 41, (b) it increased the total number of student responses from N = 406 to N = 544 ("Reviewed" n = 209, "Non-Reviewed" n = 197 and "No Review" n = 148), (c) it retained the control of paired treatment courses and control courses (selection threat to internal validity, see Table 3.7), and (d) it added some level of control against treatment diffusion (selection threat to internal validity, see Table 3.7).

To ensure both "Non-Reviewed" and "No Review" courses could be combined into a single group of "All Other," a test for significance comparing the dependent variables of "Mean of Factor Means" and "Retention" was conducted for the two groups. A one-way Analysis of Variance was conducted to evaluate the relationship between the two types of courses. The dependent variables were "Mean of Factor Means" and "Retention." The significance level was set at ($p < .10$). Table 4.5 contained descriptive statistics for the two types of courses using "Mean of Factor Means" as the dependent variable. Similarly, Table 4.7 contained descriptive statistics using "Retention" as the dependent variable. Tables 4.6 and 4.8 utilized an ANOVA analysis to compare the two types of courses to determine if there was significant difference between groups, using dependent variables of "Mean of Factor Means" and "Retention" respectively.

Table 4.5
Descriptive Statistics for Dependent Variable of "Mean of Factor Means" of Satisfaction comparing "Non-Reviewed" and "No Review"

	N	Min	Max	Mean	Std dev
Non-Reviewed	209	2.10	5.00	4.12	0.62
No Review	148	1.65	5.00	4.02	0.59
Total	357	1.65	5.00	4.08	0.61

Table 4.6
One-Way ANOVA Analysis Comparing Dependent Variable of "Mean of Factor Means" of Satisfaction with "Non-Reviewed" and "No Reviewed" Courses

		Sum of squares	df	Mean square	F	Sig.
Mean of Factor Means	Between Groups	.91	1	.91	2.46	.12
	Within Groups	131.62	356	.37		
	Total	132.53	357			

Note: No significance found for dependent variable of "Mean of Factor Means."

Table 4.7
Descriptive Statistics for Dependent Variable of Retention comparing "Non-Reviewed" and "No Review"

	N	Min	Max	Mean	Std dev
Non-Reviewed	14	.55	1.00	.77	0.17
No Review	11	.40	0.96	.70	0.19
Total	25	.40	1.00	.74	0.18

Table 4.8
One-Way ANOVA Analysis Comparing Dependent Variable of Retention with "Non-Reviewed" and "No Reviewed" Courses

		Sum of squares	df	Mean square	F	Sig
Mean of Factor Means	Between Groups	.03	1	.033	1.07	.31
	Within Groups	.72	23	.031		
	Total	.75	24			

Note: No significance found for dependent variable of retention.

The ANOVA analysis for "Mean of Factor Means" (Table 4.6) was not significant, $F(1, 357) = 2.46$, $p = .12$. Likewise the ANOVA analysis for "Retention" (Table 4.8) was not significant, $F(1, 24) = 1.07$, $p = .31$. This ANOVA analysis indicated that "Non-Reviewed" and "No Review" courses for both dependent variables of "Mean of Factor Means" of Satisfaction and "Retention" were not different; these two groups were used throughout the rest of the analysis as "All Other." The independent variables for this study were: "Reviewed" and "All Other."

Research Question One -- Overall Satisfaction

Research Question One stated: "Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses?" As described above, the two groupings of courses (independent variables) that were compared to respond to this question were "Reviewed" and "All Others." The dependent variables used to compare these two groupings of courses were "Overall Satisfaction" and "Mean Factor Satisfaction."

Question One: Independent Sample t-Tests

An independent sample *t*-Test was conducted to detect if there were a statistically significant difference in student satisfaction means between "Reviewed" verses "All Other" online courses. Significance was measured at $p < .10$. A "one-tailed" test was utilized in this instance because the anticipated study result was that faculty peer reviewing would increase student satisfaction. The first *t*-Test used the dependent variable of "Overall Satisfaction" (Question 30) as the dependent variable; see Table 4.9.

Table 4.9
Independent Samples *t*-Test Comparing "Reviewed" verses "All Other" Courses Using the Student Satisfaction Dependent Variable of "Overall Satisfaction"

	t	df	Sig. (1-tail)	Mean difference	Std. error difference
Overall Satisfaction	0.38	551	.35	0.03	0.08

Note: "Overall Satisfaction" measured by Question 30 - "I am satisfied with this online course". Grouping Variable was "Reviewed" = 1, "All Others" = 0. N = 553; "Reviewed" n = 209; "All Others" n = 344.

The *t*-Test that compared student "Overall Satisfaction" (Question 30) in "Reviewed" verses "All Other" resulted in no significance, [$t(551) = 0.38$, $p = .35$] (see Table 4.9). This analysis indicated no statistically significant difference in satisfaction with "Reviewed" course mean compared to "All Other" course mean based on student response to Question 30.

A second *t*-Test analysis was used to compare the dependent variable of "Mean of Factor Means" between "Reviewed" verses "All Other" courses (see Table 4.10).

Table 4.10
Independent Samples *t*-Test Comparing "Reviewed" verses "All Other" Courses Using the Student Satisfaction Variable of "Mean of Factor Means"

	t	df	Sig. (1-tail)	Mean Difference	Std. Error Difference
Mean of Factor Means	1.54	552	0.06*	0.08	0.08

Note: Mean of Factor Means Dependent Variable. Grouping Variable was "Reviewed" = 1, "All Others" = 0. N = 554; "Reviewed" n = 209 "All Other" n = 345. Significance *$p < .10$, **$p < .05$ (one-tail test).

When comparing "Mean of Factor Means" with the dependent variable of student satisfaction, the *t*-Test was statistically significant at the $p < .10$ confidence level [$t(552) = 1.54$, $p = .06$]. Students in "Reviewed" courses ($M = 4.12$, $SD = 0.62$) were more satisfied than students in "All Other" course ($M = 4.04$, $SD = 0.59$). The significance of the *t*-Test comparing "Reviewed" verses "All Other" courses for the dependent variable

of "Mean of Factor Means" was important. It supported the premise of the conceptual framework in Chapter 3 demonstrating that the quality of online instruction is, based on the literature review, more precisely and comprehensively, viewed as consisting of satisfaction with each of five major factors of quality (see Appendix B). In contrast to a single question of general satisfaction as evidenced in "Overall Satisfaction," "Mean of Factor Means" accounts for the five factors of quality through the mean of a series of questions relating to each factor. This approach to student satisfaction more specifically measures the importance of all five factors as a group and their effect on satisfaction as discussed in the study. Based on this logic and analysis, "Mean of Factor Means" was used throughout the rest of the presentation of study results as the measure for student satisfaction with the online course experience.

Question One: Controlling for Confounding Variables

Earlier in this chapter, four confounding variables were identified for the study. These confounding variables were shown through the review of literature to have positive effect on student satisfaction, and could have had an effect on the results of the study. In order to determine if any or all of these confounding variables contributed any significance to "Mean of Factor Means" for the study, a Pearson Correlation was utilized for the four confounding variables compared with "Mean of Factor Means" to determine if correlation significance was indicated at ($p < .05$) or ($p < .01$), see Table 4.11.

Table 4.11
Pearson Correlation Comparing Four Confounding Variables with "Mean of Factor Means"

Confounding variables	N	Sig.	Pearson correlation
Mean Comfort with DL	553	.01**	.19
Mean Age of Student	500	.01**	.16
Gender (% Female)	550	.01**	.16
Mean of Prior Experience with DL	554	.27	.03

Note: Significance *$p < .10$, **$p < .05$, "one-tail test."

Significance in the correlation of confounding variable with the Mean of Factor Means was indicated for three of four confounding variables: (1) comfort with online learning, (2) age of student, and (3) gender. Mean of prior experience with distance learning did not indicate a level of significance in the correlation. Based on the conceptual framework of the study and findings from the Review of Literature, it was important to the premise of the study to control for all four confounding variables. This control would aid in the determination of significant relationships for satisfaction and the dependent variable of "Mean of Factor Means." The concern was that these confounding variables could affect student satisfaction significance when comparing "Reviewed" and "All Other" courses. To accomplish the analysis, a one-way ANCOVA test was utilized in comparing the independent variables of "Reviewed" verses "All Other" courses in regard to "Mean of Factor Means" while controlling for the confounding variables. The ANCOVA analysis utilized four covariates of gender, age, comfort with distance learning, and number of distance learning courses taken (see Table 4.12).

Table 4.12
One-Way ANCOVA Controlling "Reviewed" Courses for Four Confounding Variables

Confounding variables	Sum of squares	df	Mean square	F	Sig.
Reviewed	1.51	1	1.51	4.62	.03**
Error	160.94	492	0.33		

Note: Four confounding variables used as covariates. Significance *p <.10, **p <.05 (one-tail test). Dependent variable was "Mean of Factor Means."

The ANCOVA analysis in Table 4.12 indicated significance for "Mean of Factor Means" when confounding variables were controlled. The ANCOVA analysis [$F(1, 492) = 4.62$, $p = .03$] indicated satisfaction with "Reviewed" courses remains significant even when the confounding variables were taking into account. This analysis supported the premise of the study that student satisfaction would be significant for "Reviewed" courses for the variable of "Mean of Factor Means."

Question One: Five Factors of Online Quality Instruction

The conceptual framework (Figure 2.1) in the Review of Literature in Chapter 2 along with the Quality Matters Rubric (Kane, 2005) suggested that the five factors of quality instruction (see Appendix B), when present, should result in more student satisfaction with an online course. The *t*-Test analysis (see Table 4.13) indicated statistically significant increased student satisfaction with several of the individual factors of quality instruction when comparing "Reviewed" verses "All Other" for levels of student satisfaction. Table 4.13 described the results of an independent sample *t*-Test used to determine if there was a statistically significant increase in satisfaction between "Reviewed" verses "All Other" courses with each quality factor. For the purpose of this analysis, the quality factor of "Interaction" was divided into two sub-factors of Instructor-Student and Student-Student interaction. The research described in Chapter 2 and the

Review of Literature, indicated a strong correlation between satisfaction and instructor interaction with students (Chickering & Ehrmann, 1996; Mandernach, 2005; Sloan-C, 2006a; Weber Sate University, 2006).

Table 4.13
Independent Samples *t*-Test Comparing "Reviewed" verses "All Other" Using Student Satisfaction with the Individual Variables of the Five Factors of Quality Instruction

Quality factors	*t*	*df*	Sig. (1-tail)	Mean difference	Std. error difference
Mean of Outcomes	1.86	552	.03**	0.11	0.06
Mean of Assessment	1.94	552	.03**	0.12	0.06
Mean of Resource Materials	1.51	550	.07*	0.10	0.06
Mean of Instructor-Student Interaction	1.88	550	.03**	0.15	0.08
Mean of Student-Student Interaction	0.69	550	.25	-0.07	0.10
Mean of Technology	0.68	552	.25	0.05	0.07

Note: Grouping Variable was Reviewed = 1, All Others = 0. N = 554, "Reviewed" n = 209; "All Other" n = 345. Significance *$p < .10$, **$p < .05$ (one-tail test). "Mean Student Interaction" was broken into two sub-factors (instructor-student and student-student).

There was statistical significance indicated at the $p < .05$ level for the mean of the factors of quality instruction in the areas of: Outcomes [$t(552) = 1.86$, $p = .03$], Assessment [$t(552) = 1.94$, $p = .03$], and Interaction with the Instructor [$t(550) = 1.88$, $p = .03$]. There was significance indicated at ($p < .10$) level for the quality of instruction factor of Resource Materials [$t(550) = 1.51$, $p = .07$]. No significance was indicated for the factors of Student-Student Interaction and Technology. The results of the *t*-Test on the factors of quality instruction supported the study's premise indicating a statistically significant correlation in student satisfaction for factors of: Outcomes, Assessment,

Resource Materials, and Instructor-Student interaction. The sub-factors of Student-Student interaction and Technology did not provide a level of significance, indicating that those factors did not support the premise of the study.

Research Question Two -- Course Retention

Research Question Two stated: "Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses?" Course retention for this study was a percentage measure based on the number of students enrolled in week one and retained through the last week of the course. This was referred to as the percent of students retained. For the purposes of this study, there were 41 courses, 14 were Quality Matters certified "Reviewed" with 27 "All Other" courses. The mean percent of students retained in the 14 Quality Matters certified courses ("Reviewed") in the study was 74%, (*SD* = .17). The mean percent of student retained for the 27 "All Other" courses for the study was 73%, (*SD* = .18). Comparing the means of "Reviewed" verse "All Other" indicated that faculty peer review did not impact student retention rates. Descriptive statistics for the retention rates of students in study courses are presented in Table 4.14.

Table 4.14
Descriptive Statistics for Retention Rates of Student in "Reviewed" verses "All Other" Courses

	N	Range	Min	Max	Mean	Std dev
Reviewed	14	0.57	0.40	0.97	0.74	0.17
All Other	27	0.61	0.39	1.00	0.73	0.18

Note: "Reviewed" online retention rates for 14 online courses in the study was 74%. "All Other" online retention rates for 27 online courses was 73%.

*Question Two: Independent Sample t-*Test *for Course Retention*

An independent sample *t*-Test was used in Question Two comparing the means of online student retention in "Reviewed" verses "All Other" courses. Significance for the "one-tailed" *t*-Test was measured at both the ($p < .05$) and ($p < .10$) levels. The independent variable for the analysis was "Reviewed" courses and the dependent variable was percent of students retained. Results for the *t*-Test are described in Table 4.15.

Table 4.15
Independent Sample *t*-Test Comparing Percent of Student Retention in Courses for "Reviewed" verses "All Other"

	t	df	Sig. (1-tail)	Mean difference	Std. error difference
Reviewed verses All Others	.37	39	.35	.02	.06

Note: Grouping Variable was Reviewed = 1, All Other = 0. "Reviewed" N=14, "All Others" N=27.

The independent sample *t*-Test comparing "Reviewed" verses "All Other" retention rates indicated no significance at either the ($p < .05$) or ($p < .10$) levels, $t(39) = .37$, $p = .35$. Analysis indicated that systematic online peer review from this study had no significant effect on student retention rates.

Question Two: ANOVA Analysis Comparing Four Confounding Variables with Retention Rates

A one-way analysis of variance (ANOVA) was conducted to evaluate the relationship of retention rates to course review when taking into account the four confounding variables. Data were prepared by computing the mean in each course for: Comfort with Distance Learning, Age, Gender (% Female), and Prior Experience with Distance Learning. The descriptive statistics for both the "Reviewed" and "All Other" courses are presented in Tables 4.16 and 4.17, respectively. The purpose for utilizing the four confounding variables in this ANOVA analysis was to determine if there was significance related to course retention influenced by the four confounding variables. See Table 4.18 for results of the ANOVA analysis.

Table 4.16
Descriptive Retention Statistics for Students in "Reviewed" Courses Using Four Confounding Variables

	Review Status	N	Mean	Std dev	Std error	Min	Max
Mean Comfort with DL	Reviewed	14	3.73	0.46	0.12	3.00	4.40
Mean Age	Reviewed	14	30.74	6.28	1.68	24.10	42.90
Gender (% Female)	Reviewed	14	0.73	0.17	0.05	.00	1.00
Mean of Prior Experience with DL	Reviewed	14	3.59	1.53	0.41	2.30	7.40

Note: Data for this table was derived by calculating the student mean for the four confounding variables within the 14 "Reviewed" courses.

Table 4.17
Descriptive Retention Statistics for Students in "All Other" Courses Using Four Confounding Variables

	Review Status	N	Mean	Std Dev	Std. Error	Min	Max
Mean Comfort with DL	All Other	27	3.96	0.57	0.11	2.0	4.71
Mean Age	All Other	27	28.90	3.98	0.77	22.2	40.90
Gender (% Female)	All Other	27	0.72	0.26	0.05	0.0	1.00
Mean of Prior Experience with DL	All Other	27	4.79	1.96	0.38	2.0	10.90

Note: Data for this table was derived by calculating the student mean for the four confounding variables within the 27 "All Other" courses.

Table 4.18
ANOVA Analysis Comparing Retention Rates of Students in Study Courses with Four Confounding Variables

		Sum of squares	df	Mean square	F	sig.
Mean Comfort with DL	Between Groups	3.84	25	0.15	0.30	1.00
	Within Groups	7.74	15	0.52		
Mean Age	Between Groups	609.62	25	24.39	1.06	0.47
	Within Groups	346.58	15	23.11		
Gender (% Female)	Between Groups	1.13	25	0.05	0.66	0.82
	Within Groups	1.02	15	0.07		
Mean of Prior Experience with DL	Between Groups	89.52	25	3.58	0.99	0.52
	Within Groups	54.14	15	3.61		

Note: N = 41 online courses in study, "Reviewed" n = 14, and "All Other" n = 27.

None of the four confounding variables: Comfort with DL, Age, Gender (% Female), or Prior Experience with Distance Learning showed a significant relationship with regard to retention rates for this study. These results suggest that the

four confounding variables did not influence the difference in student retention rates between "Reviewed" and "All Other" courses.

Research Question Three -- Factors of Quality Online Instruction Related to Student Satisfaction

Research Question Three stated: "Which factors of quality instruction most directly relate to increased levels of student satisfaction in online courses?" A regression analysis was used for Question Three in predicting student satisfaction for faculty peer reviewed courses only. "Reviewed" courses were utilized because they were the sole group of online courses fully receiving the treatment of faculty peer review. The premise of the study suggested that each of those courses would contain the five factors of quality online instruction, which were: (1) Outcomes, (2) Assessment, (3) Resource Materials, (4) Interaction (Instructor-Student and Student-Student), and (5) Technology. The purpose of this analysis was to determine the relative order of contribution of these five factors of quality in online instruction to student satisfaction. A stepwise, multiple regression analysis was employed for analysis of data in response to this question. The dependent variable for the regression model was "Mean of Factor Means."

Although there were five satisfaction factors used in the conceptual framework for the study, six factors of quality instruction were used as predictor variables for the regression analysis. The factor of "Interaction" was divided into two sub-factors: "Instructor-Student" interaction and "Student-Student" interaction. The Review of Literature in Chapter 2 suggested that students were significantly interested in instructor-to-student interactions within online courses (Chickering & Ehrmann, 1996; Mandernach, 2005; Sloan-C, 2006a). Student-to-Student interactions were suggested to be of less

importance, thus suggesting a qualitative difference between the two types of interactions.

The regression analysis showed the "variance explained" contribution of each of these six factors on the measure of student satisfaction, although due to the relationships among factors and the independent variable, there might be an inflated overall regression coefficient. Essentially, the regression analysis was used to rank the factors of quality from most important to least important as they contribute to student satisfaction. The six factors of quality instruction were ranked using the "standardized coefficients Beta" for each factor. Table 4.19 provides descriptive statistics for the analysis of "Mean of Factor Means;" Table 4.20 provides the regression analysis results that ranks the six factors of quality instruction for "Reviewed" courses.

Question Three: Regression Analysis Ranking Six Factors of Quality

The six predictor variables were entered into the regression analysis in the following order, first to last, using a stepwise regression process: Resources, Assessment, Technology, Outcomes, Instructor-Student Interaction, and Student-Student Interaction. The stepwise regression analysis used six steps in the analysis. The regression coefficient (R^2) was used to describe how much of the variance in the dependent variable of "Mean of Factor Means" was explained by the quality factor variables. R^2 was calculated by squaring the partial correlation of each factor. The first stepwise cycle provided an adjusted R^2 of .78. The final stepwise cycle provided an adjusted R^2 of .99. A limitation of the study was the presence of an inflated R^2 in stepwise regression analysis (R^2 = .99). This is revealed when dependent variables were strongly associated. Rencher and Pun, (1980) suggested that although the R^2 is inflated, order of dependent variables remain

accurate. The presence of an inflated R^2 is not considered relevant to the study. This was an explanatory analysis ranking the factors.

Table 4.19
Descriptive Statistics for Six Factors of Quality for "Reviewed" Courses Related to Student Satisfaction with Dependent Variable of "Mean of Factor Means"

Factors of Quality	N	Mean	Std. dev
Mean of Factor Means	207	4.13	0.62
Mean of Outcomes	207	4.31	0.69
Mean of Assessment	207	4.16	0.71
Mean of Resource Material	207	4.18	0.74
Mean of Instructor-Student Interaction	207	4.26	0.87
Mean of Student-Student Interaction	207	3.42	1.17
Mean of Technology	207	4.09	0.79

Note: Sample consisted of "Reviewed" courses N = 207; "Mean of Factor Means" was Mean of Questions related to the Five Factor Means.

Table 4.20
Regression Analysis Ranking Six Factors of Quality Instruction for "Reviewed" Courses Using the Dependent Variable of "Mean of Factor Means"

	Un-Std beta	Std. error	Standardized beta	*t*	Sig.
Stepwise Cycle 1					
(Constant)	1.06	0.12		9.16	.00**
Mean of Resource Material	0.74	0.03	0.88	26.95	.00**
Final Stepwise Cycle					
(Constant)	0.14	0.04			.00**
Mean of Resource Materials	0.22	0.01	0.27	17.67	.00**
Mean of Assessment	0.23	0.01	0.26	20.02	.00**
Mean of Technology	0.17	0.01	0.22	18.26	.00**
Mean of Outcomes	0.19	0.01	0.21	15.29	.00**
Mean of Instructor-Student Interact	0.10	0.01	0.13	10.00	.00**
Mean of Student-Student Interaction	0.06	0.01	0.11	9.57	.00**

Note: $R^2 = .78$ for Step one; $R^2 = .99$ for Final Step; *$p < .10$, **$p < .05$.
Ranking of quality factors was based on Standardized beta.

The analysis summary for the first regression iteration was significant: $R^2 = .78$, $F(1, 205) = 726.40$, $p < .01$ with an adjusted $R^2 = .78$. The sixth iteration of the stepwise regression yielded $R^2 = .99$, $F(1, 200) = 91.61$, $p < .01$ with an adjusted $R^2 = .99$. As indicated in Table 4.20, all six factors were significant predictors of "Mean of Factor Means." The largest standardized beta coefficient, regardless of positive or negative values, provides the strongest unique contribution in explaining the variance in the dependent variable of "Mean of Factor Means." Mean of Resource Materials was the best predictor, followed by mean of Assessment, mean of Technology, mean of Outcomes, mean of Instructor-Student Interaction, and mean of student-student Interaction, respectively. Each of these six factors of quality indicated significance as

a predictor value regarding the dependent variable of "Mean of Factor Means." This significance was reported at ($p < .01$) for each of the individual factors.

The greatest contribution to the dependent variable was the Resource Materials and the least was Student-Student interaction. The regression model supports the premise of the study in that each of the quality factors contributed in a significant way with ($p < .01$) for the "Mean of Factor Means" model. The regression model did not rank the factor of Instructor-Student interaction as high as might have been anticipated from the Review of Literature.

Research Question Four: Factors of Quality Instruction Related To Increased Retention

Research Question Four stated: "Which factors of quality instruction are most important in terms of retention levels in online courses?" A stepwise regression analysis of variables predicting student retention from "Reviewed" online courses was used in response to Question Four. The regression analysis utilized the study's five factors of quality online instruction: (a) Outcomes, (b) Assessment, (c) Resource Materials, (d) Interaction (Instructor-Student and Student-Student), and (e) Technology. As with the analysis for study Question Three; the factor of "Interaction" was divided into two sub-factors, "Instructor-Student" and "Student-Student" interactions. Analysis of Question Four used only the data from "Reviewed" courses, those that had the treatment of faculty peer review and meeting the Quality Matters standards. A stepwise regression analysis was utilized for this question. There was a single dependent variable identified in the study as "Student Retention." Student retention was the number of students enrolled within "Reviewed" courses in week one and retained through the last week of the course.

The mean of students retained in the 14 "Reviewed" courses within the study was 75% (see Table 4.21).

Table 4.21
Descriptive Statistics for "Reviewed" Courses Using Six Factors of Quality Related to Percent of Retention

	N	Mean	Std. deviation
Percent Retention	14	0.75	0.15
Mean of Outcomes	14	4.38	0.35
Mean of Assessment	14	4.19	0.28
Mean of Resource Material	14	4.29	0.41
Mean of Technology	14	4.15	0.49
Mean of Instructor-Student	14	4.31	0.27
Mean of Student-Student	14	3.45	0.39

Note: N = 14 for Study Reviewed Courses.

Regression Analysis Ranking Five Factors of Quality Instruction by Percent Retention.

A multiple regression analysis was selected to rank the five factors of quality as they related to student retention. The basic R^2 for the regression was .55, the adjusted R^2 was .16; $F(6, 7) = 1.40$, $p = .33$. This analysis indicates the overall model was not significant. Table 4.22 contains a breakdown of all six factors.

Table 4.22
Regression Analysis Ranking Six Factors of Quality for "Reviewed" Courses Related to Percent of Students Retained with Dependent Variable of "Students Retained"

	Unstandardized beta	Std. error	Standardized beta	Sig.
(Constant)	-0.97	1.20		0.45
Mean of Outcomes	0.25	0.38	0.58	0.53
Mean of Assessment	0.73	0.49	1.32	0.18
Mean of Resource Material	-0.67	0.31	-1.82	0.07*
Mean of Technology	0.09	0.10	0.30	0.38
Mean of Instructor-Student	0.17	0.22	0.31	0.46
Mean of Student-Student	-0.19	0.18	-0.49	0.32

Note: R^2 = .55; Adjusted R^2 = .16; *p < .10, **p < .05.
Factor of "Interaction" was separated into two factors for this model - Instructor-Student and Student-Student.

Out of the six quality factors of instruction, only "Resource Materials" contributed significantly to the model at (p = .07). However, as stated previously, the overall model was not significant. This regression analysis for "Reviewed" courses related to Retention failed to support the premise of the study.

Threats to Validity

Chapter 3 identified threats to internal and external validity. Internal threats to validity relate to the basic requirements for an experiment to demonstrate "cause and effect," while external threats to validity relate to questions of generalizability, ensuring results could be applied to other circumstances (Campbell & Stanley, 1963).

Internal threats to validity within the study included: selection, mortality, and diffusion of treatment. Selection threat was addressed in the study by matching treatment courses "Reviewed" by discipline and level with the "All Other" control courses. Pairing took place at both Phase One and Phase Two colleges. The mortality threat was partially addressed through both treatment and control non-response rates, see Table 4.23.

Multiple techniques were utilized during the study to improve response rates. Examples of these techniques include: sponsorship of study by administration, multiple faculty reminders for participation, follow-up reminders by faculty members to students, anonymity of responses, ease and availability of the online format of the questionnaire, use of minor extra credit points in some cases, and ample time for questionnaire completion consisting of a minimum of two weeks. Review of literature indicated that response rates suitable to address a threat to internal validity would tend to be 80% (Tuckman, 1999). That level of response rate was not achieved in this study (see Table 4.23).

Table 4.23
Descriptive Statistics of Student Response Rates to Study Questionnaire

	Students Completing Study Course	Questionnaires Returned	% Questionnaires Returned (Response Rate)
Reviewed	367	209	56.9%
All Other	534	345	64.6%
Total	901	554	61.5%

Note: Non-response rate for "Reviewed" courses was 43.1%; non-response rate for "All Other" courses was 35.4%.

Mean response rate for "Reviewed" courses was 57% and mean response rate for "All Other" courses was 65%. A survey of response rates in the fields of management and social sciences indicated that for studies that covered 200,000 respondents, over a number of years, produced on average a response rate of 55.6% (Baruch, 1999). The University of Texas at Austin (2009) considers a response rate of 30% for online questionnaires to be average. Response rate for the study was consistent with similar social science studies.

Although the study achieved what could be considered an acceptable level of response for an online administered questionnaire, the problem remains that non-response

rate was large enough to cast doubt on the validity of the questionnaire (less than 80%). As described, a number of techniques were employed to assure strong participation in the questionnaire, yet the anonymous nature of the study construction prevented follow up to assure fully sufficient participation to guard against the treat of non-response bias to internal validity. The threat to internal validity does exist until such time that sufficient response rate can be achieved. This issue will remain unresolved for the study and presents the need for a further study that is designed with a mechanism to follow up with participants. One remedy for insufficient response rate was identified by Tuckman (1972) who recommended that:

> …if fewer than about 80% of people who receive the questionnaire complete and return it, the researcher must try to reach a portion of the nonrespondents and obtain some data from them. Additional returns of all or critical portions of the questionnaire by 5 to 10% of the nonrespondents is required for this purpose" (p. 267). This technique could only be achieved through identifying participants using a different study design (p. 267).

The threat of diffusion of treatment was established early in the study with preliminary analysis of treatment and control questionnaire responses. There appeared to be diffusion of Quality Matters peer review processes within Phase One colleges, essentially, portions of treatment processes may have been applied to control courses by proximity within the same colleges. The threat was minimized through addition of Phase Two colleges which had no affiliation with Quality Matters.

External threats to validity that were addressed in the study included: interaction of selection and treatment and interaction of setting and treatment. Although the study was not experimental in design, the quasi-experimental nature of course and student participate selection was done in a "natural educational setting." Muijis (2004) stated that using this type of active approach in an educational setting provides a natural

environment, not an artificial setting for a quasi-experimental study. There was strength with the intact nature of both treatment and control groups, studied in their naturally occurring setting of online course sections. The natural setting of intact online courses in both Phase One and Phase Two colleges provides a control for the external threats of interaction of selection and treatment along with interaction of setting and treatment.

Summary of Results

The purpose of Chapter 4 was to describe the results of the statistical analysis used for each of the four research questions that guided the study. Study variables were defined as were demographics of students and colleges that made up the study participants.

The review of literature indicated that four confounding variables (see Figure 2.2) might affect study results beyond that of faculty peer review. A Pearson Correlation was conducted to test for significant relationships between the confounds and "Mean of Factor Means." It was determined that Mean Comfort with Distance Learning, Age, and Gender had a significant correlation with "Mean of Factor Means" suggesting possible confounds consistent with previous literature. A One-way ANOVA was utilized on "Reviewed" courses with the three significant confounding variables set as covariantes. This process removed the effect of all four confounding variables, three of which were significant. "Reviewed" courses remained significant for student satisfaction indicating faculty peer review had a positive effect beyond the confounding variables.

It was important to the study to determine if "Reviewed," "Non-Reviewed," and "No Review" courses could be combined into two groups of "Reviewed" and "All Other." The purpose was to compare only faculty peer reviewed courses using Quality

Matters as the treatment against all other courses. An ANOVA analysis was used with a dependent variable of "Mean of Factor Means" of satisfaction ratings between the two groups "Reviewed" and "All Other." An ANOVA analysis was not performed on the dependent variables of "Overall Satisfaction" or "Retention" because initial computations indicated that both dependent variables were not affected significantly by the treatment of faculty peer review. The decision was made to include control courses from non-Quality Matters, Phase Two colleges into the data set of the study. The benefits derived for the study include: (a) increased total number of student responses from N = 406 to N = 544; (b) retained control of paired treatment courses verses control courses; (c) retained much of the benefit of student demographic similarity within the Phase One Quality Matters colleges (controls for internal threats to validity), and (d) added some level of control against treatment diffusion (selection threat to internal validity in Table 3.7). The study utilized "Reviewed" and "All Other" courses as treatment and control for the study.

Question One involved comparing student satisfaction with "Reviewed" verses "All Other" courses. An independent *t*-Test was conducted to compare "Reviewed" verses "All Other" courses to determine if there was statistical significance in student satisfaction using dependent variables of "Overall Satisfaction" and "Mean of Factor Means." Analysis indicated there was no significance in "Overall Satisfaction," suggesting that the response to question 30 was not affected by faculty peer review. However, the dependent variable of "Mean of Factor Means" of satisfaction ratings indicated a significant difference between "Reviewed" and "All Other" courses. The "Mean of Factor Means" of satisfaction was a more comprehensive reflection of the five study factors used in the construction of the conceptual framework for the study. Due to

the comprehensive nature of this variable, "Mean of Factor Means" was used as the dependent variable throughout the rest of the study analyses.

Question One results also included an independent *t*-Test to compare the mean of "Reviewed" with "All Other" with each of the six factors of quality instruction (five factors with "Interaction" separated into instructor-student and student-student interaction). Results of this analysis indicated statistical significance for the factors of: Outcomes ($p < .05$), Assessment ($p < .05$), Instructor-Student Interaction ($p < .05$), and Resource Material ($p < .10$). The means of Student-Student Interaction and Technology did not reflect significance.

Question Two ask a question concerning faculty peer review and its effect on student retention. An independent *t*-Test was utilized to compare the mean of retention for "Reviewed" verses "All Other" courses. No significance was indicated. Question Two also compared the four confounding variables with retention rates in "Reviewed" and "All Other" courses. No significance was indicated in this analysis.

Question Three was concerned with the five factors of quality instruction and how they influenced student satisfaction for "Reviewed" courses. Question Three also addressed the order of importance of the five factors. "Reviewed" courses were solely used for this analysis because only that group could be assured of having all five factors of quality identified by the study. A stepwise multiple regression was utilized for this analysis. The dependent variable used for this analysis was "Mean of Factor Means." The analysis also separated "Interaction" into two components, Instructor-Student and Student-Student. This analysis revealed that all six factors were statistically significant ($p < .01$). The order of contribution of these factors to student satisfaction of "Mean of

Factor Means" was: (a) Resource Materials, (b) Assessment, (c) Technology, (d) Outcomes, (e) Instructor-Student Interaction, and (f) Student-Student Interaction.

Question Four explored the possible effect of faculty peer review on increased retention rates. A regression analysis was used to compare the six factors of quality instruction with course retention. No significance was indicated, meaning that faculty peer review did not positively affect retention rates of "Reviewed" courses; "All Other" was not included.

Threats from both internal and external validity were addressed in Chapter 4. Techniques were described within study processes to address threats to validity. Examples included a study process of pairing treatment and control courses. Additionally, there was introduction of additional Phase Two colleges in the study along with multiple methods to increase student response rates for the questionnaire providing an overall response rate of 62% for both "Reviewed" and "All Other" courses.

CHAPTER 5: SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This chapter concludes the study and contains five major components: (1) summary and discussion of responses to research questions, (2) recommendations for educational policy and professional practice, (3) study limitations, (4) recommendations for future research, and (5) study conclusion. The summary and discussion section is organized by research question with a summary of question findings followed by a discussion of relevant research to the findings.

Summary and Discussion of Findings

The purpose of the study was to determine if online courses that were faculty peer reviewed using the five factors of quality instruction resulted in higher levels of student satisfaction and demonstrated higher rates of student retention over other online processes. Both student satisfaction and student retention rates were found to be valid metrics of institutional effectiveness for online courses in the related literature (Bocchi, et al., 2004; Ludwig-Hardman & Dunlap, 2003; Moore, 1989), corroborating their use as dependent variables in the study.

Research Question One -- Overall Satisfaction

Research Question One was based on the premise that improvement of overall student satisfaction with their online courses could be achieved through faculty peer review. There were two indicators of student satisfaction selected for the study, “Student Satisfaction” and “Student Retention.” Question One asked: “Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses?” The question of satisfaction was one of two primary questions addressed by the study. Student

satisfaction was identified as an important measure of instructional quality in higher education, as was student retention. “Schools face the ‘if you build it will they come?’ question: If they offer online courses and students are not satisfied with them, they will not enroll.” (Sloan-C, 2004, p.2)

In an effort to answer this question, the study utilized a treatment identified as “Reviewed” courses and defined as courses that have been “certified” through the Quality Matters process of faculty peer review. The control for this treatment was defined as all other online courses identified in the study and referred to as “All Other” courses. “All Other” courses were matched with treatment courses in terms of course discipline and content level.

Finding: Overall Satisfaction. The study revealed an unexpected result from this single question approach to overall student satisfaction of online courses. Overall Satisfaction as an indicator of student satisfaction was measured by a single question (question 30) on the data collection instrument. Students in “Reviewed” courses did not rate their satisfaction with the course at a significantly higher level than students in “All Other” courses when using this single question to measure student satisfaction. The *t*-Test that compared student “Overall Satisfaction” in “Reviewed” verses “All Other” resulted in no significant difference ($p < .10$), [$t(551) = 0.38$, $p = .35$ (see Table 4.10). This finding did not support the premise of the study.

Discussion: Overall Satisfaction. “Overall Satisfaction” was defined by Question 30 on the questionnaire as “Overall, I was satisfied with this course.” The study anticipated a positive relationship between overall satisfaction for students in faculty peer review courses based on the review of literature presented in Chapter 2 (Abel, 2005;

Arbaugh, 2001; Howell, et al., 2003). Further, the review of literature suggested that online courses that contain factors of quality as described in the study were important to satisfaction in online courses. The Quality Matters Rubric placed significant emphasis on eight standards of best online practice (Kane, 2004). These factors as highlighted by the related literature were assured to be present in each of the "Reviewed" courses, yet, the use of a single question as a measure of student satisfaction did not yield a significant result comparing "Reviewed" with "All Other" courses. Asking a single question in the questionnaire (question 30) did not provide the depth in measuring a complex question such as student satisfaction. The study determined significance in using a multiple question approach through the use of "Mean of Factor Means" of satisfaction ratings. Instructional Assessment Resources of the University of Texas suggested that using multiple questions to derive conceptual concept is superior to a single question (The University of Texas at Austin, 2009). Findings from a single question did not support the premise of the study, nor did it match with the study's summary of relevant literature.

Finding: Mean of Factor Means. The study used a second indicator to measure student satisfaction with online courses. The second indictor was identified as "Mean of Factor Means," as an indicator of student satisfaction. "Mean of Factor Means" was defined as the mean of the means derived from questions directly associated with each of the five factors related to the learning experience and described in the study's conceptual framework (see Figure 2.1). When comparing the "Mean of Factor Means" for "Reviewed" and "All Other," the *t*-Test statistic was determined to be statistically significant ($p < .10$). Significance for this one-tailed test was significant [$t(552) = 1.54$, $p = .06$]. This finding supported the study premise.

Discussion: Mean of Factor Means. The review of literature related to quality learning supported the value and importance of each of the five quality factors of student satisfaction identified in the conceptual framework, (Chickering & Ehrmann, 1996; Council of Regional Accrediting Commissions, 2001; Kane, 2004; Mandernach, 2005; Sloan-C, 2006a; Weber State University, 2006) and selected for use in the study. "Mean of Factor Means" was found to be statistically significant when comparing "Reviewed" with "All Other" courses. The implication is that the *t*-Test results supported the review of literature, the study's conceptual framework, and the study premise that systematic faculty peer review increased the level of student satisfaction for "Reviewed" online courses. Use of the five factors of quality instruction (i.e., Outcomes, Assessment, Resource Materials, Interaction, and Technology), when present, appeared to increase the sensitivity of overall satisfaction for students enrolled in online courses.

> Supplementary instruction programs should use a combination of successful instructional techniques that support learning preferences of the entire student audience. Online and distance education has helped raise the bar for teaching and learning on campus, and faculty need to be more aware of the interaction of teaching styles and pedagogy with student learning styles. (Swail, 2004)

The use of the mean of multiple factor means provided a significant measure of satisfaction and would seem superior to a single question related to student satisfaction. Use of this multiple factor measure could provide better feedback to a researcher interested in comparing faculty peer review processes with student satisfaction levels of online courses.

Finding: Confounding Variables. The Review of Literature in Chapter 2 (see Table 2.2) identified four possible confounding variables external to the learning process that, when present, may influence student satisfaction in online courses (Kim & Moore,

2005). These four confounding variables were: age, gender (female), number of past online courses, and student comfort with online learning. These variables could modify the impact of faculty peer review on student satisfaction. To control for the possible influence of these confounding variables, a Pearson Correlation was performed (see Table 4.11) to determine if any of these four confounding variables were significantly related to "Mean of Factor Means." The analysis indicted significance for three of the four confounding variables: (a) comfort with online learning ($p < .01$) and ($r = .19$); (b) age of student ($p < .01$) and ($r = .16$); and (c) gender ($p < .01$) and ($r = .16$). The number of past online courses taken by a student did not have a significant correlation to "Mean of Factor Means" ($p = .27$) and ($r = .03$). A one-way ANOVA test ompared the independent variables of "Reviewed" verses "All Other" courses while controlling for the four confounding variables. After controlling for the four confounding variables, the ANCOVA analysis indicated that satisfaction significance still existed for "Mean of Factor Means" and "Reviewed" courses, [$F(1, 492) = 4.62$, $p = .03$]. This finding supported the premise of the study regarding effect of three of the four confounding variables on student satisfaction.

Discussion: Confounding Variables. The review of literature indicated that influence on student satisfaction with instruction could be associated with the confounding variables of: (a) comfort with online learning (Arbaugh, 2001; Kim & Moore, 2005), (b) age of student (Arbaugh; Carr, 2000; Fredericksen et al. 2000; Kim & Moore), and (c) gender - female (Arbaugh; Bocchi et al., 2005; Carr; Kim & Moore), and (d) number of online courses taken in the past (Arbaugh; Carr; Kim & Moore). The Pearson Correlation confirmed the influence of three of the four factors in the study

identified through the literature review. This finding is important to both this and future studies because of the need for controlling the influence of all four of these confounding variables. The finding that the "Mean of Factor Means" remained significant related to a course undergoing faculty peer review, even after taking account of the confounding variables, confirming the study premise that "Mean of Factor Means" is related to increased student satisfaction. The finding also showed that the "Mean of Factor Means" indicator of student satisfaction was sufficiently sensitive as a measure of satisfaction beyond the effects of important confounding variables. Future researchers with an interest in overall student satisfaction of online courses could reasonably utilize the "Mean of Factor Means" as a measure of student satisfaction. Additionally, further studies should be designed to account for the four confounding variables external to learning when measuring student satisfaction.

The analysis of confounding variables alleviated concern that some of the variables external to the learning process may have mediated the relationship between "Reviewed" online courses and student satisfaction. This analysis supported the findings of the Review of Literature and the premise of the study that there are confounding variables that could affect increases in overall student satisfaction with online courses.

Research Question Two -- Student Retention

Research Question Two stated: "Is there a significant difference in course retention rates between online courses that have had a systematic faculty peer review process compared with non-peer reviewed online courses?" Student retention is important for any higher education institution delivering online courses (Bocchi et al., 2004). The review of literature revealed there was more concern regarding retention within online

courses than campus based face-to-face courses; “One of the earliest perceptions about online learning was that it was of lower quality than face-to-face instruction” (Sloan-C, 2004, p. 3). Retention of online students has been suggested as one of the greatest weaknesses for use of the online modality (Carr, 2000).

Finding: Student Retention. An independent sample *t*-Test was used to compare the means of online student retention in “Reviewed” verses “All Other” courses. This analysis was expected to detect a level of significance at either $p < .05$ or $p < .10$ for a one-tailed test. The independent variable for the analysis was “Reviewed” courses and the dependent variable was percent of students retained. Study results for the *t*-Test were described in Table 4.15; no significant relationship was found [$t(39) = .37$, $p = .35$]. These results did not support expected results based on the prior review of relevant literature. Both the “Reviewed” and “All Other” online course retained students at levels of 74% and 73%, respectively. No finding of significance could be drawn regarding student retention and faculty peer review. This finding did not support the premise of the study.

Discussion: Student Retention. Related literature indicated there were approaches in the delivery of online courses that would improve student retention within courses. This literature emphasized the integration of institutional systems and best teaching practice in order to ensure online students have access to comparable educational resources, experiences, and environments as their campus-based peers (Bocchi et al., 2004; Chickering & Ehrmann, 1996; Raphael, 2006; Swail, 2004). The premise of the study was that faculty peer review would provide aspects of online learning similar to the

classroom experience. Faculty peer reviewed courses would show increased student retention over "All Other" courses.

The finding that resulted from the study regarding student retention was no significant difference in student retention could be found between courses which had formal faculty peer review and "All Other" courses. The lack of significance could be a result of student retention being tied to factors other than online course quality. Other services such as admissions, student records, financial aid, registration, library services, bookstore, and counseling are often available to students physically attending classes on campus (Raphael, 2006; Swail, 2004). Additional research may be needed to determine factors linked to retention and part of the online environment. The finding from Question Three did not support the premise of the study.

Research Question Three -- Factors of Quality Online Instruction Related to Satisfaction

Research Question Three stated: "Which factors of quality instruction most directly relate to increased levels of student satisfaction in online courses?" The analysis for this research question addressed the significance and contribution of each of the five factors of quality instruction as predictors of student satisfaction and the order of predictive contribution each factor made to the measure of student satisfaction, "Mean of Factor Means."

Finding: Factor of Learning Outcomes. A stepwise regression analysis was conducted to determine how well Learning Outcomes as a factor of instructional quality predicted student satisfaction as measured by "Mean of Factor Means." The predictor factor of Outcomes yielded a mean of 4.31 ($SD = 0.69$); the test was significant [$t(200) = 15.29$, $p < .01$], for "Reviewed" courses (see Table 4.20). The predictor factor of

Outcomes made a statistically significant contribution in explaining overall student satisfaction for "Reviewed" courses. Learning outcomes achieved the highest factor mean, but ranked number four in factor regression order (see Table 5.1). This analysis substantiated the importance of outcomes as indicated in the Review of Literature, and reiterated the importance of outcomes as a factor in a faculty peer review process. This analysis supported the premise of the study that outcomes, when present, are important to student satisfaction.

Discussion: Factor of Learning Outcomes. The review of literature indicated that learning outcomes should be prominent, clearly defined, and explained. Outcomes assist the learner in focusing on learning activities. Course outcomes should be presented early in the course and assessment linked with these learning outcomes. The value of measurable and achievable learning outcomes had strong support in the literature (Bloom, 1956; Mager, 1975; Quality Matters, 2008; Sloan, 2006). There was a trend in post secondary education away from seat time toward outcome based competency.

> When asked to compare learning outcomes in online courses with those for face-to-face instruction, academic leaders put the two on very close terms, and expected the online offerings to continue to get better relative to the face-to-face option. (Sloan-C, 2004, p. 14)

Howell et al. (2002) described best practice for outcomes to be: clear in design and defined as competency-based learning activities. Learning outcomes were described by the Quality Matters Rubric as measurable and written from a students' perspective (Quality Matters, 2008). The faculty peer review process used in the study assured that each "Reviewed" course in the study had learning outcomes embedded within each online course.

This analysis of the factor of Learning Outcomes supported the findings of the Review of Literature and the premise of the study that the presence of learning outcomes had a positive relationship to student satisfaction. Instructional designers who wish to positively influence student satisfaction of online courses should consider the existence of Learning Outcomes in each online course. Researchers who wish to measure student satisfaction in online courses should include learning outcomes as a factor in the measure of satisfaction.

Finding: Factor of Assessment. The regression analysis determined significance for the individual predictor factor of Assessment. The quality factor of Assessment provided a mean of 4.16 ($SD = 0.71$). The test was significant for the factor of Assessment [$t(200) = 20.02$, $p < .01$], see Table 4.20. Assessment ranked number 2 behind Resource Materials for the rank order of predictive contribution to "Mean of Factor Means" (see Table 5.1). The finding of significance supported the premise of the study that Assessment as a factor is important to student satisfaction.

Discussion: Factor of Assessment. Kane (2005) described attributes of student assessment as an established way to measure effective learning, associated directly with learning objectives and designed as essential to the learning process. Ross et al. (2005) categorized evaluation and assessment as one of the five categories selected to review online courses. Assessment was described as an essential element in reviewing courses and programs and is becoming increasingly important to accrediting bodies (CHEA, 2002). The Quality Matters Rubric stated: "The types of Assessments selected measure the stated learning objectives and are consistent with course activities and resources" (Quality Matters, 2008 ¶ 3).

The predictor factor of Assessment made a statistically significant contribution in explaining overall student satisfaction for "Reviewed" courses. This analysis substantiated the importance of assessment as specified in the Review of Literature, the study's conceptual framework, and reiterated the importance of Assessment as a factor of quality instruction for the faculty peer review process. Instructional designers who wish to positively influence student satisfaction of online courses should consider that assessment strategies of outcomes are present in each online course. Researchers interested in online student satisfaction should include assessment strategies as a measure of satisfaction.

Finding: Factor of Resource Materials. Analysis of the factor of Resource Materials yielded a mean of 4.18 ($SD = 0.74$). The test was significant for the factor of Resource Materials [$t(200) = 17.67$, $p < .01$], see Table 4.20. Resource Materials ranked first from the regression analysis as a factor predictor of satisfaction (see Table 5.1). This analysis confirmed the premise of the study regarding resource materials as important to student satisfaction.

Discussion: Factor of Resource Materials. Nakos, Deis, and Jourdan (2002) identified resource materials such as study guides and materials embedded within the online course as important to a good online course. Similarly, Mandernach (2005) described resource materials as additional readings and resources within the online course structure. The Quality Matters rubric stated that instructional materials should possess sufficient breadth, depth, and currency to provide relevance to the subject (Quality Matters, 2008).

The quality factor of Resource Materials made a statistically significant contribution in explaining overall student satisfaction. This analysis substantiated the importance of Resource Materials to the study's conceptual framework and premise of the study. Instructional designers should consider the use of Resource Materials within each online course; researchers should include this factor in their studies when considering student satisfaction.

Finding: Factor of Interaction. The study separated the quality factor of Interaction into two separate sub-factors. These two sub-factors were: (1) Instructor-Student Interaction and (2) Student-Student Interaction. The study utilized a stepwise regression analysis to determine the predictive significance for the Interaction sub-factor of Instructor-Student interaction. The analysis resulted in a mean of 4.26; $SD = 0.87$. Instructor-Student interaction was significant [$t(200) = 10.00$, $p < .01$], see Table 4.20. This was the second highest factor mean, second only to that of Outcomes. Instructor-Student interaction was ranked number five in order of predictive contribution to "Mean of Factor Means" (see Table 5.1).

The second Interaction sub-factor was Student-Student interaction. The study regression analysis determined the mean of Student-Student interaction to be the lowest of the mean factor scores yielding a mean of 3.42; $SD = 1.17$. Student-Student interaction was significant [$t(200) = 9.57$, $p < .01$]. Student-Student interaction ranked lowest of the five factors in predictive value (see Table 5.1). This analysis confirmed the importance of both Interaction sub-factors in the premise of the study. Both Instructor-Student and Student-Student interactions significantly contributed to overall student satisfaction.

Discussion: Factor of Interaction (Instructor-Student and Student-Student). Most of the references to interaction in the Review of Literature either described Instructor-Student interaction, or combined Instructor-Student and Student-Student interaction (Quality Matters, 2008). Little was found in the Review of Literature specifically referencing Student-Student interaction as an essential part of online course practice. For the purposes of analysis, two separate interaction factors were used. Both were found to have made a statistically significant contribution to overall satisfaction of students with "Reviewed" online courses. Although both contributed to overall satisfaction, Student-Student interaction ranked last in the contribution of the six factors considered. This analysis confirmed the premise of that study that Interaction is an important factor to overall student satisfaction, but indicated that Student-Student would provide the least value as a predictor of satisfaction. The sub-factor of Instructor-Student interaction was found to be more important based on the Review of Literature and from the analysis of study data.

The conceptual framework (see Figure 2.1) identified a single factor of Interaction, but based on the Review of Literature and the study findings; there was evidence that both interaction factors were distinct sub-factors in "Interaction" (Herbert, 2006). Interaction could be broken into two factors of Instructor-Student and Student-Student interaction. The Quality Matters rubric recognized that there are some courses where Student-Student interactions were not utilized (Quality Matters, 2008) such as in more self paced online courses. Quality Matters did identify that quality online learning activities should foster Instructor-Student, Content-Student, and Student-Student interaction. Additionally, best practice for online courses would set expectations for

instructor responsiveness and availability as well as expectations for student interactions. Keeton, Sheckley, and Krejci-Griggs (2002) recognized that instructors should elicit active and critical reflections by learners. Regular and systematic contact between students and instructors was cited as important by the following authors: Chickering & Ehrmann, (1996); Herbert; Kane (2004); Liao (2006); Mandernach (2005); Nakos et al. (2002); and Sloan-C (2006a); each described the importance of Instructor-Student to satisfaction.

The Quality Matters Rubric in Item 5.1 of Learner Engagement describes interaction as: "Learning activities foster Instructor-Student, Content-Student, and if appropriate to the course, Student-Student interaction" (Quality Matters, 2008, ¶5). Quality Matters itself does not put more or less emphasis on Instructor-Student or Student-Student interaction, but looks at the topic as a single entity.

Analysis of the factors of Student Interaction supported the findings of the Review of Literature, the study's conceptual framework, and the premise of the study. Both literature and the stepwise regression analysis suggest that the use of Interaction (Instructor-Student and Student-Student) had a positive relationship toward the "Mean of Factor Means" measure of student satisfaction. The Review of Literature predicted that Student-Student interaction, although important would be less significant than most factors of the conceptual framework. The unexpected finding from the stepwise regression verses the study's Review of Literature was that Instructor-Student interactions ranked low, at number five of six factors of quality instruction. The related literature would generally rank Instructor-Student interactions as primary to student satisfaction and a successful online course (Chickering & Ehrmann, 1996; Mandernach,

2005; Quality Matters, 2008; Sloan-C, 2006a). The low ranking of contribution of Instructor-Student interaction toward student satisfaction as measured by "Mean of Factor Means" was unexpected. Regardless of factor ranking, Instructor-Student and Student-Student interaction contributed positively and at ($p < .01$).

Instructional designers who want to improve student satisfaction of online courses should consider the positive influence of both Instructor-Student interactions, and when possible and appropriate for the course format, Student-Student interaction strategies. Researchers measuring student satisfaction in online courses should include Instructor-Student and Student-Student strategies as an important satisfaction factor.

Finding: Factor of Technology. The regression analysis determined the factor Technology to be significant. The mean of Technology was 4.09, ($SD = 0.79$). Technology as a predictor of student satisfaction was [$t(200) = 18.26$, $p < .01$], see Table 4.20. The predictor factor of Technology made a statistically significant contribution in explaining overall student satisfaction for "Reviewed" courses. This analysis confirmed the factor of instructional technology as an important factor of quality instruction. This analysis confirmed the premise of the study that the factor of Technology contributed to student satisfaction.

Discussion: Factor of Technology. The conceptual framework of the study identified the factor of Technology as important to student satisfaction in an online course. Sloan-C (2006a) indicated that the appropriateness of technology was important to online courses. CHEA (2002) described course technology as being tied to curriculum and instruction. Quality Matters (2008) in the scoring rubric recognized that tools and media support for the learning objectives should be appropriately chosen to deliver the

content of the course. Additionally, Quality Matters found that course tools and media support for student engagement would guide the student to become an active learner (2008).

The predictor factor of Technology made a statistically significant contribution to overall student satisfaction. The analysis confirmed the premise of the study that Technology as a factor of quality instruction is important to student satisfaction. The quality factor of Technology supported the findings of the Review of Literature and the study's conceptual framework. Both literature research and the stepwise regression analysis suggest that when appropriate technology is present there exist a positive relationship to student satisfaction. Instructional designers should consider that appropriate technologies are important factors in each online course. Researchers should consider technology as important when measuring student satisfaction.

The six factors of quality instruction were compared using "Mean of Factor Means" in the study in two ways. One was ranking based on mean score. The second ranking was taken from the stepwise regression analysis. The method of ranking yielded different results between mean and the regression analysis; Table 5.1 reflects the two methods of factor ranking. Further research would be helpful in clarifying the rank importance of Instructor-Student interaction within the five factors studied. Research literature consistently ranks Instructor-Student interaction either at or near the top of importance (Chickering & Ehrmann, 1996; Liao, 2006; Mandernach, 2005; Sloan-C, 2006a). The study ranked Instructor-Student interaction near the bottom of the factors of quality instruction when using the regression analysis.

Table 5.1
Order of Contribution of Five Factors of Quality Instruction to "Means of Factor Means" as Measured by Mean and Stepwise Regression

Factor Order by Mean	Factor Order from Stepwise Regression
(1) Outcomes ($M = 4.31$)	(1) Resource Materials ($\beta = .27$, $p < .01$)
(2) Instructor-Student Interaction ($M = 4.26$)	(2) Assessment ($\beta = .26$, $p < .01$)
(3) Resource Materials ($M = 4.18$)	(3) Technology ($\beta = .22$, $p < .01$)
(4) Assessment ($M = 4.16$)	(4) Outcomes ($\beta = .21$, $p < .01$)
(5) Technology ($M = 4.09$)	(5) Instructor-Student ($\beta = .13$, $p < .01$)
(6) Student-Student Interaction ($M = 3.42$)	(6) Student-Student ($\beta = .11$, $p < .01$)

Note: All factors of quality instruction contributed to the student satisfaction ($p < .01$). Combination of Tables 4.19 and 4.20.

Research Question Four -- Factors of Quality Online Instruction Related to Retention

Question Four, which was related to student retention stated: "Which factors of quality instruction are most important in terms of retention levels in online courses?" Student retention rates remain of interest to college administrators and in many cases retention tends to be lower in online courses verses traditional face-to-face courses (Carr, 2000). The study sought to determine if any or all of the factors of quality online instruction would increase student retention rates.

Findings: Student Retention and the Factors of Quality Online Instruction. A stepwise regression analysis was utilized to determine two items: (1) the predictive significance of each of the five factors of quality, and (2) the order of contribution of these factors to the analysis. Significance from the stepwise regression analysis was only shown for the predictor variable of "Resource Materials" indicated at ($p = .07$). There was no significance related to any of the remaining five factors of quality as they relate to students retained. Five of the six factors (Interaction had two sub-factors) produced

significance of ($p > .10$). The result of this stepwise regression analysis was that "Resource Materials" may play a role in retention of students, while the remaining five factors provided no relationship (see Table 4.22).

Discussion: Student Retention and the Factors of Quality Online Instruction. The study attempted to determine if any of the five factors of quality online instruction proved to have a positive relationship to student retention. The Review of Literature indicated that retention was important to institutions of higher education and retention could be linked to satisfaction. A stepwise regression analysis was utilized to predict student retention from "Reviewed" online courses from the study's five factors directly related to the online learning experience: (1) Outcomes, (2) Assessment, (3) Resource Materials, (4) Interaction (Instructor-Student and Student-Student), and (5) Technology. These factors were all linked to the learning experience (see Figure 2.1). The need for support of students exclusively studying in an online environment were substantively the same as for students on a campus (Raphael, 2006; Swail, 2004). According to Bocchi et al. (2004) when there was extensive faculty feedback and interaction addressing isolation concerns, providing application-based content and activities, and helping students meet expectations for personal and professional growth, students tended to be retained.

The finding that resulted from the analysis of Question Four was that no significance in relationship could be found between retention rates and four of the five primary factors of quality instruction. The only factor of predictive value related to student retention was Resource Materials. The regression analysis for "Reviewed" courses did not relate to student retention. The analysis failed to support the premise of the study, the conceptual framework, nor did it predict what was suggested through the

literature. Neither the faculty peer review process nor more than one of the factors of quality provided a positive relationship to student retention in online courses.

There are several possible reasons for the failure of the study's analysis to provide evidence of a relationship. There are many reasons students are not retained at colleges, these can include issues ranging from personal, job conflicts, family obligations, transportation, financial, and dedication.

> Nearly every distance-education instructor and student has a different explanation for the higher dropout rate, but the explanations generally fall into two camps: Some believe students leave distance courses for essentially the same reasons they drop out of traditional courses, but that distance-education students, who are often older, have more obligations and simply must drop more frequently. (Carr, 2000, ¶ 17)

Each of these could be considered a confounding variable beyond the quality of either a campus based course or online course. Based on the study findings, no conclusion could be drawn regarding contribution of faculty peer review to student retention. Due to the importance of student retention for colleges, future research could be conducted to determine if faculty peer review could have positive influence on student retention through instructional delivery.

Summary of Findings and Discussion Relating to Study Questions

The results of the study findings can be categorized into three areas: (1) student retention findings, (2) faculty peer review influencing student satisfaction findings, and (3) factors of quality instruction influencing student satisfaction findings. First, no significance could be determined in the application of faculty peer review to increased student retention. No study recommendations could be given based on that finding. Second, a significant relationship was found in the use of the process of faculty peer review as predictive of increased student satisfaction overall in "Reviewed" courses when

using “Mean of Factor Means” in satisfaction ratings as a dependent variable. No significance could be found in the analysis of a single question (Question 30) as a measure of student satisfaction. Third, there was significance found in the use of each of the five factors of online quality instruction as predictive for increased student satisfaction in “Reviewed” courses using “Mean of Factor Means” as a dependent variable. The unexpected finding was the low rank (five of six) for the factor of Instructor-Student interaction. Related research would have suggested a higher ranking in the contribution to “Mean of Factor Means” in student satisfaction.

Recommendations Derived from Study

Findings from the study and their discussion in the context of related literature provided the basis for recommendations related to both educational policy and professional practice. These recommendations for educational policy include those related to: (a) accreditation standards and (b) criteria for instructional funding models. Recommendations for professional practice include those related to: (a) use of study questions for quality assessment purposes, and (b) quality improvement processes related to Baldrige criteria.

Administrators and faculty who have an interest in quality online learning could consider applying faculty peer review as a process to the development or revision of online courses with the intention of improving student satisfaction. The study confirms that the presence of the five factors of online quality instruction in “Reviewed” courses enhances the systematic faculty peer review process. These factors, when present, are related to and predictive of increased student satisfaction. “Mean of Factor Means” when measured by the study questionnaire appears to be sufficiently sensitive to these factors

of quality instruction and is an indicator of student satisfaction. The on-line study questionnaire initially appears to be a reliable means to gather information about satisfaction with each of the factors of quality instruction in the context of faculty peer review application.

Recommendations Related to Educational Policy

Higher education administrators responsible for online educational policy at the national, regional, state, and institutional levels should consider the application of faculty peer review of online courses toward: (a) accountability in accreditation standards, and (b) standards used in funding models for online course development.

Recommendation: Faculty peer review processes and factors of quality could be used for improved accountability for on-line instruction with regard to accreditation standards.

Accreditation standards for online courses are emerging as instructional technology and delivery methods change. There is a dilemma for accrediting organizations that have a responsibility to assure institutions are providing online students with the traditional measures of performance standards and outcome achievement. At issue is the requirement to assure academic achievement within the context of an online format. Measurements of evidence required by an accrediting organization are broader than academic achievement, and can include additional aspects such as retention, student satisfaction, and specific as well as general student skills.

> Institutions must assess student achievement in the distance learning programs using such measures as student retention rates, student satisfaction, faculty satisfaction, measures of student competence in both general skills (communication, comprehension, analysis, etc.) and skills specific to the field of study. Students completing distance learning courses must have sufficient

> opportunity to acquire comparable levels of knowledge and competencies as in similar programs or courses offered in more traditional ways (CHEA 2002, p. 13)

There is a concerted effort by the eight regional accreditation entities to systematically look at online course delivery as an important component of academics for institutions they oversee.

> The majority of the specialized accreditors expect programs to demonstrate that their graduates possess the knowledge, skills, and abilities generally regarded as essential for the entry-level professional in that field, regardless of the delivery mode of the instruction those programs provide. (CHEA, 2002, p. 2)

CHEA recognizes that for accreditation purposes, outcomes and assessment strategies are important to quality of online courses. Due to emphasis on modalities outside of the traditional face-to-face delivery format, standards for online delivery are newer and in some cases could be more rigorous than traditional classroom based assessment. Traditional standards place emphasis on student seat time, professionally qualified faculty, quality of facilities, textbook selection, and academic planning (NWCCU, 2003). Emerging standards for online delivery are additionally concerned with student learning outcomes and assessment, continuous improvement processes, and direct faculty involvement in curriculum decisions. CHEA for example recommends that institutions voluntarily subject themselves to internal "peer review." This peer review would be relevant to both program and course level reviews, administered by faculty peers.

Study findings could provide assistance to both regional accrediting organizations and college self studies in an effort to enhance accountability and provide evidence toward meeting accreditation standards. Areas that the study could prove of value would be in documenting the direct involvement of faculty in the curriculum development

process, providing evidence of a continuous improvement process for online courses, and the documented use of best practice factors of quality online instruction.

The study's focus, and therefore findings, was on student satisfaction. Many accrediting organizations do place emphasis on measuring student satisfaction using results from instruments such as Community College Survey of Student Engagement (CCSSE) or National Survey of Student Engagement (NSSE) as evidence for student satisfaction. The study's questionnaire could provide a level of measurement of student satisfaction with online courses.

A potential problem exists with satisfaction as an indication of achievement. There does not appear to be evidence of a clear relationship between student satisfaction and achievement of learning outcomes and, therefore, there are limits to the implications of the study for directly meeting the learning outcomes emphasis in emerging accreditation standards.

There are two potential areas where the study could influence accreditation policy and evidence. The first area of influence is at a regional accrediting level to provide guidance criteria for online course quality.

> Accreditation (external peer review of institutions and programs to assure and improve quality) is the primary means by which higher education distance learning offerings are currently reviewed for quality. Accreditors are responsible for scrutiny of distance learning for all higher education institutions and programs they review that offer education through distance. (CHEA, 2001, p. 1)

The second area of influence could be at the institutional level. Colleges prepare for regional accreditation visits by developing institutional policy and procedures and then documenting these policies and procedures by means of a self study. The institutional self study is the primary tool used by accrediting bodies for purposes of accountability and

evidence. A college could utilize a formal process of faculty peer review as a method to both create and continuously improve online courses. Accrediting bodies are interested in academic quality, accountability, and continuous improvement processes. “These standards include attention to advancing academic quality, demonstrating accountability and encouraging needed quality improvement” (CHEA, 2001, p. 2).

Colleges that adopt processes outlined in this study could use the documentation and processes as evidence for a self study. The Council of Regional Accrediting Commissions has developed a list of criteria by which a regional accrediting body can evaluate online course and program delivery at educational institutions. “While endeavoring to maintain balance and flexibility in the evaluation of new forms of delivery, the regional commissions are also resolved to sustain certain values” (Council of Regional Accrediting Commissions, 2001, p. 2). Table 5.2 compares the standards recommended by the Regional Accrediting Commissions regarding electronically offered degrees and certificates with either the peer review process as a whole, or individual factors of quality instruction found to have significance described from the study.

Table 5.2
Statement of Commitment by the Regional Accrediting Commissions for the Evaluation of Electronically Offered Degree and Certificate Programs Compared with Study's Peer Review Process or Factors of Quality

Commitment to Standards by Accreditation Commissions	Study Related Findings
Education is best experienced within a community of learning where competent professionals are actively and cooperatively involved with creating, providing, and improving the instructional program;	Faculty Peer Review Process
Learning is dynamic and interactive, regardless of the setting in which it occurs;	Quality Factor of Interaction (Instructor-Student, Student-Student)
Instructional programs leading to degrees having integrity are organized around substantive and coherent curricula which define expected learning Outcomes;	Quality Factor of Learning Outcomes
Institutions accept the obligation to address student needs related to and to provide the resources necessary for their academic success;	Quality Factors of: Resource Materials and Technology; Study Questionnaire Measuring Student Satisfaction
Institutions are responsible for the education provided in their name;	Quality Factor of Assessment
Institutions undertake the assessment and improvement of their quality, giving particular emphasis to student learning;	Quality Factors of: Learning Outcomes, Assessment, and Resource Materials
Institutions voluntarily subject themselves to peer review.	Faculty Peer Review Process

Note: Column one: (Council of Regional Accrediting Commissions, 2001). Column two: Peer review process or factors of quality instruction found to be significant in the study.

Colleges and universities that embrace the five factors of quality directly related to online learning could build and assure alignment with general regional accrediting principles regarding online course delivery. These quality factors could be integrated into online course development, faculty training, online best practice, continuous course improvement, online course assessments, and course/program review. These processes could serve as evidence of best online practice. Colleges may find it beneficial to align their self-studies in the area of online course development and online delivery to a consistent set of rubrics which includes the five factors of best practice set forth in this study.

> To the extent that institutional and programmatic standards are reflected in individual courses, the QM Rubric can verify adherence to these standards. Thus, the implementation of QM reviews in an institution or program can serve as a major element of the quality assurance process for online education that accreditation requires. (Legon, 2006)

By documenting the presence of the five factors of quality online instruction in the review rubric, a college could provide evidence of both best practice and continuous improvement for the purposes of a self study.

Recommendation: Faculty peer review processes and quality factors could be used for criteria in consortium or statewide funding models. Higher education consortiums, foundations, or statewide associations frequently distribute resources in the form of grants or funding for the purpose of development and deployment of individual online courses or full online programs. These organizations should consider using the study's faculty peer review model and the five factors of best practice as a component of the criteria for funding projects and programs. Consortiums often set funding criteria based on specific grant outcomes, best practices, or ability to replicate the grant. The study presented a model of faculty peer review with the concept that several trained

faculty using a course review rubric consisting of factors of quality online instruction could review and suggest improvements to new or existing courses.

The faculty peer review process along with the five factors of instructional quality used in the study's conceptual framework could be utilized in the following ways: (a) setting standards for criteria used in grant proposals, (b) setting processes for replication or continuation of a grant, leveraging funds into ongoing course development processes, (c) faculty peer mentoring processes, and (d) development of faculty peer review processes for new or continuous improvement of existing courses.

Grant funding criteria could place funding priority on online course development and faculty training processes that have components of faculty peer review and evidence of the five factors of quality instruction integrated into the proposal. When utilized prior to delivery, a peer review panel of trained faculty and instructional designers using a standard rubric of best practice could provide feedback and adjustment of course design, delivery, and content. Additionally, faculty peer review could be utilized on existing courses that have not initially been reviewed, and could serve as a tool for continuous improvement for courses that would make up a full online program. Finally, peer review techniques could be utilized in the training of new online faculty who would be designated as either course developers or online course delivery faculty. Each of these items could have a positive effect on effectiveness of funding models.

Recommendations Related to Professional Practice

Those who manage online course delivery within higher education intuitions are responsible for the design, delivery, and assessment of online course modalities. These

individuals who are directly involved at a specific course level should be aware of quality factors of instruction that could directly contribute to student satisfaction.

The five factors of quality online delivery were shown by study and supported by prior research to have significance for student satisfaction. Colleges and universities could consider more formal methods of online course development processes and review of existing online courses using the faculty peer review model. Although the Quality Matters process was used by the study for the purpose of treatment consistency, many institutions utilize similar peer review models and best practice factors. The study identified two important elements of the online best practices model. First is the importance of the five factors of quality online instruction to student satisfaction. The second is the importance of faculty peer review as a process of quality control, training, and importance to accreditation standards.

Recommendation: Use the study questionnaire as a tool for online course quality improvement or assessment. The 30 question online study questionnaire could be considered for use as an assessment tool to measure student satisfaction with an online course. The study could benefit managers of online programs at a local college level through use of the study's questionnaire for the purpose of course assessment.

The questionnaire was designed to measure each of the five factors of quality instruction. Additionally, a comprehensive assessment of overall satisfaction could be discerned through using the mean of each of the five factor means "Mean of Factor Means." The study addressed content and construct validity of the questionnaire. The questionnaire was reviewed by a panel of experts and found to be valid. Construct validity was addressed in developing the questionnaire by structuring questions around

the constructs in the conceptual framework (see Figure 2.1). The study addressed questionnaire reliability through Cronbach alpha. Cronbach's alpha was used to analyze data gathered through the study. The measures of reliability were derived through correlation coefficients of inter-item correlations and item-total subscale scores. Inter-item correlations between .30 to .70 are considered acceptable to capture homogeneity and minimize redundancy (Nunnally & Berstein, 1994). Table 5.3 describes the coefficient test for Cronbach alpha related to the five factors of quality instruction. Cronbach alpha used blocks of related questions (blocks related to each factor of quality) to determine if student responses to these blocks moved together, indicating a reliable testing instrument. Nunnally and Berstein (1994) state that a Cronbach alpha of > .70 indicates responses to blocks of questions strongly move together. Table 5.3 demonstrates that each block of quality factors move together with an alpha of (> .70).

Another measure of reliability was the use of a Principal Component Factor Analysis, see Appendix D. The Factor Analysis revealed that the communality "extraction" for each of variables in the factor show that each variable within the factors are strong linear combinations of each other, and that the eigenvalues in each of the analysis show only one eigenvalues greater than one. The implication of this analysis is that there is a strong positive correlation between the questions within each factor.

Table 5.3
Cronbach alpha Coefficient Test for Study Questions

	Outcomes	Assessment	Resource Materials	Interaction	Technology
	Qs 6, 7, 8	Qs 10, 11, 12, 13	Qs 15, 16, 17, 18	Qs 20, 21	Qs 24, 25, 26
Alpha	0.79**	0.85**	0.85**	0.82**	0.88**

Note: Cronbach alpha > .70**
Cronbach alpha of > .70 indicates blocks of question responses move strongly together.

One area of weakness in the use of the study's questionnaire is that of potential for non-response bias based on the online delivery format. Questionnaire validity remains in question based on the potential for non-response bias. Online administration of the questionnaire in the study did not account for a lower than anticipated levels of response rate due to the inherent difficulty in follow up due to the anonymous nature of the tool. Full confidence in the validity of the questionnaire could be achieved with a future study that would provide for follow up on non-response to achieve a level of response that could dispel non-response issues or could test and control for non-response bias.

The study questionnaire could be utilized at institutions for quality improvement processes in several ways: (a) questionnaire used in whole could provide faculty and administration with a "snapshot" of student satisfaction with courses -- this snapshot from the questionnaire includes each of the five factors of quality instruction plus the overall "Mean of Factor Means," (b) questionnaire used in whole with local results collected and compared over the period of multiple course sessions to provide a time-lag study of student satisfaction with online courses, and (c) selected portions of the study questionnaire could be used to gather data on very specific factors of online courses for a local institution.

Item (a) above suggests that college administrators and faculty use the full 30 question study questionnaire to collect satisfaction data for the purposes of comparing and contrasting satisfaction results of both means and standard deviations within all online courses at the college. Results from the questionnaire would provide a numerical satisfaction level for each course. This would provide a starting point for both

administrators and faculty chairs to review college online courses that received low relative overall scores or low individual quality factor scores.

Item (b) above describes the use of the full 30 question study questionnaire by an institution for the purposes of gathering time-lag data. The questionnaire could be used over the period of several terms/semesters or over several years for the purpose of gathering quantifiable data concerning student satisfaction. Student satisfaction is provided in the form of satisfaction levels for each of five quality factors and overall student satisfaction, measured as "Mean of Factor Means." This time-lag study of student satisfaction would provide both faculty and administration with data on trends with the online offerings of classes and some level of quality measurements if modifications are introduced into online course delivery. Examples of these types of modifications are changes in the learning management system or a shortened delivery period such as summer session.

Item (c) describes the use of selected portions of the study for the purpose of comparing student satisfaction within certain questions or factors deemed important at a local institution. Statistical analysis could be utilized to distinguish differences in levels of satisfaction factors between courses. Table 5.4 below could be used to create a question inventory for the study questionnaire. This type of data gathering could be used in a quality improvement process to measure faculty effectiveness with an area, such as factor four (instructor-student interaction).

Table 5.4
Questionnaire Item Inventory for Questions related to Student Satisfaction

Type of Question	Question Items by Quality Factor
Study questions related to Student Satisfaction	Outcomes Qs-6,7,8 Assessment Qs-10, 11, 12, 13 Resources Qs-15, 16, 17, 18 Interaction Qs- 20, 21, 22 Technology Qs- 24, 25, 26 Overall Q-30

Recommendation: Use faculty peer review, quality factors, and questionnaire processes for new course development or existing course improvement process. Another area in which the study findings could benefit professional practice is in the use of components of the study to create a quality improvement process for both new and existing courses. Most institutions have formal or informal methods to develop new online courses or review and improve existing online courses. One very specific example of a development process is the Baldrige National Quality Program (Education Criteria for Performance Excellence, 2009). Baldrige is a quality improvement process embraced by many educational institutions for the purposes of documented performance improvement processes using specific criteria.

> The requirements of the Education Criteria for Performance Excellence are embodied in seven Categories, as follows: 1. Leadership, 2. Strategic Planning, 3. Customer Focus, 4. Measurement, Analysis and Knowledge Management, 5. Workforce Focus, 6. Process Management, and 7. Results. (Education Criteria for Performance Excellence, 2009, p. 1)

The use of the factors of quality derived from the study could be incorporated into Category 6 “Process and Management” of the Baldrige criteria. Specifically, the process of “Plan-Do-Study-Act” as a quality improvement process could utilize study findings.

> To improve process performance (6.2b) and reduce variability, your organization might implement approaches such as the Plan-Do-Study-Act methodology or other process improvement tools (e.g., ISO 9000:2000 standards, Six Sigma methodology, or a Lean Enterprise System). These approaches might be part of your performance improvement system described in response to P.2c in the Organizational Profile. (Baldrige National Quality Program, 2009, p. 23)

This quality improvement process is commonly known as the "P-D-S-A" cycle. "P-D-S-A" is a continuous improvement cycle reflecting the four process steps of: (1) Plan, (2) Do, (3) Study, and (4) Act (Shewhart, 1939). Baldrige criterion recommends that quality processes be placed in a continuous feedback loop so that managers can recognize and change the elements of the process that need improvements. The "P-D-S-A" cycle could be used to create a course development process that would systematically create courses and provide evidence of quality and improvement for accreditation purposes. Three study components that could be useful in the course development process are: (1) peer review, (2) factors of quality, and (3) study questionnaire.

The Baldrige model describes the first element as "Plan," which establishes the objectives and processes necessary to deliver results in accordance with the expected output (develop the course). The second element of the process is "Do," which implies the implementation of the process (delivery of the course). The third element of the "P-D-S-A" process is "Study," which indicates measurement of current results compared with expected results to highlight a gap between expected and actual results (collection and measurement of data). The final element of the Baldrige process is "Act," which completes the quality cycle of improvement (adjust the courses if needed). This final step is used to refine the scope of the process model to embed improvement. Table 5.5 describes a conceptual model of the four-step "P-D-S-A" cycle applied to study findings. The study confirmed the significance of the five factors of quality instruction related to

online student satisfaction as well as the value of the faculty peer review process to overall student satisfaction. These findings could be incorporated into an online course development and delivery process. Specifically, if an institution is interested in the "P-D-S-A" it is highlighted in the Baldrige Education Criteria for Performance Excellence utilized Baldrige criteria, Category 6 "Process Management" sub area 6.2 "Work Processes." Table 5.5 applies this "P-D-S-A" process model to (a) new online course development, and (b) online course delivery.

Table 5.5
Sample Quality Improvement Planning Process Using "P-D-S-A" Process Applied to New Online Course Development and Online Course Delivery

"P-D-S-A" Cycle – New Course Development Process

Plan (Develop)	Do (Deliver)	Study (Measure)	Act (Adjust)
Utilize study factors of: Outcomes, Assessment, Resources, Interaction and Technology to create a rubric format for course design. Use faculty peer review to develop process for online course review.	Develop and deliver a faculty mentoring course. Embedded in the mentoring course are principles of peer review and five factors of online quality. Faculty would develop their new online course during this phase.	Use faculty peer review process with five factors of quality instruction to review newly developed online courses prior to initial delivery.	Use feedback from faculty peer review process of new course to change or adjust online course prior to first delivery.

"P-D-S-A" Cycle – Course Delivery Process

Plan (Develop)	Do (Deliver)	Study (Measure)	Act (Adjust)
Use feedback from peer review to modify online course for initial delivery. Train faculty in peer review processes and practices to deliver the online course.	Deliver the online course using trained and mentored faculty who use the factor rubric. Emphasis should be placed on Instructor-Student interactions.	Use study questionnaire or elements of the questionnaire to gather student satisfaction feedback with online course. Use study student responses as a beginning point for gap analysis.	Use data from gap analysis to improve the online course.

The use of the study questionnaire could serve as an assessment tool to measure levels of student satisfaction with new or existing online courses for the purpose of quality improvement cycle. The concept of a quality improvement process revolves

around gathering data and use of measurement to adjust. The Baldrige criteria describes measurement as using fact-based decision making for setting and aligning organizational direction, resource use, and alignment of key processes (Baldrige National Quality Program, 2009). The study questionnaire could serve as a tool to measure levels of student satisfaction in online courses. The questionnaire was designed to be deployed electronically, and has been reviewed by a panel of online experts providing construct and face validity. There is a level of reliability established through a Cronbach alpha analysis along with the Principal Component Factor Analysis. The five factor variables are high (i.e. above .5) within the factor analysis, indicating that other variables in that factor are highly related to that variable. The study established a strong correlation among questions related to each of the five factors related to online learning (see factor analysis results shown in Appendix D).

Study Limitations

There are four limitations that need to be acknowledged and addressed regarding the study. These limitations need to be taken into account when considering the study and its contributions. Some of these limitations are seen as productive avenues for future research.

The first limitation of the study was that the target population from which colleges were selected was relatively small. It should be noted that this study focused solely on community college general education courses and not the array of professional technical or not for credit courses. Data collection was restricted to target colleges (See Figure 3.1) that formally used Quality Matters as a peer review process for the "Reviewed" courses, and agreed to participate in the study. There were seven target

colleges located in both Maryland and Oregon that consisted of the study sample for Phase One (See Figure 3.1). At the time of the study, there were 70 courses nationally that met the criteria of being formally peer reviewed and served as the study's population (Quality Matters, 2006). Over the course of time, while the study was on-going, many more institutions and hundreds of courses were added to the Quality Matters venue, providing a much larger and diverse pool of potential target institutions from more diverse areas around the country. A similar study conducted today would have access to significantly more Quality Matters affiliated institutions that are broadly distributed throughout the United States with hundreds of "Reviewed" courses available for a study sample.

A second limitation of the study was the sampling method utilized in the quasi-experimental design for this study. A convenience, non-random sampling approach was applied to both the colleges and courses within study institutions. Using a quasi-experimental approach for this type of social science study lacked the true rigor that a full experimental approach would have provided. A disadvantage of the quasi-experimental approach was that more threats to internal and external validity were introduced. By definition, the quasi-experimental approach does not randomly assign participants to the experimental and treatment groups; hence potential threats exist to validity (Creswell, 2005).

A third limitation of the study was the lower than expected and desired response rates and no opportunity for follow-up with non-responders. This was a limitation inherent in the design of this study and the use of an on-line questionnaire. The overall response rate for the study was 61.5% (see Table 4.23); it would have been desirable to

have at least an 80% response rate and, if that was not met, to be able to do non-respondent follow-up to check for non-response bias. Because the data were anonymous, there was no way to determine the difference between students who completed the survey and those who did not.

A fourth limitation of the study was that several of the findings utilized a regression analysis to confirm a correlation between two variables. Although there were statistically significant relationships among the six factors (Interaction utilized 2 sub-factors) of quality as predictive for student satisfaction in "Reviewed" online courses, that still presented a limitation. Because findings were drawn from a correlational approach, no conclusions of "cause and effect" can be drawn. The study, by design, was not able to establish a "cause and effect" relationship between variables, only significance in the predictive relationship.

A fifth limitation was the focus on student satisfaction. The study did determine a relationship between faculty peer review and student satisfaction, but the related literature does not provide strong evidence of an association of student satisfaction to student achievement. Such a relationship could prove valuable to college administration and accrediting bodies, with their current emphasis on student achievement. This unknown relationship could warrant further study.

Recommendations for Future Research

The purpose of the Recommendations for Future Research section of the study is to highlight areas that could prove productive for further study in the area of faculty peer review. Six areas have emerged for future research from the study. Recommendations for future research include: (1) study of factors of online learning that could have a positive

influence on increased student retention, (2) study of effect of diffusion of treatment on student satisfaction of online courses at institutions that have implemented peer review processes for some courses, (3) time-lag study of long term effect of faculty peer review on student satisfaction, (4) study of relationship of peer review with attention to the five factors of quality instruction to achievement of learning outcomes, (5) study that addresses the inherent problem of the questionnaire with non-respondent follow-up in online data collection, and (6) study to determine if the relationship found for satisfaction and peer reviewed general education courses remains consistent for other types of online courses.

Future Research: Online Factors that have Positive Influence on Student Retention

Based on the findings from Study Question Two regarding student retention, further study is suggested in the area of improved student retention in online courses. Retention is of critical importance to most colleges (Bocchi et al., 2004; Carr, 2000; Sloan C, 2004). Bocchi et al. and Raphael (2006) from the study's review of literature suggested there are numerous instructional best practices factors related to increased student retention. These factors tend to parallel the five factors of quality instruction identified in the study, yet the study could not determine any level of significance between faculty peer reviewed courses and "All Other" courses in the area of increased retention.

It is possible there are many factors that influence student retention such as family issues, finances, job obligations, and preparedness for class. Swail (2004) of the Educational Policy Institute suggested multiple factors outside of direct instruction influence student retention. Factors identified by Swail include: college costs, social

factors, cognitive factors, institutional factors, and model of practice. Although the study used course pairings of treatment and control courses to account for these issues, there may be confounding variables that effect retention in online courses. Swail suggested a conceptual framework for student retention which includes five components: (1) Financial Aid, (2) Recruitment and Admissions, (3) Academic Services, (4) Curriculum and Instruction and (5) Student Services. Of the five components identified by Swail, "Curriculum and Instruction" is the only component directly influenced by faculty peer review.

A future researcher might design a study that identifies and isolates factors of student retention external to the online learning process, similar to the study's use of factors external to the instructional process. Such a study design would control for these external confounding variables of student retention. This or a similar type of study might determine if there are either direct or indirect instructional factors which might influence student retention in online courses. Additionally, further study could determine instructional factors of best practice that correlate with improved student retention. Finally, further study might determine student services factors that, when embedded within an online course, could provide support to online students actively engaged in an online course. Findings generated from such a study could prove valuable to both faculty and administration in both the instructional and student services areas of a college.

Future Research: Effect of Diffusion of Treatment from Formal Faculty Peer Review Processes on Student Satisfaction

Based on the findings from Study Question One, diffusion of treatment may have influenced student satisfaction levels within a college using a formal faculty peer review

process. The initial design of the study intended that only Quality Matters colleges (Phase One) would be used for study purposes. Formally "Reviewed" courses within Phase One colleges were paired by discipline and level with "Non-reviewed" courses. Selected courses for the study consisted of either formally Quality Matters certified "Reviewed" courses or non-peer reviewed courses. When data were initially collected, preliminary analysis indicated that little difference in student satisfaction measures existed between formally peer reviewed courses "Reviewed" and "Non-reviewed" courses. This caused the study plan to be expanded beyond the Quality Matters colleges to several colleges with no affiliation with Quality Matters (Phase Two). The initial concern was that there was some level of diffusion of treatment at the Quality Matters colleges. Essentially, principles and processes from the Quality Matters rubric may have been used informally by non-certified instructors at these colleges, because of interactions among faculty. Although this is speculation, a future study might determine if the presence of a formal peer review process actually positively influences all the online courses at an institution and not exclusively those having the formal faculty review. Conclusions from such a study could influence both faculty and administration to consider formal faculty peer review processes, both for the direct formal benefit in student satisfaction and for an indirect, informal influence possibly derived from the diffusion of treatment.

Future Research: Time-lag Study of Effect of Formal Faculty Peer Review on Student Satisfaction

Based on the findings of Study Questions One and Three and identification of significance between formal faculty peer review and student satisfaction, a potential exists to study the long term effect of faculty peer review. A potentially important area

for future research could be that of the effect of continuous improvement processes on student satisfaction with online courses. This potential effect of long term formal faculty peer review could be researched through a time-lag study of student satisfaction of online courses. The intention of this future research would be to determine if the faculty peer review process, which could include a continuous improvement process, would have an increasingly positive effect on student satisfaction with online courses. Such research could utilize the study questionnaire and would be designed around measuring the five factors of quality instruction plus "Mean of Factor Means" for the same courses and same instructors over time. By way of a suggestion, a faculty peer reviewed section of a course could be paired with a "Non-reviewed" section. The study questionnaire could be administered over time to these paired sections to determine if there is any effect (increase or decrease) of student satisfaction. The results from such a study could provide valuable data for administrators or department chairs deciding to use formal faculty peer review processes, evaluating changes to the courses or as evidence of a continuous improvement process for accreditation purposes.

Future Research: Study of relationship of peer review with attention to the five factors of quality instruction to achievement of learning outcomes

The study revealed a relationship between peer reviewed online courses using five factors of quality instruction and increased levels of student satisfaction. Student satisfaction is important to both college administrators and faculty because it provides evidence that students value their learning experience. Related literature used in the study did not provide strong evidence of a relationship of student satisfaction to student achievement. Additionally, satisfaction is not a primary measure of achievement for

accrediting organizations. One of the primarily measurements for accreditation purposes is the achievement of learning outcomes. “Accrediting organizations examine those distance learning offerings with alternative designs of instruction with a particular focus on key areas of institutional activity essential to quality: curriculum and instruction, faculty support, student support, and student learning outcomes” (CHEA 2002, p. 14). All accrediting organizations use achievement of learning outcomes through assessment as evidence of learning. An area for further study that would benefit both colleges in the self study process and accrediting organizations would be the relationship between the use of the five factors of quality instruction and student satisfaction in achievement of learning outcomes.

Future Research: Study that Addresses the Problem of Non-Respondent Follow-up Inherent in the Study Questionnaire.

The overall response rate of the study was 61.5% (see Table 4.23). The internal threat to validity requires an 80% response rate to validate the study questionnaire (Tuckman, 1999). The study described several uses for a valid and reliable questionnaire as suggested in the Recommendations Derived from the Study and this section. There could be multiple reasons students fail to respond to an online questionnaire such as unwillingness to participate due to concern for grades, lack of perceived importance, personality type with some types more prone to responding to surveys, time required to complete the instrument, or lack of attention paid to the request. Prior to the use of the study questionnaire for these purposes, further research should be conducted to validate the study questionnaire as relates to the possibility of non-response bias.

The recommended future study could be designed differently to administer the online study questionnaire, but not utilize a technique of anonymity. With knowledge of study participants and identification of non-participants there would at least two techniques to achieve an 80% participation rate. Tuckman (1972) suggests monitoring respondents verses non-respondents and working diligently to achieve 80% through direct follow up. The second technique to validate the questionnaire is to compare a sample of responses from respondents and non-respondents to detect any differences. *Future Research: Study to determine if the relationship found for satisfaction and peer reviewed general education courses remains consistent for other types of online courses.*

The study utilized only general education as target courses. The study found a positive relationship between general education courses that were peer reviewed and student satisfaction. A question remains regarding this relationship with other types of online courses. Future research could examine this relationship for career technical and adult enrichment online courses that have been faculty peer reviewed.

Conclusion of Study

In conclusion, the purpose of the study was to determine through four study questions if online courses that were formally faculty peer reviewed using the five factors of quality instruction resulted in higher levels of student satisfaction and demonstrated higher rates of student retention. Through the use of a quasi-experimental method and an online questionnaire administered to students in “Reviewed” and “All Other” courses, it was determined that formal faculty peer review did not have significance in effecting retention of online students. The study did provide significance at a 99% level for the relationship between the five factors of quality instruction and student satisfaction.

Additionally, there was significance at 90% level that overall course satisfaction was related to faculty peer review using the measure of "Mean of Factor Means."

The positive relationship between faculty peer review and five factors of quality instruction has implications for both instructional policy and professional practice. Based on the positive relationships, faculty, administrators and instructional designers could: (a) utilize study findings to influence accreditation standards and provide evidence of satisfaction through a self study for online courses, (b) develop legitimate criteria for course development funding models and grant applications, (c) utilize the study questionnaire to assess online student satisfaction, and (d) use study findings to develop online course quality improvement processes which are in parallel with Baldrige criteria.

Although this is an initial study into the effect of formal faculty peer review processes and factors related to quality online instruction, there is evidence to suggest there is a positive relationship between these processes and increased student satisfaction. Additional research is warranted as this will be an emerging area of interest to institutions interested in student satisfaction with the online experience.

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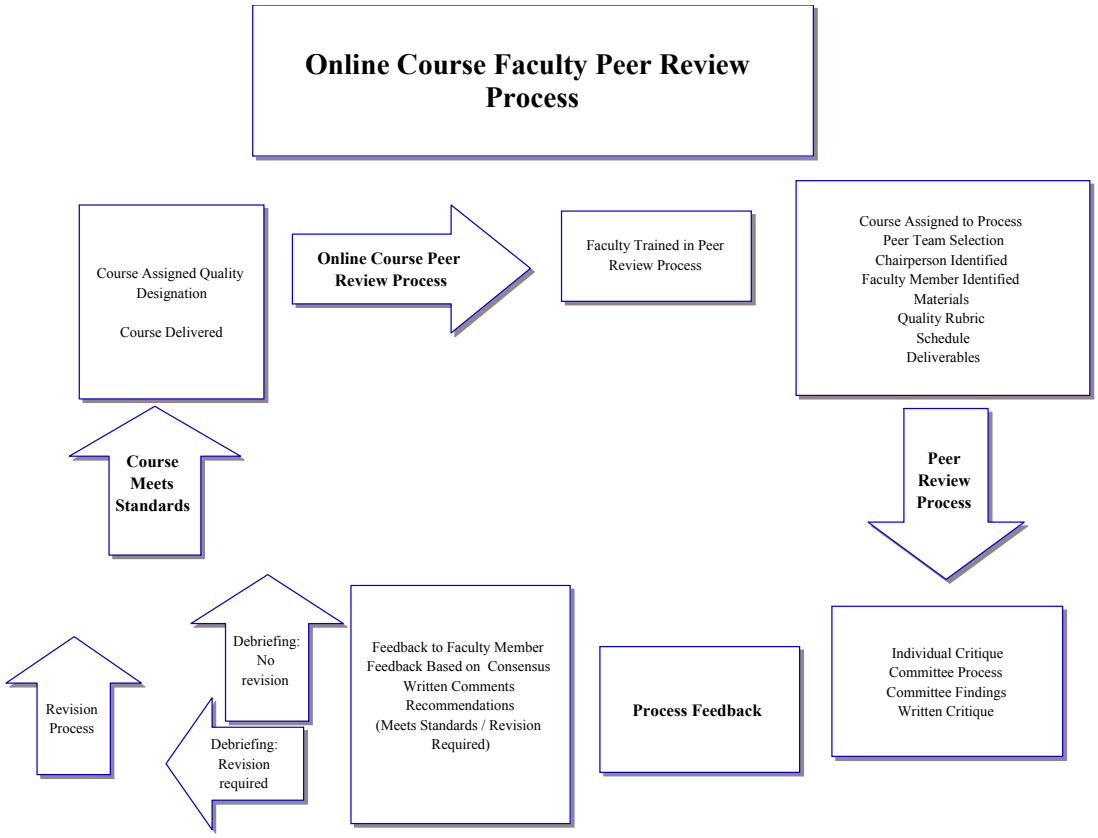
Appendix A

Online Course Faculty Peer Review Process



Appendix B

Factors of Quality Online Instruction Found in Research Journals

Factors of Quality in Online Instruction	(Nakos, Deis, & Jourdan, 2002)	(Chickering & Ehrmann, 1996)	(WCET, 2005)	(Keeton, Sheckley, & Krejci-Griggs, 2002)	(Sloan-C, 2006a)	(Kane, 2004)	(Mandernach, 2005)	(Council of Regional Accrediting Commissions, 2001)	(Weber State University, 2006)	(CHEA, 2002)
1. Course Overview and Introductions						Course overview and introductions	Online Classroom Set-Up		Course Orientation	
2. Learning Outcomes or Objectives	Discussion of course materials	Communicates high expectations	Curriculum and Instruction	Make learning goals and paths to them clear	Outcomes that match course description	Learning objectives-competencies	Syllabus	Institutional Context and Commitment	Course Syllabus	Student Learning Outcomes
3. Student Assessment and Measurement		Gives prompt feedback	Evaluation and Assessment	Provide prompt and constructive feedback.		Assessment and Measurement	Assessments, Grading and Feedback	Evaluation and Assessment	Course Equivalence	Student Learning Outcomes
4. Learning Resources and Materials	Study guides and materials	Encourages Active Learning	Curriculum and Instruction	Create an institutional environment Encouraging inquiry		Learning Resources and Materials	Additional Readings and Resources		Appropriate Electronic Media	Institutional Resources
5. Learner Interactions (Instructor, Student, and Content)	Interaction between instructor and students	Contact between students and instructor		Elicit active and critical reflection by learners on their growing experience base	Interaction with instructor and students	Learner Interactions	Encourage student-instructor contact	Curriculum and Instruction	Instructor Feedback	Instructor Support
6. Course Technology			Evaluation and Assessment		Appropriateness of Technologies	Course Technology		Curriculum and Instruction		Curriculum and Instruction
7. Learner Support	Ability to get support when needed		Student Support		Technical Support	Learner Support		Student Support	Interactive Community	Student Support

Appendix C

Peer Review "Student Satisfaction" Questionnaire

Research Question: Is there a significant difference in levels of student satisfaction between online courses that have undergone a systematic faculty peer review process compared with non-peer reviewed courses?

1.	How comfortable are you with online learning technology? -Very uncomfortable with online learning technology -Uncomfortable with online learning technology -Neutral -Comfortable with online learning technology -Very comfortable with online learning technology	Background- Indirectly related Factors	Confounding Variable
	Questions 5 through 30 was based on a Likert Scale: *1 - Strongly Disagree* *2 - Disagree* *3 - Neutral* *4 - Agree* *5 - Strongly Agree*		
2.	A clear introduction (including overall design, navigation, and faculty information) was available at the beginning of this on-line course.	Background- Indirectly related Factors	Background
3.	Technology support was available for using the online features of this course.	Background- Indirectly related Factors	Background
4.	Student support (for example, advising, financial aid, registration) was available in using the online format of this course.	Background Indirectly related Factors	Background

5.	I find it important to be provided with the learning objectives of a course.	Learning Outcomes	Importance of Factor to Student
6.	The objectives for this online course were provided at the beginning of this course and were clearly described.	Learning Outcomes	Factors Directly Related to Online Learning
7.	The course objectives for this online course were closely related to what I was expected to learn.	Learning Outcomes	Factors Directly Related to Online Learning
8.	The course objectives for this online course assisted with guiding my learning activities.	Learning Outcomes	Factors Directly Related to Online Learning
9	I find it important to be provided with the course assessment methods at the beginning of a course.	Assessment & Measurement	Importance of Factor to Student
10.	The course assessment methods for this online course were provided at the beginning of the course.	Assessment & Measurement	Factors Directly Related to Online Learning
11.	The course assessment methods for this online course were clearly described.	Assessment & Measurement	Factors Directly Related to Online Learning
12.	The course assessment methods for this online course included a variety of assessment methods.	Assessment & Measurement	Factors Directly Related to Online Learning
13.	The course assessment methods for this online course were closely related to the course objectives.	Assessment & Measurement	Factors Directly Related to Online Learning
14.	I find it important to be provided with the course resources and materials during a course.	Learning Resources & Materials	Importance of Factor to Student

15.	The course resources and materials for this online course were easily accessible during the course.	Learning Resources & Materials	Factors Directly Related to Online Learning
16.	The purpose of course resources and materials for this online course were clearly described.	Learning Resources & Materials	Factors Directly Related to Online Learning
17.	The course resources and materials for this online course helped me reach the course objectives.	Learning Resources & Materials	Factors Directly Related to Online Learning
18.	The course resources and materials for this online course included a wide variety of resources and materials.	Learning Resources & Materials	Factors Directly Related to Online Learning
19.	I find it important to interact with the instructor during a course.	Learner Interactions w/ Instructor	Importance of Factor to Student
20.	The course instructor for this online course interacted with me in a timely fashion.	Learner Interactions w/ Instructor	Factors Directly Related to Online Learning
21.	The course interaction with the instructor for this online course helped me reach the course objectives.	Learner Interactions w/ Instructor	Factors Directly Related to Online Learning
22.	The amount of course interaction with other students for this online course was helpful in reaching the course objectives.	Learner Interactions	Factors Directly Related to Online Learning
23.	I find it important to be provided with course technology that enhances learning during a course.	Learner Interactions	Factors Directly Related to Online Learning
24.	The course technology for this online course was readily available during the course.	Online Course Technology	Factors Directly Related to Online Learning

25.	The course technology for this online course functioned very well.	Online Course Technology	Factors Directly Related to Online Learning
26.	The course technology for this online course was helpful in reaching the course objectives.	Online Course Technology	Factors Directly Related to Online Learning
27.	What is your gender? (Female/Male)	Demographic Indirectly related Factors	Confounding Variable
28.	How many online courses have you taken in the past? (enter number)	Background-Indirectly related Factors	Confounding Variable
29.	What is your age? (optional)	Demographic-Indirectly related Factors	Confounding Variable
30	Overall, I am satisfied with this online course.	Overall	Overall Student Satisfaction
			190

Appendix D

Principal Component Factor Analysis of Five Factors of Quality Instruction

Principal Component Factor Analysis

OUTCOMES				
Questions	Q-6	Q-7	Q-8	
Communality estimate	0.69	0.74	0.70	
ASSESSMENT				
Questions	Q-10	Q-11	Q-12	Q-13
Communality estimate	0.78	0.79	0.61	0.62
RESOURCES				
Questions	Q-15	Q-16	Q-17	Q-18
Communality estimate	0.67	0.75	0.78	0.58
INTERACTION				
Questions	Q-20	Q-21	Q-22	
Communality estimate	0.72	0.82	0.50	
TECHNOLOGY				
Questions	Q-24	Q-25	Q-26	
Communality estimate	0.77	0.83	0.83	

Note: One factor was retained by the eigenvalue criterion for each factor group, indicating questions for each factor are related. A single factor in each group signifies there is a strong positive correlation between the variables in the factor

Appendix E

Demographic of All Students Participating in Study by College

	Gender		
College	Female %	Male %	Age Median
Anne Arundel CC	68%	32%	28
Allegany CC	71%	29%	30
C of S. Maryland	68%	32%	27
Carroll CC	74%	26%	23
Clackamas CC	65%	35%	27
Harford CC	65%	35%	26
Montgomery CC	74%	26%	28
Portland CC	61%	39%	27
SW Oregon CC	66%	34%	28
Median for Colleges	74%	26%	28.8

Note: N = 554

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Appendix F

Demographic of All Students Participating Study: Reviewed, Non-Reviewed, No Reviewed Courses.

	Female	Percent Female	Male	Percent Male	Total Students	Median Age	Median # DL Classes	Median Comfort w DL
Reviewed	153	73%	56	27%	209	28.4	3.9	3.7
Non-reviewed	138	70%	59	30%	197	28.9	3.7	3.9
No Review	117	79%	31	21%	148	29.4	4.9	3.8
Totals	408	74%	146	26%	554	28.9	4.2	3.8

Appendix G

Descriptive Statistics for Confounding Variables by College.

College	Statistic	Mean Comfort with DL	Mean Age	Gender (% Female)	Prior Experience with DL
AACC	Mean	4.4	27.1	0.8	4.0
	N	11.0	10.0	11.0	11.0
	Std. Deviation	1.2	8.1	0.4	3.3
	% of Total N	2.0	2.0	2.0	2.0
Allegany CC	Mean	4.4	28.7	0.6	2.5
	N	20.0	18.0	20.0	20.0
	Std. Deviation	0.7	10.9	0.5	1.7
	% of Total N	3.6	3.6	3.6	3.6
Carroll CC	Mean	3.9	26.6	0.8	3.0

	N	126.0	110.0	126.0	127.0
	Std. Deviation	1.2	9.4	0.4	2.6
	% of Total N	22.8	22.0	22.9	22.9
Clackamas	Mean	3.9	29.5	0.7	5.8
	N	71.0	67.0	71.0	71.0
	Std. Deviation	1.3	10.2	0.5	5.7
	% of Total N	12.8	13.4	12.9	12.8
CSM	Mean	3.6	28.0	0.8	2.8
	N	49.0	48.0	48.0	49.0
	Std. Deviation	1.3	9.7	0.4	2.3
	% of Total N	8.9	9.6	8.7	8.8
Harford CC	Mean	4.1	24.9	0.9	3.2
	N	9.0	7.0	8.0	9.0
	Std. Deviation	1.4	8.8	0.4	2.2
	% of Total N	1.6	1.4	1.5	1.6
Montgomery	Mean	3.8	25.0	0.7	3.0
	N	25.0	21.0	25.0	25.0
	Std. Deviation	1.1	5.9	0.5	1.6
	% of Total N	4.5	4.2	4.5	4.5
PCC	Mean	3.7	31.2	0.7	5.0

	N	165.0	154.0	164.0	165.0
	Std. Deviation	1.3	11.1	0.5	4.7
	% of Total N	29.8	30.8	29.8	29.8
SOCC	Mean	4.0	29.4	0.9	4.0
	N	77.0	65.0	77.0	77.0
	Std. Deviation	1.1	11.5	0.4	4.1
	% of Total N	13.9	13.0	14.0	13.9
Total	Mean	3.8	28.9	0.74	4.1
	N	553.0	500.0	550.0	554.0
	Std. Deviation	1.2	10.4	0.4	4.1
	% of Total N	100.0	100.0	100.0	100.0