ART APPRECIATION IN FACE-TO-FACE AND ONLINE SETTINGS:

AN ANALYSIS OF COURSE EFFECTIVENESS

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ART APPRECIATION IN FACE-TO-FACE AND ONLINE SETTINGS:
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The purpose of this quantitative quasi-experimental study was to determine if
students enrolled in an online introductory art appreciation course learned the same
content as their fact-to-face counterparts. To achieve this goal, the researcher compared
the level of knowledge attainment of course outcomes in four different content areas: the/themes and purposes of art, the organizing principles of art, interpreting iconography, and
differentiating between various art media (drawing, painting, sculpture).

The following research questions guided the study: 1. How does the overall
profile (gender, major, number of terms completed) of students enrolled in a face-to-face
art appreciation course differ from that of students enrolled in an online art appreciation
course?; 2. How does the gender profile of students enrolled in both the face-to-face and
the online sections of an art appreciation course compare to that of students enrolled in
courses in the greater academic division and the college?; 3. What impact does course
format (face-to-face vs. online) of an introductory art appreciation course have on student achievement of course outcomes: familiarity with the themes and purposes of art, recognition of the organizing principles of art, ability to interpret iconography, and familiarity with various art media?

The study’s findings serve as an excellent point of departure for future research focusing on gender distribution in face-to-face art appreciation course sections, undeclared majors enrolled in online art appreciation course sections, and the impact that a variety of teaching styles and approaches to interaction may have on students’ knowledge achievement of the art appreciation course outcomes.
Dedicated to my parents, Dianne Boley and the late Reverend Larry L. Boley.

Your heartfelt prayers and unwavering belief in my ability to succeed compelled me to reach this major milestone.
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CHAPTER I
INTRODUCTION

During the past decade, online course delivery has become the fastest growth area in higher education (Allen & Seaman, 2011) with substantial growth rates occurring at community colleges and proprietary schools (Mayadas, Bourne, & Bacsich, 2009). The proliferation of web-based or online courses and fully online degree and certificate programs in higher education demonstrates the undeniable impact this teaching and learning modality has had on the academy (Allen & Seaman, 2005, 2007; Myring, Bott, & Edwards, 2014; Cavanaugh & Jacquemin, 2015; Weiland, 2015). Increasing numbers of higher education institutions are moving toward a greater reliance on distance learning options with a focus on online instruction (Hoskins & van Hooff, 2005; Allen & Seaman, 2005, 2007; Grundmann, Wielbo, & Tebbett, 2010; Chauhan, 2014; Cavanaugh & Jacquemin, 2015; Gercek, Saleem, & Steel, 2016).

Of the 21,147,055 undergraduate and graduate students enrolled in postsecondary distance education courses at Title IV institutions (institutions with a written agreement with the Secretary of Education allowing the institution to participate in Title IV federal student financial assistance programs), 2,642,158 (12.5%) are enrolled exclusively in distance education courses. Of those students, 1,249,135 (8.3%) are enrolled in public
institutions, 467,528 (11.8%) are enrolled in private nonprofit institutions and 2,175,031 (42.6%) are enrolled in private for-profit institutions (National Center for Education Statistics, 2014, Table 1). Of the 2,642,158 students enrolled exclusively in distance education courses, 674,134 (9.8%) are enrolled in public 2-year institutions and 925,495 (42.6%) are enrolled in private for-profit 4-year and 2-year institutions (2014).

Online education allows higher learning institutions to attract greater numbers of both national and international students to their programs while reducing institutional expenditures by allowing for larger class sizes (Song, Singleton, Hill, & Koh, 2004; Osman, 2005; Grundmann, Wielbo, & Tebbett, 2010; Chauhan, 2014; Maloney, Nicklen, Rivers, Foo, Ooi, Reeves, Walsh, & Ilic, 2015). Cost savings are also realized through the expanded use of adjunct faculty to staff the ever-increasing number of online course sections. In short, colleges and universities benefit financially from offering online courses and fully online degree and certificate programs.

In terms of both time and location, students enrolling in online courses appreciate the flexibility afforded by this alternative to traditional face-to-face instruction (Moore, 2002). Subsequently, online courses have strongly impacted higher education (Kerr, Rynearson & Kerr, 2006). More than a decade ago, Allen and Seaman (2005) provided quantifiable evidence of online education’s pervasive nature by citing a “62.5% penetration rate for undergraduate-level courses” (p. 5). More recently, The National Center for Education Statistics shows that of the 2,642,158 undergraduate and graduate students enrolled exclusively in distance education courses, 674,134 (9.8%) of those students are enrolled in public 2-year institutions with the majority of those students, 925,495 (42.6%), enrolled in private for-profit 4-year and 2-year institutions (2014, Table
These percentages suggest that online education has, indeed, made its mark on institutions of higher learning.

**Benefits and Concerns**

**Institutional Focus – Revenue and Cost-Effectiveness**

Song, Singleton, Hill, and Koh (2004) note much of the literature focusing on online learning also recognizes the benefits afforded to educational institutions. Online courses and fully online degree and certificate programs allow colleges and universities to expand their market share as they “reach new learners at a distance, [increase] convenience, and [expand] educational opportunities” (p. 60). In short, these programs may generate additional, and highly desired, revenue for institutions contending with diminishing State and Federal funding.

The revenue-generating potential afforded by online education may be realized by an institution’s ability to cater to “diverse and hard-to-reach student populations” (Sapp & Simon (2005), p. 471), thus, making the institution available to “otherwise untapped markets” (p. 471) and revenue streams. One serious criticism leveled against college and university administrators in response to their push to expand online courses and fully online degree and certificate programs is that the impetus for the unprecedented expansion is, essentially, more profit-driven than pedagogy-driven (Speck, 2000).

Harasim (2002) observes that online education has moved from higher education’s periphery to the mainstream. As a result of this transition, the virtual classroom has become a viable means for instructional delivery (Allen & Seaman, 2005). College and university administrators grappling with space and funding limitations often cite efficiency and cost effectiveness as factors influencing them to favor the
implementation of online courses and fully online degree and certificate programs (Sapp & Simon, 2005).

In response to the online learning boom, administrators desiring to take advantage of students’ demands for expanded online learning options often push for the quick replication of course sections as a means to effectively compete with a variety of traditional and proprietary higher education institutions (Cox, 2005). Standardized master courses, typically designed and developed by full-time tenured or tenure-track faculty members, serve as an efficient means by which academic institutions may quickly replicate, or clone, multiple online sections of a single academic course.

While tenured or tenure-track faculty members may opt to teach online courses, the bulk of the online teaching load is often relegated to adjunct or part-time faculty members as a means for the institution to reap greater cost-efficiencies. While efficient in terms of cost and implementation, the use of standardized master courses not only challenges the traditional approach to course development and content delivery, but it may also impact an individual faculty member’s ability to effectively shape the structure of a course when teaching in an online format. Cox observes that a “disconnect” (p. 5) often exists between administrators and the faculty who actually develop and teach online courses. As a result, it is feared administrators may focus solely on the potential financial gains and efficiencies garnered from an enhanced roster of online course offerings and fully online degree and certificate programs without first carefully considering the pedagogical challenges faculty members face as they work to create positive and productive student-centered learning environments while striving to maintain the requisite academic rigor. This “disconnect” may initially culminate in faculty frustration.
and discouragement, but, if left unchecked, it may ultimately prove detrimental to student persistence and academic success. To this end, Speck (2000) strongly cautions college and university administrators to avoid falling prey to an “entrepreneurial impulse for economic gain” (p. 78) as this approach has the potential to dramatically undermine the very underpinnings of academic rigor.

**Faculty Focus – Pedagogical Concerns**

Harasim (2000) identifies online educators as “virtual professors” (p. 57) noting that their ability to forge more personal relationships with students may be hampered by the obvious limitations to interpersonal communication inherent to fully online course environments. This concern echoes Tinto’s (1993) focus on the importance of student socialization as a means to encourage persistence. In the traditional classroom setting, faculty members may rely heavily on their observations of students’ nonverbal cues as a means to gauge immediate comprehension of course content and address questions.

Translating these active classroom experiences to an asynchronous online format may prove challenging for faculty course developers, especially when the developer must create a standardized master course that will, in turn, be replicated into multiple identical course sections, and facilitated by a variety of faculty members with differing teaching styles and scholarly perspectives. The level of autonomy experienced by faculty members teaching in a traditional classroom setting may be greatly reduced when teaching an online course that has been replicated, or cloned, from a standardized master course developed by another faculty member. Subsequently, the potentially restrictive nature of the standardized master course may impact the level of student learning in an online art appreciation course in a manner that may not occur in the traditional classroom setting.
Converting a face-to-face course to an online format requires the faculty developer to essentially translate classroom lectures into online lesson modules that students may read and study asynchronously. Written assignments may become part of online discussion forum activities in which students respond to faculty-led prompts, post their individual responses to the prompts in the forum for their classmates to read, and respond to their classmates’ posts using threaded discussions. Research papers may be assigned in the online course format similarly to the manner in which they are assigned in the face-to-face setting.

In contrast to the face-to-face environment, the virtual realm prevents faculty members from directly observing their students’ nonverbal cues and, as a result, challenges them to identify alternative means by which to actively engage their students in the learning process and effectively determine the degree to which they comprehend course content (Sapp & Simon, 2005; Sonwalkar, 2008). As a result, faculty members often view online teaching as being far more demanding and time consuming than traditional face-to-face courses (Harasim, 2000; Sonwalkar, 2008) and, in many cases, this perception proves accurate. Faculty members teaching online courses must also contend with the reality that their students are, essentially, “invisible students” (Sapp & Simon, 2005, p. 479) and it may be questioned whether these faculty members feel the same level of commitment to their “invisible students” as they do to the students enrolled in their traditional face-to-face courses.

In turn, students enrolled in online courses must make a concerted effort to diligently interact with their “virtual professors” (Harasim, 2000, p. 57) in a realm far removed from the comfort and familiarity of the traditional classroom setting. Issues
surrounding effective student engagement, persistence, and success must be seriously considered in regard to student and faculty interactivity. The challenges inherent in the virtual classroom environment may potentially cause students to fail, drop out, or fail to complete in much greater numbers than students enrolled in the same course delivered in a traditional face-to-face setting (Sapp & Simon, 2005).

While the high degree of interpersonal interaction typically experienced by faculty and students in the traditional face-to-face setting may be dramatically limited in the online course environment. This limitation may prove to be especially challenging for students enrolled in online introductory art appreciation courses. In these courses, faculty members present lectures illustrated with images of artwork and guide students through formal compositional analyses of the works of art. Faculty also contextualize the art within its appropriate historical period and culture. In an online environment, both faculty members and students miss the dynamic interactive communicative process that occurs readily in the traditional face-to-face setting.

**Student Focus – Demand**

A review of the literature reveals notable advantages associated with online instruction (King, 2002; Song, Singleton, Hill, & Koh, 2004; Garrison & Cleveland-Innes, 2004; Shea, Pickett, & Pelz, 2004). For many students, personal convenience serves as a definite benefit associated with asynchronous learning in the online course environment (King, 2002). Convenience, in terms of clock-hours, location, and time for reflection, makes online courses appealing as attractive alternatives to traditional face-to-face instruction (Harasim, 2000). While some students opt to complete all of their coursework solely online, many students enrolled in online courses also enroll
concurrently in traditional face-to-face courses (Sapp & Simon, 2005). Ultimately, the sheer number of college and university students enrolling in online courses and fully online degree and certificate programs suggests this innovative approach to learning serves as an accessible means by which increasing numbers of students may efficiently complete coursework and progress through their college experience.

The flexibility provided by courses delivered in an online format proves especially appealing for non-traditional college students who are typically older than their traditional college-age counterparts. Additionally, these non-traditional students are often also contending with the rigors of full-time employment and a myriad of family commitments and obligations. However, convenience should not serve as the primary consideration for a student contemplating entering into an online learning environment. Many students simply lack the self-discipline necessary to successfully complete course requirements in the virtual realm where they may find themselves disconnected from their classmates and professor (Sapp & Simon, 2005). These students often find they seriously underestimated both the time commitment and workload associated with online coursework and they quickly become frustrated and overwhelmed (2005). In addition to time commitment and workload considerations, online students must also contend with disconcerting impediments that are beyond their control such as “slow network time” and “technical difficulties” (Harasim, 2000, p. 58). These impediments are not only frustrating for students, but, more importantly, may negatively impact their progress toward the successful completion of course requirements.

Although students enrolled in online courses must participate in structured virtual classrooms, they may enter these virtual environments at times best suited to their
individual schedules. Students are also free from the requirement to travel to campus and other attendance-related demands on their time required in traditional face-to-face settings. This convenience may be especially appealing for nontraditional college students attending two-year community colleges who are typically older than traditional college students, attend college on a part-time basis, work full-time, and must contend with family-related obligations (Tinto, 1993). For these students, online learning may very well serve as an important means by which they may efficiently complete coursework and ultimately earn college degrees.

In contrast to the instantaneous nature associated with face-to-face classroom discussion, online courses afford students the opportunity to think carefully and to reflect on their responses before answering questions (King, 2002). Additionally, Kroder, Suess, and Sachs (1998) note students perceive that they have more direct interaction with the instructor via an online course than they do when they participate in traditional classroom-based courses. For this reason, faculty must maintain an active presence within the online course environment to encourage student success and persistence in the virtual classroom (Schoenfeld-Tacher, McConnell, & Graham, 2001; Garrison & Cleveland-Innes, 2004; Shea, et al., 2004).

The literature clearly identifies students engaging in online instruction as nontraditional students (King, 2002; Garrison & Cleveland-Innes, 2004; Pike & Kuh, 2005). As such, these online students, especially those who are new to the virtual classroom environment, face definite challenges that are distinctly different from the challenges faced by nontraditional students in traditional face-to-face settings. For this reason, it is imperative that educators recognize the unique challenges faced by students
enrolled in online courses so they may effectively adapt instructional processes to encourage student engagement, persistence, and success.

Pike and Kuh (2005) elaborate on the difficulties faced by first-generation college students and their often-dismal persistence rates. The challenges faced by first-generation college students may be further exacerbated when these students participate in online courses for the first time. The potential for this occurrence is great at two-year community colleges offering online instruction. In their study focusing on student support services for distance learners, Workman and Stenard (1996) recognized the additional challenges faced by students engaging in distance learning modalities and they identify five service needs that must be addressed if these students are to persist in their programs of study. Specifically, they identify these needs as consistency and clarity, self-esteem, identifying with the school, social integration, and ready access to support services.

Students new to online course instruction must first contend with a “significant adjustment” as they transition from the familiarity of the traditional classroom setting to a virtual classroom environment (Garrison & Cleveland-Innes, 2004, p. 34). The distance format requires students to take greater responsibility for their learning. Sherry (1996) emphasizes that students participating in online courses must be highly proactive in their approach to learning. This degree of proactivity may prove daunting for students who are unfamiliar with college in general and even more so with the often-mysterious virtual classroom environment.

A high attrition rate serves as the most serious problem associated with online courses. In fact, the attrition rate for courses offered online is much higher than the attrition rate for courses offered in the traditional classroom setting (King, 2002). King
cites “lack of feedback, feelings of isolation, frustrations with the technology, anxiety, and confusion” (p. 159) as factors contributing to the high attrition rates associated with online courses. According to King, approximately one-third of the students registering for online courses fail to complete the courses. This unusually high attrition rate serves as a definite cause for concern and it further underscores the importance of recognizing the special needs of students enrolled in online courses. In the virtual classroom environment, these nontraditional students are forced to contend with the challenges involved in working in a highly self-motivated and independent manner. This often proves to be a daunting task for many students.

**Student Focus – Socialization**

Much has been written about socialization and its ultimate impact on student persistence. Tinto (1993) stated quite plainly, “involvement matters” (p. 168). Tinto further emphasized the importance of encouraging students to share learning experiences across the curriculum and he promoted a collaborative approach to learning. Although Tinto’s primary concern focused on students’ educational experiences in the traditional classroom setting, he also recognized the potential for “virtual classrooms” and “virtual campuses” to serve as venues for engaging students and creating a sense of personal involvement leading to persistence (pp. 175-176).

Tinto (1993) also examined factors contributing to attrition in two-year institutions. He identified a range of external factors that typically impact nontraditional students during their studies at two-year institutions and explains that these factors hinder students from fully integrating into the social fabric of campus life. For Tinto, “informal social and intellectual contact beyond the classroom” (p. 78) positively impacts student
persistence in two-year college settings. It is important to note that socialization plays an important role in encouraging non-traditional students enrolled in courses at two-year colleges to persist. Tinto’s thoughts regarding the importance of socialization are also relevant in terms of online instruction.

Rovai (2003) recognized the importance of the psychological models of persistence developed by Tinto and by Bean and Metzner as means of identifying “student-institution ‘fit’” (p. 30). Rovai examined Tinto’s student integration model and Bean and Metzner’s student attrition model and concluded both models are limited by their focus on students who attend traditional courses on campus as opposed to students engaging in online instruction. In Rovai’s opinion, Tinto’s model was designed to focus on “traditional undergraduate students” (p. 5) and, citing Bean and Metzner (1985), he believes this approach does not adequately address the factors contributing to high attrition rates of “older students for whom academic and social integration within the university may be less influential” (p.5). Rovai suggested a synthesis of these two models, which he describes as a “composite persistence model,” would be better suited for students engaging in online instruction because it considers “student characteristics,” “skills prior to admission,” and “external and internal factors affecting students after admission” (p. 8). In a similar vein, Feldman, Smart, and Ethington (2004) focused on John Holland’s (1966, 1973, 1985, 1997) theory of careers as a means to explore differences in person-environment fits in relation to student satisfaction, learning, and retention. Specifically, Feldman et al. examined “environment-personality compatibility,” “environmental reward of abilities/interests,” “environmental congruence” (p. 528) and stress that educators should consider these factors as a means to encourage student
success and persistence in online courses and fully online degree and certificate programs.

**Statement of the Problem**

In terms of competition for enrollment, revenue generation, student demand, and pedagogical concerns, the impact of online courses on higher education seems quite profound (Allen & Seaman, 2005; Kerr, Rynearson, & Kerr, 2006). While much has been written about this quickly emerging teaching and learning modality, Kerr, Rynearson, and Kerr (2006) recognize a distinct weakness in current research, noting that a preponderance of the literature addressing online learning is based on “anecdotal observations” (p. 92) rather than on quantitative studies. Song, Singleton, Hill, and Koh (2004) further noted the majority of extant studies are not only “anecdotal” (p. 60), but are also based on instructors’ perceptions of the online teaching and learning experiences rather than on the perceptions of students and their experiences as online learners. Qualitative studies often focus on small groups of students and may not always generalize to a larger student population (Baxter, 2012; Allen, Wright, & Inness, 2014). Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw, and Liu (2006) strongly encourage researchers to pursue continued studies of online courses. In short, they consider these studies “imperative” (p. 119). For these reasons, a quantitative research study focusing on introductory online and face-to-face art appreciation courses offered at a large public Midwestern, two-year, urban community college will help fill the apparent gap in the extant literature and add relevant information to the current knowledge base.

With regard to the discipline of art, introductory art appreciation or visual literacy courses conducted in the traditional classroom setting are typically lecture-based.
However, course content is also highly visual in nature and strongly influenced by the individual faculty member’s scholarly focus and pedagogical practices. During face-to-face lectures, a faculty member typically presents a variety of works of art in the form of projected digital imagery or 35mm slides. The faculty member guides students through directed discussions focusing on a given work of art’s formal compositional properties in terms of the visual elements, the principles of design, historical context, and historical significance. The predominantly visual nature of these faculty-facilitated lectures trains students to formally analyze art in a knowledgeable and an informed manner.

Because introductory art appreciation course lectures presented in the traditional face-to-face setting focus on a combination of visually engaging imagery and instructor-facilitated discussion, questions may arise regarding whether or not students enrolled in an online introductory art appreciation course receive the same level of instruction as students enrolled in a face-to-face course. It may be argued that students enrolled in the online art appreciation course are not exposed to the same quality of faculty-guided examinations of artwork and subsequent compositional analysis as are their face-to-face counterparts.

Numerous studies have been conducted to determine the effectiveness of online courses in comparison to traditional face-to-face courses (Garrison & Cleveland-Innes, 2004; Hoskins & van Hooff, 2005; Kerr, et al., 2006; King, 2002; Osman, 2005; Rovai, 2003; Shea, et al., 2004; Song, et al., 2004); however, the lack of studies focusing specifically on online fine art courses suggests this discipline has not yet been adequately addressed or fully investigated. The lack of scholarship focusing on online introductory
art appreciation courses may further suggest that comparatively few fully online art appreciation courses exist for study and evaluation.

While Cox (2005) identifies the community college as a “strategic site of study” (p. 1), she further notes extant literature focusing primarily on four-year colleges and universities fails to address online education as it exists in the community college setting. Therefore, a quantitative research study comparing the levels of student learning in online and face-to-face introductory art appreciation course sections offered by a large public Midwestern, two-year, urban community college will contribute new findings to the body of knowledge and provide community college administrators and faculty with useful information regarding the effectiveness of an introductory online art appreciation course.

**Research Purpose and Questions**

The purpose of this study was to determine if students enrolled in an online introductory art appreciation course learned the same content as their face-to-face counterparts. To achieve this goal, the study compared the level of student attainment of established course outcomes related to identifying the themes and purposes of art, the organizing principles of art, interpreting iconography, and differentiating between various art media (drawing, painting, sculpture) in online and face-to-face settings to determine if students enrolled in an online introductory art appreciation course learn the same content as their face-to-face counterparts. The following research questions guided the study:

- How does the overall profile (gender, major, number of terms completed) of students enrolled in a face-to-face art appreciation course differ from that of students enrolled in an online art appreciation course?
- How does the gender profile of students enrolled in both the face-to-face
and the online sections of the art appreciation course compare to that of
students enrolled in courses in the greater academic division and the
college?
• What impact does course format (face-to-face vs. online) of an
introductory art appreciation course have on student achievement of
course outcomes: familiarity with the themes and purposes of art,
recognition of the organizing principles of art, ability to interpret
iconography, and familiarity with various art media?

Significance of the Problem

A research study focusing on what impact delivery method has on the level of
student learning in an introductory art appreciation course offered by a large public
Midwestern, two-year, urban community college would serve as a means by which
community college administrators, distance learning personnel, department chairpersons,
and faculty could more effectively consider the impact online introductory art
appreciation courses may have in terms of their institutions’ online course offerings,
degree programs, and certificates. Community college administrators, distance learning
personnel, and department chairpersons may find this study’s findings to be helpful as
they consider ways to expand the reach of their current degree and certificate programs or
develop new courses and degree and certificate programs while remaining conscious of
space and funding limitations. While many fine art faculty members may feel somewhat
reluctant, or even opposed, to embrace online teaching as a successful instructional
modality, a quantitative study would provide them with hard data and, perhaps, allow
these faculty members to make more informed decisions regarding the potential
effectiveness, or ineffectiveness, of the online format for their institutions’ approaches to introductory art appreciation instruction. Finally, students may also find this study useful as a means to determine whether an online introductory art appreciation course would fit their learning needs and help them effectively reach their academic goals.

Assumptions

Extant literature focusing on online education indicates no significant difference exists in terms of student learning in traditional face-to-face and online courses (Neuhauser, 2002; Buckley, 2003; Caywood & Duckett, 2003; Bata-Jones & Avery, 2004; Campbell, Gibson, Hall, Richards, & Callery, 2008; Tanke & Logan, 2012; Fishman, Konstantopoulos, Kubitskey, Vath, Park, Johnson, & Edelson, 2014; Kemp & Grieve, 2014; Cavanaugh & Jacquemin, 2015). Based on the findings of these studies, the current researcher assumes the characteristics of students enrolled in face-to-face introductory art appreciation course sections and those enrolled in online introductory art appreciation course sections offered by a large public Midwestern, two-year, urban community college are, essentially, the same.

Additionally, the researcher assumes the students working in face-to-face settings and those working in online course environments will work independently and will not rely on outside assistance to complete course-related requirements.

Finally, the researcher assumes the degree to which the individual faculty member shapes a course impacts student learning. While it may be much easier for a faculty member to shape a course in the traditional classroom setting, doing so in the online course environment may prove more challenging, especially if the online course in question is replicated, or cloned, directly from a standardized master course developed by
another faculty member. However, because the researcher designed and developed the standardized online art appreciation master course, the researcher assumes greater parity between the study’s face-to-face and online course sections.

**Delimitations**

The sample used was a convenience sample consisting of intact groups, previously established online and face-to-face introductory art appreciation course sections, rather than a sample drawn from randomly selected students enrolled in various online and face-to-face art appreciation courses offered at a large public Midwestern, two-year, urban community college. The use of intact groups may create a threat of selection with the potential to negatively impact internal validity. This delimitation is clearly noted in the study’s discussion.

**Operational Definitions**

For the purposes of this study, the following definitions have been adopted by the researcher and were used throughout the document to describe specific aspects associated with face-to-face and online course settings and instruction.

**Course Shell**: A blank course environment created for each online course section offered during a given academic term. Course content must be copied and uploaded from the master course to prepare the individual course section for instructional delivery.

**Delivery Method**: The means by which students receive instruction. The delivery method may refer to instruction delivered via the traditional classroom or online course settings.
**Discussion Forum:** A tool serving as a type of message board that resides within an individual online course shell. Faculty and students use the discussion forum as a means to communicate asynchronously in threaded discussions.

**Face-to-Face Students:** Students enrolled in traditional face-to-face classroom-based course environments.

**Master Course:** An online course serving as a standardized template from which multiple, identical online course sections of a single academic course are replicated, or cloned.

**Master Course Syllabus:** The approved course syllabus formally housed in the college’s curriculum management system serving as the standardized template from which all subsequent course teaching syllabi are derived. The master course syllabus format consists of the following information: course prefix, course number, division, department, credit hour total, lecture hours, date revised, course description, general education outcomes, course outcomes, course outline.

**Online:** Refers to use of the World Wide Web (www) as a means for instructional course delivery.

**Online Students:** Students enrolled in web-based or online course environments as opposed to traditional face-to-face classroom-based courses.

**Teaching Syllabus:** Derived from the official master course syllabus, the teaching syllabus includes all requisite curricular information as well as course section-specific information such as the identification of the current academic term, class meeting days and times, course policies, topical content outline, assignments, and grade scale.
Threaded Discussion: The means by which asynchronous discussions are organized within an online discussion forum. Posted comments are grouped, by linked messages, according to subject. The message groupings evolve over a duration of time as students and faculty members read and respond to existing message posts.

Web-Based: Refers to use of the World Wide Web (www) as a means for instructional course delivery.

Summary

This chapter provided an overview of the benefits and concerns associated with online education from an institutional perspective in terms of revenue and cost-effectiveness, a faculty perspective in terms of pedagogy, and a student perspective in terms of demand and socialization. The chapter then provided an overview of the intended research project by stating the problem, the research purpose and questions, assumptions, delimitations, and operational definitions. The following chapter provides a chronological review of relevant literature.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Many research studies compare online versus face-to-face education in both K-12 and college or university settings. However, no comprehensive review of the research literature occurred until 2001 (Bernard, Abrami, Lou, & Borokhovski, 2004). This fact underscores the relative newness of online teaching as an instructional modality.

A survey of the literature reveals most studies focus predominantly on medical or healthcare-related courses, followed by computer science, teacher education, mathematics, languages, science, social science, and business (Means, Toyama, Murphy, Bakia, & Jones, 2009). After reviewing 232 quantitative studies comparing face-to-face and online education and finding many cases of poor methodological quality, Bernard, et al. (2004) strongly encouraged researchers conducting future studies to maintain high methodological standards.

Until very recently, studies focusing on visual art and, more specifically, art appreciation courses, were missing from the literature. This absence may be explained by the fact that relatively few colleges and universities offer fully online visual art courses and degrees (Alter, 2014). Because this research project focuses on postsecondary education, the following literature review is limited to the examination of research studies conducted in higher education settings comparing face-to-face and online instruction.
Chronological Review

1999 – 2005

Citing 1996 and 1997 U.S. Department of Education data noting an increase in the enrollment of non-traditional college students in higher education and an observed change in pedagogical practices moving away from solely lecture-based instruction to collaborative learning involving small groups of actively engaged students, Ocker and Yaverbaum (1999) examined the effects of two modes of collaboration on student groups. The researchers explored the following research question: Is group collaboration via asynchronous computer-mediated communication a good substitute for face-to-face collaboration? To determine the usefulness of asynchronous computer conferencing for group collaboration outside the classroom, the researchers employed a single factor, counter-balanced repeated-measures design. The factor, communication mode, had two treatments (face-to-face with no technology support, distributed asynchronous computer conferencing). Forty-three graduate students enrolled in the core information systems class required of all M.B.A. and MS/IS students served as the study’s subjects. The study was based on two course sections taught by the same instructor. Within the two course sections, 10 groups, composed of four-to-five students each, were created for group collaboration purposes. The researchers developed the following six hypotheses:

1. There will be no difference, in terms of in learning, between asynchronous and face-to-face groups.
2. There will be no difference, in terms of quality of written case analyses, between asynchronous and face-to-face groups.
3. There will be no difference, in terms of content of written case analysis, between asynchronous and face-to-face groups.

4. Face-to-face groups will be more satisfied with the group interaction process than asynchronous groups.

5. Face-to-face groups will be more satisfied with the discussion quality than asynchronous groups.

6. There will be no difference in terms of solution satisfaction between online and face-to-face groups (1999, pp. 430-432).

Paired $t$-tests were used to test the effects of communication mode on the dependent variables: quiz scores (face-to-face, $m = 57.62$; asynchronous, $m = 56.43$; $sd = 39.52$; $p = 0.846$), solution quality (face-to-face, $m = 7.77$; asynchronous, $m = 7.55$; $sd = 0.5584$; $p = 0.235$), content (face-to-face, $m = 15.60$; asynchronous, $m = 16.10$; $sd = 9.2400$; $p = 0.868$), process satisfaction (face-to-face, $m = 4.15$; asynchronous, $m = 3.80$; $sd = 0.9855$; $p = 0.023$), perceived discussion quality (face-to-face, $m = 4.12$; asynchronous, $m = 3.66$; $sd = 0.9842$; $p = 0.004$), and solution satisfaction (face-to-face, $m = 4.08$; asynchronous, $m = 4.01$; $sd = 0.9624$; $p = 0.656$).

The researchers’ Hypotheses 1, 2, 3, and 6 were supported showing no difference in learning, quality of written work, quality of content, and solution satisfaction. Hypotheses 4 and 5 were supported showing greater satisfaction with group interaction and discussion quality in face-to-face classes.

Based on the findings, the researchers suggested it would be beneficial to increase students’ exposure to asynchronous technologies in support of collaborative learning activities if the desired course outcomes focus on learning and quality. However, if
collaborative interaction is key to the learning process, the researchers suggested face-to-face interaction appears to be superior in terms of discussion quality and overall student satisfaction.

Despite these findings, the researchers stressed asynchronous technologies may serve as effective means of learning and engaging students in collaborative processes. To achieve optimal effects of asynchronous collaboration, the researchers cautioned that institutions must first provide students with appropriate technical training and support to allow them to feel comfortable with asynchronous technologies. The researchers also stressed that faculty must help students recognize the potential that exists for collaborative learning through the use of asynchronous technologies and, more specifically, how those technologies may benefit their collaborative learning efforts.

While Ocker and Yaverbaum (1999) incorporated online communication-based activities in face-to-face classes to determine if the online format served as an effective replacement for face-to-face communication, implementing fully online instructional content for portions of an otherwise face-to-face course serves as a means by which to determine the effectiveness of online learning as a teaching modality. Using ANOVA to compare the means of a spreadsheet applications test, Wallace and Clariana (2000) examined the effectiveness of online delivery using a post-test only research design with one experimental treatment (online) and a control group (face-to-face) to compare student achievement in face-to-face and online settings for four class sections of undergraduate students \(N = 93\) enrolled in a high-demand Computer Fundamentals course at a small, east coast, suburban public institution. Achievement on a spreadsheet application test measuring students’ ability to perform concepts presented in the spreadsheet instructional
lesson module, student self-reports on a distance learning profiler survey, and an online satisfaction survey served as the study’s dependent variables. The researchers hoped to: 1. Determine if online instruction is as effective as face-to-face instruction, 2. Identify characteristics of successful and unsuccessful online students, and 3. Identify the degree of student satisfaction with online course delivery.

The entry-level course examined fundamental computer concepts and the use of a computer system. All students completed four weeks of instruction in traditional classroom and computer laboratory settings. Prior to initiating fully online content, the researchers introduced the online unit and demonstrated software use to students enrolled in the face-to-face-with-online-content course section. While these students logged into a course web site and worked asynchronously at their own pace, the control group, consisting of students working in traditional face-to-face classroom and computer laboratory settings, completed their studies synchronously during eight regularly scheduled class sessions with instructor assistance.

The researchers used ANOCVA to compare student achievement between groups using the spreadsheet applications test (post-test) means. The spreadsheet application test required students to solve problems focusing on automobile financing, payroll, and statistical functions. The results showed no statistically significant difference ($p = 0.46$) between the control group ($m = 75$) and the online group ($m = 77$).

The researchers used correlation analysis to determine the relationship between students’ responses to a 24-item, Distance Learning Profiler (DLP) instrument and their spreadsheet applications post-test scores to examine characteristics exhibited by successful and unsuccessful online students. The distance learning profiler instrument
focused on students’ interest in assignments, their performance compared to other students in the class, exam preparation, and degree of desired instructor feedback. DLP items and the spreadsheet applications post-test scores showed control group (face-to-face) students who identified themselves as “working hard to standout (question 13, \( r = .44 \)), self-starters (question five, \( r = .39 \)), preferring tough courses (question three, \( r = .29 \))” (p. 6) performed better on the spreadsheet applications test compared to other control group students. The researchers noted that these items did not relate to achievement for treatment group members. Treatment students (online) who identified themselves as “not being competitive (question 18, \( r = .35 \)), and frequent e-mail use (question 24, \( r = .32 \))” (p. 6) performed better on the spreadsheet applications test compared to other treatment group students. The researchers noted that these items did not relate to achievement for control group (face-to-face) members.

Students enrolled in the treatment group (online) were also asked to complete a researcher-developed online evaluation form that allowed the researchers to gauge students’ satisfaction with online delivery using principle components factor analysis. The satisfaction survey asked students to comment on their ability to use the online course as instructed, ability to complete assignments as scheduled, use of supplemental tutorials, connectivity issues, and effort devoted to the course. Students in the treatment group (online) noted that they “read the class announcement (question nine), forwarded their assignments by e-mail (question 8), used the course as instructed (question 1), and kept up-to-date with the online work (question 2)” (p. 7). Interestingly, question 17, “I would like to be part of an online course in the future” (p. 7) was the only item showing a statistically significantly relationship to student achievement (\( r = .37, p < .01 \)).
To gain insight into students’ perceptions of online courses, the researchers conducted a principle components factor analysis focusing on the treatment groups’ online evaluation self-report data. Three factors were identified: 1. “kept up and worked hard or not,” 2. “liked/disliked the online course,” and 3. “did/did not use optional support” (pg. 7). The researchers noted that factor two focusing on students’ like or dislike of the online course format was the only factor showing a statistically significant relationship to student achievement (p < .01). Treatment group students who reported disliking the online course format scored lower scores on the spreadsheet applications test than did treatment group students who reported liking the online course format.

Based on the findings, the researchers concluded that, for high ability students, the online course format serves as a “viable alternative instructional delivery method for presenting computer concepts and applications in a computer fundamentals course” (pg. 7). Because preference appeared to serve as a determining factor influencing students’ success, or lack thereof, the researchers recommended that institutions continue to offer both face-to-face and online course sections to allow students to select the course delivery format best suited to their learning preferences.

While students’ preferences regarding course delivery format serve as important considerations, it is also crucial to determine if students enrolled in fully online courses achieve the same learning objectives as their face-to-face counterparts. Using t-tests, ANCOVA, and ANOVA, Schoenfeld-Tacher, McConnell, and Graham (2001) examined the effects of online course delivery to determine if a difference in content achievement existed between online and face-to-face students enrolled in an upper level histology
course focusing on the structure of microscopic plant and animal tissues offered at a large, 4-year, land grant university in the Western United States.

The researchers were interested in learning the degree to which course format affects interactions within the learning environment. They investigated the effect of computer-mediated communication (CMC) on student-to-student and student-to-instructor interactions in the classroom in terms of the time devoted to content interactions and the quality of those interactions as classified by Bloom’s taxonomy with an emphasis on the cognitive domain. The cognitive domain focuses on the “recall or recognition of knowledge and the development of intellectual abilities and skills” (as cited in Schoenfeld-Tacher, et al., 2001, p. 258). In this domain, knowledge moves from basic understanding to higher levels of learning as demonstrated through the use of increasing degrees of abstract thought. Finally, the researchers investigated the extent to which the instructor’s presence or absence affected the number and type of questions posed by students during online group interactions.

The researchers combined qualitative and quantitative research methods to conduct their study. Observations were conducted in two course sections, one online and one face-to-face, of the same course, taught by the same instructor during a single semester. The study’s sample size consisted of 44 students, 11 were enrolled in the fully online course and 33 enrolled in the face-to-face course. Students enrolled in the online course section completed all course requirements online with no on-campus instructional activities. Students enrolled in the face-to-face course met in the classroom for three, 50-minute lecture periods per week and participated in one, three-hour, on-campus laboratory session each week. Face-to-face students were only required to use the Internet
to complete online exams that were identical to the exams completed by their online counterparts.

Students enrolled in face-to-face and online course sections completed the same pre-test instrument consisting of 25 multiple-choice questions. The instructor presented the same content to students enrolled in both course settings. The students’ achievement of course learning outcomes was assessed by comparing students’ scores on four comprehensive multiple-choice and laboratory exams. Course exams consisted of identical questions asked of students in face-to-face and online course sections. Finally, students enrolled in face-to-face and online course sections were required to complete the same post-test instrument consisting of 32 multiple-choice questions.

The researchers observed interactions during on-campus lectures, synchronous on-line discussions with the instructor present, and synchronous on-line student-organized review sessions without the instructor’s participation. Transcripts of interactions in each setting were independently coded by the researchers and crosschecked for reliability. The researchers then coded students’ questions according to the following categories: 1. Content – focusing on course material, 2. Administrative – details associated with the course such as assignment submission dates, 3. Management – prompts to move to the next topic, and 4. Social – non-academic questions. The researchers further classified content questions according to the definitions established by Bloom’s taxonomy as synthesized by Schoenfeld-Tacher, et al.: 1. Knowledge – simple recall, 2. Comprehension – ability to demonstrate abstract thought, 3. Application – applying abstraction to a new problem without instruction, 4. Analysis – breaking information into parts and recognizing relationships, 5. Synthesis – putting parts together
to create a new whole and, 6. Evaluation – judging the value of information based on criteria (p. 259). The researchers analyzed the qualitative data using each session as an independent observation.

To determine possible differences in students’ performance, the researchers used $t$-tests and ANCOVA to compare students’ pre-test and post-test scores. The researchers also conducted post hoc comparisons using Fisher’s Least Significant Difference (LSD) test. At the beginning of the study researchers found no statistically significant difference in academic performance between students enrolled in online and face-to-face course sections. However, post-test scores showed a statistically significant difference ($t = -2.032$, $p < .05$) between online and face-to-face courses with online students outperforming their face-to-face counterparts by an average of seven percentage points. The researchers noted the online students showed a lower pre-test mean score ($M = 10.67$) compared to face-to-face students’ pre-test mean score ($M = 15.09$). Using ANCOVA, the researchers controlled for the effects of pre-test performance by using the pre-test scores as a covariate. They found the effect of format, face-to-face vs. online, on post-test scores was statistically significant ($F = 5.95$, $p < .05$) with a small to medium effect size ($\eta^2 = 0.192$).

The researchers computed the average rate of student interactions in each setting by dividing the total number of interactions by the total amount of time elapsed over all course sessions. One-way ANOVA showed statistically significant difference ($F = 6.07$, $p < .01$) prompting the researchers to conduct a post hoc LSD test. The post hoc LSD test showed the mean rates of student interactions per hour were significantly higher in synchronous on-line discussions with the instructor present ($M = 54.29$) and synchronous
on-line student-organized review sessions without the instructor’s participation \((M = 41.29)\) than were found in the face-to-face setting \((M = 18.31)\). The researchers cautioned that while the intent of face-to-face lectures was to present course content, the intent of online sessions was to elaborate on previously covered content. In view of this fact, the researchers suggested the statistically significant difference has limited implications.

With regard to the percentage of student-initiated interactions by setting, one-way ANOVA showed statistical significance \((F = 6.49, p < .001)\). The researchers used weighted averages calculated using each session as an independent observation to conduct post hoc tests that showed online students initiated a larger percentage of interactions \((M = 20.79)\) than did their face-to-face counterparts \((M = 6.14)\). When examining the topic of interactions, the researchers found the greatest number of content interactions occurred during face-to-face class sessions and the greatest number of social interactions took place during online review sessions.

The researchers conducted a two-way ANOVA to examine the effects of initiator (student or instructor) and setting (on-campus lectures, synchronous on-line discussions with the instructor present, and synchronous on-line student-organized review sessions without the instructor’s participation) on the percentage of interactions devoted to each topic. Statistically significant results were found for all topics of interaction (management, social, administrative, content) at the \(p < .001\) level.

The researchers conducted LSD post hoc tests to examine the patterns for each topic. They found students enrolled in face-to-face and online settings were more likely to initiate content interactions than was the instructor. The researchers noted no social interactions occurred during lecture settings; however, both students and the instructor
initiated social interactions during online discussion sessions. In both face-to-face and online settings, the instructor also initiated more course management-related interactions than did students.

Content interactions per course session at each level of Bloom’s taxonomy by setting and initiator using weighted data showed a greater number of low-level knowledge and comprehension-based student-initiated interactions occurring in online review sessions (77.3%) than in face-to-face sessions (68.6%). Medium-level application and analysis comprised a much lower level of student-initiated interactions in online-review sessions (13.2%) as opposed to face-to-face sessions (29.4%). However, high-level synthesis and evaluation appeared relatively low in both student-initiated interactions in online-review sessions (1.8%) and face-to-face sessions (2.0%). In contrast, instructor-initiated interactions showed a greater use of high-level synthesis and evaluation in the online course (11.1%) than in the face-to-face course (3.3%). The instructor relied more heavily on medium-level application and analysis interactions in the face-to-face course (41.1%) than in the online course (20.7%).

A two-way ANOVA for level of questioning by initiator and setting showed significant $F$ values for all levels of questioning at the $p < .001$ level. While the researchers performed post hoc tests for all possible comparisons of the five types of initiation (students’ review, students’ chat, students’ lecture, instructor’s chat, instructor’s lecture) on six levels of questioning (knowledge, comprehension, application, analysis, synthesis, evaluation), only those deemed by the researchers to have practical value were presented in the study.
Overall, the researchers found students generated high-level synthesis questions in online discussion sessions when the instructor also participated in the discussions. Students were more likely to initiate high-level evaluation questions during face-to-face lecture sessions than during online review sessions. Students were least likely to initiate high-level questions during online discussion sessions without the instructor’s participation. Although not statistically significant \((p > .05)\), online students generated a greater number of interactions in the online sessions and did not require the same level of instructor prompting as required for face-to-face students. In view of these findings, the researchers suggested that face-to-face contact in lecture-based courses does not necessarily generate, or, encourage, greater levels of communication between students and instructors.

As a result of these findings, the researchers determined the online delivery format and the teaching techniques it promoted relative to student-to-student and student-to-instructor interactions led to improved academic outcomes when measured by a common post-test instrument. The researchers further proposed that the online format served as an effective means for “facilitating learner-content interaction and creating content learning opportunities at least equivalent to those available in the on-campus course” (p. 263).

The researchers speculated that the sense of anonymity engendered by the online environment may have contributed to the greater freedom of expression exhibited by students in the online course. They further suggested the online environment’s asynchronous quality may also have contributed to the greater degree of expression because it provided students with more time to formulate answers to questions than they
would have experienced in a face-to-face setting. The researchers stressed that the study’s focus on the impact of a delivery system on students’ and instructors’ interactions demonstrates the effectiveness of the online format. They noted the level of this effectiveness is further documented by the positive academic outcomes achieved by students participating in the online course setting.

Similar to Schoenfeld-Tacher, et al. (2001), Sexton, Raven, and Newman (2002) employed Bloom’s taxonomy of the cognitive domain as the basis for their study comparing an online and a face-to-face, in-service Hippology (horse study) training program designed for 4-H Extension agents employed with the Mississippi State University Extension Service. The entire sample \((n = 26)\) was composed of adults ranging in age from 23 to 53 years \((M = 35.81)\) with youth-development responsibilities in their respective counties. All 26 Extension agents confirmed they had regular access to Internet-capable computers and had previously used the Internet for work- or school-related purposes. These individuals voluntarily enrolled in the in-service training program to enhance their knowledge and allow them to provide better guidance to 4-H youth Hippology teams.

The purpose of the research study was to compare the effectiveness of face-to-face and online Extension agent in-service training in Mississippi with respect to Bloom’s taxonomy of higher order cognitive skills, specifically knowledge and application, and the possible impact computer anxiety may have on the learning process. The researchers established and tested the following six null hypotheses:

1. There will be no difference in group means on the Station Identification post-test (Bloom’s taxonomy – knowledge).
2. There will be no difference on the Station Identification post-test (Bloom’s taxonomy – knowledge) resulting from computer anxiety.

3. There will be no interaction observed between training format and computer anxiety on the Station Identification post-test (Bloom’s taxonomy – knowledge).

4. There will be no difference in group means on the Ration Formulation post-test (Bloom’s taxonomy – application).

5. There will be no difference on the Ration Formulation post-test (Bloom’s taxonomy – application) resulting from computer anxiety.

6. There will be no interaction observed between training format and computer anxiety on the Ration Formulation post-test (Bloom’s taxonomy – application).

The post-test only control group design’s dependent variables were the Extension agents’ scores on two subject matter post-test instruments focusing on two distinct cognitive levels of Bloom’s taxonomy – knowledge (low-level) and application (medium-level).

The Extension agents participated in three training sessions and were randomly assigned to the treatment groups – face-to-face (control) and online. Following group assignments, the Extension agents completed their training and then returned, as a group, to complete the post-test instruments. Extension agents participating in the face-to-face (control) training sessions received traditional lecture presentations and demonstrations. They also participated in hands-on activities, group activities, and class discussions.
During the course of training, the face-to-face participants were also able to directly pose questions to the instructor and receive immediate feedback.

In contrast, the Extension agents participating in the online training sessions worked in a computer lab where they were provided with individual Internet-capable computers and permitted to work independently at their own pace using the Hippology training web site as their only source of information. Although the Hippology training web site provided participants with the opportunity to submit learning checks as their studies progressed and to receive basic feedback, the participants were not able to ask specific questions or to physically examine the horse-related equipment that they would later see during the Station Identification post-test.

The first post-test instrument, Station Identification, tested for knowledge and required the Extension agents to rotate through a series of eight testing stations to identify a horse-related item that was presented during training. The second post-test instrument, Rations Formulation, tested for the application of knowledge and required the Extension agents to perform six progressive calculations to demonstrate their ability to formulate an appropriate feeding ration for a given horse.

The researchers were also interested in examining the possible impact of computer anxiety on the Extension agents’ performance in the online training program. The researchers required the Extension agents to complete a computer anxiety and demographics questionnaire. The first part of the instrument consisted of 12, four-part Likert scale questions focusing on computer anxiety. The second part of the instrument required the participants to provide demographic data including age, education, gender, computer usage, and computer preferences.
Due to the study’s small sample size \((n = 26)\), with only 13 participants in each treatment group, the researchers established a less stringent alpha level of .10 \textit{a priori}. The study’s beta level was .40. Ideally, power is determined by subtracting the beta level from 1 \((1 - .40)\). Therefore, the acceptable power for this study should have been .60. However, with only 13 Extension agents in each treatment group, the final statistical power was a less-than-ideal .38 with a medium effect size. In response, the researchers opted to use interval-level data and selected multiple linear regression as the most appropriate statistical analysis technique for the study.

The researchers used multiple linear regression analysis to test the study’s six hypotheses. Data were checked using normality, homoscedasticity, and multicollinearity to determine that the assumptions of multiple linear regression were met. The checks showed no cause for concern. The researchers computed the \(R^2\) values for both dependent variables, Extension agents’ scores on two knowledge post-tests, and used the \(R^2\) values to compute \(F\) values to test the null hypotheses at an alpha level of .10. The researchers grouped the hypotheses according to dependent variable with hypotheses 1-3 relating to the Station Identification post-test (Bloom’s taxonomy – knowledge) and hypotheses 4-6 relating to the Ration Formulation post-test (Bloom’s taxonomy – application). The researchers analyzed mean differences across groups. In regard to computer anxiety with 48 serving as the instrument’s maximum score, face-to-face and online groups reported only mid-scale anxiety levels, \(M = 21.69\) and \(M = 21.00\) respectively. The researchers interpreted these mid-scale levels to mean the Extension agents were neither overly anxious, nor overly confident in regard to their computer-related skills.
Using hierarchical multiple linear regression, the researchers conducted four regression analyses for both dependent variables, Extension agents’ scores on two knowledge post-tests, and obtained R² values for F-tests at the .10 level of significance. Results from the F-tests for the Station Identification post-test (Bloom’s taxonomy – knowledge) showed no statistically significant difference (p > .01) between face-to-face and online treatment groups’ post-test scores. The F-test also revealed participant’s level of computer anxiety did not alter performance on the Station Identification post-test in a statistically significant manner (p > .01). Thus, the researchers retained (failed to reject) null hypotheses 1-3. Results from the F-tests for the Rations Formulation post-test (Bloom’s taxonomy – application) yielded slightly different results. While null hypotheses 4 and 5 revealed no statistically significant difference (p > .10) at the .10 level of significance and the researchers retained (failed to reject) these null hypotheses, F-test results for null hypothesis 6 showed the interaction between the type of training methodology (face-to-face vs. online) and computer anxiety were statistically significant (p < .10) with face-to-face students scoring statistically significant higher scores than online students completing the post-test. Therefore, the researchers rejected null hypothesis 6.

Since both treatment groups were equally successful in terms of their scores on the Station Identification post-test, the researchers concluded delivery format and computer anxiety did not negatively impact learning at the knowledge level – the lowest-level of Bloom’s taxonomy. However, when presented with higher level cognitive challenges, as required in the Ration Formulations training and subsequent post-test focusing on the application of mathematical calculations, agents participating in online
training experienced greater computer anxiety which seems to have negatively impacted their learning. In view of this finding, the researchers suggested additional research should be conducted to examine the relationships between levels of cognitive learning and online instruction. Further investigation regarding the types of subject matter that are best suited for online instruction would be beneficial as would the development of enhanced feedback mechanisms that are closer to those experienced by learners in face-to-face settings.

Recognizing the positive potential of online instructional delivery, Bello, Pennisi, Maviglia, Maggiore, Bocci, Montini, and Antonelli (2005) conducted a pilot study in which they compared the effectiveness of face-to-face and online course delivery methods for teaching the principles and practices of difficult airway management to graduate-level anesthesiology and intensive care resident physicians.

The study’s sample (n = 56) was drawn from the total population of 79 graduate physicians enrolled in the four-year Residency Program in Anesthesiology and Intensive Care Medicine at the Catholic University Medical Center in Rome, Italy. Of the sample, 28 residents were first- or second-year students (beginners) and 28 residents were third- or fourth-year students (advanced). The mean age of the residents enrolled in the face-to-face (Group 1) and online (Group 2) course sections were the same (M = 28.8 ± 1.6 years) with a range of 26-32 years. In terms of gender, 57.1% of the residents enrolled in the face-to-face course (Group 1) and 60.7% of the residents enrolled in the online course (Group 2) were women. Both groups reported similar experience in terms of Internet usage with 19 (68%) of the residents enrolled in the face-to-face course (Group 1) and 16
(57%) of the residents enrolled in the online course (Group 2) reporting daily Internet use.

Prior to commencing their studies, the residents enrolled in both face-to-face (Group 1) and online (Group 2) course sections completed written and practical tests to measure each resident’s baseline knowledge of airway management. The written portion of the pre-test consisted of 40 multiple-choice questions. The researchers administered the baseline knowledge pre-test to Group 1 and Group 2 on the same day, at the same time, with a 30-minute timeframe for completion. The residents enrolled in the face-to-face course section (Group 1) answered questions manually in a classroom under instructor supervision. Residents enrolled in the online course section (Group 2) completed the test online in an instructor-supervised setting. The researchers administered the same final exam (post-test) to both groups 48-hours after the conclusion of the courses. Final exam questions differed from those used on the baseline knowledge test; however, the questions were similar in terms of level of difficulty.

Practical skills associated with each of the airway management techniques were evaluated before studies commenced and once again after course completion. The residents in both groups were required to demonstrate their ability to correctly complete airway management maneuvers on a medical dummy in a classroom setting. If all requisite techniques were performed correctly, without instructor assistance, residents could earn a maximum score of 65 points.

Before studies commenced and again after course completion, the researchers assessed each resident’s judgment in terms of difficult airway management situations by administering a multiple-choice questionnaire proposing specific scenarios and requiring
the residents to select the most appropriate response. At the end of the course, the researchers administered a 4-part Likert scale learner satisfaction questionnaire designed to evaluate the residents’ perceptions of: 1. quality of the course and completeness of course materials, 2. quality of interactions with instructors, and 3. time available for concept acquisition.

The researchers used the Mann-Whitney U test to analyze intergroup differences of baseline knowledge and learner satisfaction scores, Wilcoxon matched pairs test to determine changes in knowledge reflected by difference in pre-course and post-course scores, a chi-square test to identify categorical variables, and Cronbach’s alpha coefficient to estimate the internal consistency of the learner satisfaction scale. The researchers hypothesized the two teaching methods, face-to-face and online, would be equivalent in terms of knowledge gain. In support of this hypothesis, results showed no statistically significant differences between the baseline performance of the face-to-face (Group 1) and online (Group 2) students on the written (p = 0.249) or the practical skills tests (p = 0.670). Analysis of median scores on the written test revealed improvement in both groups after course completion (p < 0.001) with a 40% increase in face-to-face (Group 1) students’ median test scores, from 12.0 to 29.0, and a 42.5% increase in online (Group 2) students’ median test scores, from 13.5 to 30.5. However, the observed difference was not great enough to show statistically significant difference (p = 0.228). The researchers observed similar results with regard to each group’s practical skills test scores with face-to-face (Group 1) students showing a 22.3% increase in median test scores, from 32.5 to 47.0, and online (Group 2) students showing a 23.1% increase in
median test scores, from 31.5 to 46.0. Once again, the observed differences between the
groups were not statistically significant ($p = 0.376$).

Using a Likert scale ($1 = \text{poor}; 2 = \text{fair}; 3 = \text{good}; 4 = \text{very good}$), the learner
satisfaction questionnaire allowed Group 1 and Group 2 students to evaluate three
specific aspects of their learning experience: 1. quality of the course and completeness of
course materials, 2. quality of interactions with instructors, and 3. time available for
concept acquisition. Noting a 0.82 Cronbach’s alpha coefficient for the learner
satisfaction scale, the researchers cited adequate internal consistency to support between-
group comparisons. No statistically significant difference existed between the groups’
ratings of course material or interaction with the instructors. However, online (Group 2)
students showed statistically significantly greater satisfaction with the time available for
concept acquisition than did their face-to-face (Group 1) counterparts (median ratings:
4.0 for online and 3.0 for face-to-face; $p < 0.001$).

In an attempt to quantify students’ perceptions of time for concept acquisition, the
researchers examined the amount of time online students (Group 2) dedicated to working
in the online course environment and participating in three, 30-minute, synchronous,
threaded discussion forums with each of the four instructors’ participation. In sum, Group
2 students spent 6 hours and 56 minutes working in the online course environment
compared to Group 1 students who spent 5 hours in the classroom. The number of
accesses per student ranged from 2 to 8 (median: 5). Examination of the three 30-minute
online discussion forums showed 15 of the 28 students (54%) participated in the forums
for the full duration of all three sessions (90 minutes) and 26 students showed as
“present” for at least 50% of the total forum time. In addition to the time spent in the
classroom and in the online environments, students in both groups also spent time studying outside of the formal learning environment. The researchers noted it is impossible to quantify this time. The researchers also examined the duration of time in which the four instructors interacted with students and found instructors spent 90 minutes interacting with students during each synchronous forum session, plus an additional 42-65 minutes offline evaluating students’ forum comments and preparing replies.

After reviewing all data, the researchers concluded an exclusively online format might be as effective as face-to-face instruction for teaching the principles and practical skills involved in airway management. The researchers stressed the success of the online course was based on their intentional course design involving a high degree of instructor-student interaction with real-time responses to students’ queries. The researchers believed the importance of this dynamic was confirmed by the high rates of student participation in the online discussion forums and their positive responses to the learner satisfaction questionnaire.

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From an institutional perspective, content standardization, efficiency of dissemination, and cost effectiveness serve as important benefits of online instruction. These benefits become especially desirable when training a geographically diverse population. Using ANCOVA analysis, Benjamin, Tate, Bangdiwala, Neelon, Ammerman, Dodds, and Ward (2007) conducted a study to investigate if online training is as effective as face-to-face training for preparing a geographically diverse population of childcare health consultants (CCHCs) in North Carolina to address nutritional issues promoting healthy weight for young children. The researchers conducted a three-group
randomized controlled trial using pre- and post-training performance on a 28-item nutrition and physical activity knowledge test focusing on childhood obesity issues. The researchers hypothesized that consultants trained in a face-to-face setting would perform more than five points better on a knowledge post-test than would consultants trained online. Researchers also expected web-based and in-person trained groups to outperform CCHCs in the control group who received no formal training.

Working through the state agency responsible for training and support, the researchers sent a formal invitation to all CCHCs located in counties across North Carolina to participate in the research study. Only CCHCs who had not previously participated in Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) training were eligible to participate in the study. Approximately 38 participants were recruited for the study in this manner. An additional 16 participants were recruited via word-of-mouth. Although 54 participants were initially recruited representing 70% of active CCHCs in North Carolina, three participants withdrew from the study prior to randomization leaving a final sample size of 51.

Prior to establishing randomized group assignments, the researchers collected demographic and background information by conducting brief telephone interviews with all study participants ($N = 51$). The researchers asked the participants to provide the following information: 1. age in years, 2. Gender, 3. race/ethnicity, 4. number of years working as a childcare health consultant (CCHC), 5. work hours per week, 6. professional degree 7. nursing degree (RN or LPN), 8. preference for face-to-face training, 9. preference for online training, 10. equal preference for online and face-to-face training, 11. prior online training, and 12. time using Internet in months.
Following the completion of the telephone interviews, the researchers randomly assigned participants into one of three groups: 1. face-to-face training ($n = 16$), 2. online training ($n = 17$), and 3. control with no training ($n = 17$).

Participants assigned to the face-to-face training group participated in one of six, three-hour, in-person training sessions held across the state of North Carolina during a three-month period. The training sessions were also open to CCHCs who were not participating in the study; however, the class size for each face-to-face session was limited to five participants. For consistency, the study’s coordinator facilitated all face-to-face training sessions and a note taker was present during all sessions to document the duration of time spent on each portion of training. Face-to-face participants completed a pre-knowledge test prior to the start of the training session and a post-knowledge test immediately following the training session. The participants were also asked to complete a modified computer and Internet use questionnaire to gauge their prior experience and preferred learning format.

Participants assigned to the online training group received the knowledge pre-test and a computer and Internet usage questionnaire from the researchers via email. Following the completion and return of these instruments, the researchers sent the participants the Uniform Resource Locator (URL) for the online training web site, a login ID, and a password. The researchers asked online participants to abstain from consulting outside resources and to complete all training within a three-week timespan. The researchers tracked each participant’s training progress online. Following training completion, the researchers sent the post-training knowledge test to the online group participants via email.
Participants assigned to the control group received no formal training. The researchers sent the knowledge pre-test and a computer and Internet usage questionnaire to the control group participants via email. Upon completion and return of the instruments, the study’s coordinator sent the post-training knowledge test to the control group participants. Control group CCHCs were asked to abstain from consulting outside resources while completing all tests. As incentive for completing and returning the study’s instruments, the researchers offered Control group CCHCs access to the online training web site upon completion of the study.

The researchers examined the demographic and background data collected during the preliminary telephone interviews and found no statistically significant differences in baseline characteristics among the three groups. As a result, the researchers decided not to include demographic characteristics in their statistical analysis models. With pre-test scores serving as a covariate, the researchers used ANCOVA to assess differences between post-training test knowledge scores. The researchers conducted paired sample $t$-tests to identify differences between pre-training and post-training test scores within each group. All tests were conducted at the $\alpha = .05$ significance level.

In terms of baseline variables of CCHCs characteristics, results showed no statistically significant difference between the three groups (face-to-face, online, and control). Scores on the pre-training and post-training knowledge tests did not differ significantly at baseline among the groups. In contrast to the researcher’s hypothesis, ANCOVA results suggested that CCHCs who completed the training in a face-to-face setting did not perform better on the post-training knowledge test than did consultants trained online. Both face-to-face and online consultants performed similarly. However,
post-training knowledge test scores for both face-to-face and online groups showed statistically significant improvement ($p < 0.0001$) compared to the post-training knowledge test scores of consultants in the control group.

Slight differences were identified when specific knowledge content areas were analyzed for all three groups. However, after controlling for the pre-test baseline score, ANCOVA models for Childhood Overweight ($p = 0.39$), Nutrition for Children ($p = 0.88$), Physical Activity for Children ($p = 0.13$), and Nutrition and Physical Activity for Adults ($p = 0.48$) showed no statistically significant difference between groups.

The researchers tracked the time that CCHCs in the online group were actively engaged in training by tracking the time consultants spent completing training modules and also tracking their idle time. After 20 minutes of inactivity, the computer system automatically logged the consultants out of the training web site. Consultants were then required to login again if they wished to return to training. Online participants spent a mean of 124 minutes working on the training modules with a range of 53-363 minutes compared to the 180 minutes spent in face-to-face training. Researchers noted that time spent on the overall training did not necessarily indicate time spent actively engaged in the online training program.

Overall, the researchers found no statistically significant difference in the gain of post-training knowledge between face-to-face and online participants. The researchers therefore rejected the null hypothesis stating that face-to-face participants would perform more than 5 points better than their online counterparts on the post-training knowledge test. However, as predicted, face-to-face and online training groups outperformed CCHCs in the control group. The researchers acknowledged that the use of a cognitive measure as
the primary metric for evaluating training is somewhat limited in that increased knowledge does not necessarily equal better performance with regard to delivering interventions for young children. The researchers also acknowledged that, despite their efforts to require online study participants to abstain from consulting outside resources, they could not monitor testing and were, therefore, unable to guarantee that the participants actually adhered to the requirement. The researchers concluded that online CCHC training yielded nearly identical results as face-to-face training and, therefore, serves as a successful approach to CCHC training to address childhood overweight concerns.

Shifts in pedagogical approach may also create a need for effective alternative instructional methods. In response to such an observed shift in medical education from traditional didactic lectures to more self-directed learning approaches, Beyea, Wong, Bromwich, Weston, and Fung (2008) used chi-square analysis to compare the pass rate of family medicine residents performing the Particle Reposition Maneuver (PRM) to treat Benign Paroxysmal Positional Vertigo (BPPV) after participating in one of three interventions – small group Particle Reposition Maneuver (PRM) instruction, standard classroom-based Particle Reposition Maneuver (PRM) instruction, online Particle Reposition Maneuver (PRM) instruction. The researchers employed a “prospective randomized control trial” (p. 175) design that included all family medicine residents (N = 25) in the Family Medicine Postgraduate Education Program at the University of Western Ontario, Canada. The researchers hypothesized that their online learning module would be more effective than standard classroom instruction and equally as effective as small group instruction.
Baseline knowledge tests were administered to all residents prior to participation in intervention. Researchers then randomly assigned all residents to one of the three intervention groups. Small group Particle Reposition Maneuver (PRM) participants \( n = 8 \) were split into two small groups comprised of four members in each group. An experienced physiotherapist demonstrated the Particle Reposition Maneuver (PRM) twice. Following these demonstrations and under the direct supervision of the physiotherapist, each resident performed the PRM once on their partner and then their partner performed the PRM once on them. The physiotherapist provided immediate feedback regarding the accuracy of each resident’s performance. The residents were then permitted to perform the Particle Reposition Maneuver (PRM) one more time. The entire small group PRM training session lasted for 15 minutes.

Standard Classroom Instruction participants \( n = 9 \) received a standard lecture presented by a senior ear, nose and throat (ENT) resident focusing on basic information about Benign Paroxysmal Positional Vertigo (BPPV) and the techniques required to properly perform the PRM that is a component of the undergraduate medical curriculum at the University of Western Ontario. The standard lecture training session lasted for 15 minutes.

Online Learning Module participants \( n = 8 \) viewed a series of slides containing basic information about BPPV and instructions regarding properly performing the PRM. The diagrams used in the online learning module were identical to those used in the standard classroom instruction group. The online learning module concluded with an activity to reinforce learning. Participants were given 15 minutes to use the online learning module.
Prior to the start of the interventions on day zero, all residents were tested using a pass/fail pre-test based on their manipulation of a device, The DizzyFIX, designed to serve as a visual representation of the Particle Reposition Maneuver (PRM). Additionally, trained observers evaluated each resident’s performance completing the Particle Reposition Maneuver (PRM). Following testing, the researchers randomly assigned the residents to one of three intervention groups – small group Particle Reposition Maneuver (PRM) instruction, standard classroom-based Particle Reposition Maneuver (PRM) instruction, online Particle Reposition Maneuver (PRM) instruction. At the conclusion of the interventions, the residents were tested again using a pass/fail post-test based on their manipulation of The DizzyFIX. Additionally, trained observers evaluated each resident’s performance completing the Particle Reposition Maneuver (PRM). To ensure a blind evaluation, the trained observers were not provided with any information regarding residents’ intervention type.

At the end of the study, the researchers also provided the residents with the opportunity to share their feedback in the form of a short questionnaire asking them to comment on the ease of comprehension of the intervention they were assigned and their preferred method of learning. The researchers noted the questionnaires documented that most students found the content of the interventions to be easy to understand with all three interventions rated on average as three on a five-point scale of difficulty (1 = too elementary, 3 = average, 5 = too advanced). The researchers suggested the students’ ratings might reflect the fact that the task difficulty was comparable across all three groups and, therefore, it did not serve as a confounder in the test results. Similarly,
residents in all three intervention groups reported a preference for small group clinical-instruction for learning clinical skills such as PRM.

While baseline knowledge test results showed 20% of all residents passed the device manipulation test, only 12% of those residents were judged by the trained observers to have correctly performed the PRM. There was no statistically significant difference in pass rates (device manipulation, $p = .2096$; trained observer, $p = .3710$) between the three groups prior to administration of the interventions ($p > 0.05$); however, the results showed no statistically significant difference ($p > 0.05$). Post-intervention, all three groups improved their device manipulation and trained observers’ scores. Device manipulation results were comparable between groups ($p = .3564$); however, the results showed no statistically significant difference ($p > 0.05$). Trained observer scores were comparable between the small group clinical instruction group and the online instruction group, but not between these two groups and the standard classroom instruction group ($p = .0431$). The standard classroom instruction group earned scores of 30% or less. In contrast, the small group clinical instruction group and online instruction group earned correct scores of 80% or higher, showing a statistically significant difference ($p < 0.05$) after intervention.

Issues that arose during the course of the study included the loss of five residents who did not return for the follow-up post-test at the end of the study. This loss reduced the sample size from 25 to 20 participants ($N = 20$). One resident was lost from the small group clinical instruction group ($n = 7$), two were lost from the standard classroom instruction group ($n = 7$) and two were lost from the online instruction group ($n = 6$). The researchers also found the checkbox indicating the results of the DizzyFIX testing
showed no outcome recorded on three of the completed score sheets. The researchers deemed these score sheets “spoiled.” The researchers acknowledged these losses resulted in a small sample size that lacked the power to accurately distinguish small differences between the groups.

However, the researchers argued the use of trained observers allowed the study to show that residents who received face-to-face instruction did not perform as well as those who received online instruction or small group clinical instruction. Thus, the researchers failed to reject the null hypothesis and concluded that their online PRM instruction module is as effective as small-group clinical instruction and more effective than standard classroom instruction. Based on these findings, the researchers suggested online learning modules may be used in combination with small-group clinical instruction to further enhance hands-on learning experiences for medical residents. The researchers stressed that not only does online learning have the potential to serve as a promising component of ENT clinical skills training for medical residents, but it also has the power to more efficiently utilize the time physicians spend working with residents in the clinical setting.

Using “a repeated measures analysis of variance (RMANOVA) with one between-subjects factor (conference group attended) and one within-subjects factor (pretest-posttest follow-up) to assess changes in three groups over three time periods” (p. 558), Harris, Jr., Elliott, Davis, Chabal, Fulginiti, and Fine (2008) investigated the degree to which lectures presented by national pain management experts compared with a publicly available online Continuing Medical Education (CME) program as a means to improve generalist physicians’ knowledge, attitudes, and beliefs (KAB) associated with expertise in chronic pain management. The researchers noted both practical and
theoretical reasons to consider other means, beyond live lectures, to provide pain management training for frontline generalist physicians. The researchers cited the considerable cost involved with hiring expert speakers, the obvious advantages in terms of cost savings and convenience associated with online training, and the knowledge-gained outcomes measurement that may assist others in evaluating and improving their own pain management education programs. The researchers hypothesized that physicians receiving one of two types of pain management CME would show immediate and long-term (three months) improvement in pain management expertise compared with a control group.

The study’s participants ($N = 136$) were self-selected from 228 physicians attending a two-day CME meeting in Southern California focusing on geriatric care. Eligible study participants were active, community-based primary care physicians working in nonacademic medical practice treating patients suffering from chronic pain. The researchers told the participants they would be randomly assigned to one of three four-hour programs taking place on the second day of the meeting. The participants would receive four hours of free CME credit for completing identical pre-test and post-test KnowPain-50 instruments administered on the day of the event and paid a $200 stipend for completing a second identical KnowPain-50 post-test instrument three months following the event. Participants were also required to complete an eight-statement, program satisfaction survey using a Likert-type scale with five indicating “strong agreement” and one indicating “strong disagreement.” All 136 physicians attended their assigned educational programs; however, 41 eligible physicians who provided self-reported demographic information at the start of the study did not complete the three
required surveys, essentially dropping out of the study. Only 95 physicians (70%) provided complete data for evaluation.

The researchers randomly assigned participants to one-of-three intervention groups: 1. live CME chronic pain management lectures conducted by three national experts ($n = 32$), 2. online CME pain program administered using laptop computers with headphones ($n = 30$), and 3. live CME palliative and end-of-life care presentations conducted by three national experts ($n = 33$). The first group received face-to-face, lecture-based pain management CME training. The second group received online pain management CME training. The third intervention group received no pain management CME training and served as the study’s control.

Both the live and online CME educational programs were based on current best practices in chronic pain management. As such, both programs incorporated four identical goals:

1. to enhance ability to diagnose common nonmalignant chronic pain syndromes;
2. to improve ability to assess and manage functional status in chronic pain patients;
3. to increase skill and confidence in managing long-term pain medications; and
4. to improve management of referral and ancillary care providers for chronic pain patients (p. 557).

To ensure consistency between the live and online CME educational programs, the researchers ensured both programs focused on common syndromes: 1. back pain, 2. headache, 3. fibromyalgia, and 4. neuropathic pain. During the study, the online program
participants entered their names into their laptop computer stations and were required to analyze a short opening case dealing with acute back pain. After completing the case, the participants could view any of the remaining five virtual patient (VP) cases and as much or as little supporting materials as they wished. Study participants could not access the online CME program after the four-hour intervention time expired. The palliative care (control) group received no discussion of pain management techniques. In contrast to managing chronic nonmalignant pain, palliative care focuses on specialized treatment for patients with serious illnesses. The control group observed two, one-hour lectures focusing on palliative care and quality and participated in two expert-led workshops focusing on advance care planning, delivery of bad news, and withholding or withdrawing treatment.

The researchers conducted RMANOVA with one between-subjects factor (conference group attended) and one within-subjects factor (pretest-posttest follow-up) to evaluate the effects of the study’s educational interventions on the KnowPain-50 survey scores for study participants before and after educational programs. Analysis showed increases in scores for the two intervention groups and a mild linear increase in scores for the control group with effects persisting for at least 3 months. The researchers performed cross tabulation analyses for sampling bias verifications to compare the three final groups and dropouts. A chi-square test of association was used to examine variables with nominal data. The researchers also performed one-way ANOVA to examine how group satisfaction ratings compared. ANOVA analysis showed no statistically significant differences between groups in any demographic characteristic ($p = 0.289$-$0.809$).
To gather mean educational program satisfaction data, researchers administered an eight-statement Likert-type scale satisfaction survey to participants. ANOVA results showed no statistically significant difference between any satisfaction measures across the three groups. The researchers concluded that live lectures presented by highly regarded national experts and an online CME program delivered under comparable conditions produced the same level of improvements in physicians’ knowledge, attitudes, and beliefs related to the management of chronic pain. The researchers found the online CME group showed higher baseline pre-test scores than the other two groups and further noted the use of ANCOVA would have allowed them to adjust for the CME group’s higher baseline pre-test scores. The researchers acknowledged they failed to specify the use of ANCOVA and suggested this approach might be used in a future study. The researchers concluded their study provides evidence supporting the continued use of complementary face-to-face and online teaching approaches to provide generalist physicians with continuing medical education for pain management.

As Harris, Jr., et al (2008) demonstrated in the previous study, CME training for generalist physicians can be enhanced through the use of online training. However, with a focus on occupational physicians (OPs), Hugenholtz, de Croon, Smits, van Dijk, and Nieuwenhuijzen (2008) noted important contextual distinctions between occupational healthcare and clinical or primary healthcare fields. In addition to medical concerns, OPs must also be cognizant of their patients’ working conditions, management priorities, and applicable legislation. The researchers noted OPs may not be actively utilizing the Internet to obtain information and this potential lack of exposure may serve as a possible barrier to their ability to successfully complete online CME training.
Using $t$-test and chi-square analysis, the researchers evaluated the effect of knowledge gained via online instruction verses face-to-face instruction in a postgraduate CME program focusing on mental health care for OPs. Both online and face-to-face training programs focused on three primary mental health topics – diagnosis, prognosis, and treatment. Content for face-to-face and online instruction was identical and each training lesson lasted 30 minutes. The researchers designed a randomized, four-group, controlled trial study with two groups receiving face-to-face instruction and two groups receiving online instruction.

Associated with the Coronel Institute of Occupational Health of the Academic Medical Center at the University of Amsterdam, the researchers conducted the study in The Netherlands during a meeting focusing on mental health care that was set within a series of four postgraduate meetings for OPs. The study’s sample ($N = 72$) was drawn from meeting attendees who were randomly assigned, in order of arrival, to one-of-four different groups (two face-to-face ($n = 37$) and two online ($n = 35$)). The researchers did not inform the participants that the two teaching approaches (online and face-to-face) were compared during the meeting.

Prior to instruction, the researchers administered a knowledge pre-test to participants and, at the conclusion of instruction, the researchers administered an identical knowledge post-test. Each knowledge test consisted of 33 questions (30 true/false and 3 open-ended). Two mental healthcare experts and one occupational health care education expert developed a pool of 66 questions for the knowledge test. From this pool, the researchers created two versions of the knowledge test ($X$ and $Y$) and they administered the tests with one online group completing test $X$ as a pre-test and test $Y$ as
a post-test while the second online group completed test Y as a pre-test and test X as a post-test. This practice was also used for face-to-face instruction groups. Additionally, the researchers collected the following baseline characteristics of the study’s participants: 1. age in years, 2. women, 3. OP years of experience, 4.) acquaintance with the website, and 5. previous use of the website.

Using *t*-tests for continuous variables and chi-square tests for categorical variables, the researchers examined differences in the OPs’ baseline characteristics between groups in terms of age in years, women, years of experience, acquaintance with the website, and previous use of the website. Of the baseline characteristics, only years of experience showed a statistically significant difference between both groups (*p* ≤ 0.05).

Although baseline scores of both knowledge tests (X and Y) did not differ significantly within each teaching approach or between the two teaching approaches, post-test scores showed both face-to-face and online teaching approaches enhanced OPs’ knowledge of mental health care issues. Baseline mean scores for face-to-face and online were 52.1 (SD 8.4) and 52.3 (SD 9.0), respectively, with post-test scores of 65.1 (SD 9.6) and 64.3 (SD 9.0), respectively. Based on these findings, the researchers concluded postgraduate online instruction is as effective as face-to-face instruction in enhancing occupational physicians’ knowledge via CME in the occupational healthcare setting. The researchers further suggested online training allows OPs to complete training independently, at their own pace, and in a convenient manner best suited for their schedules.

Using a pre-test/post-test control group experimental design, Wang (2008) compared the learning outcomes of optometry students enrolled in a first-year basic
optics course who used virtual optics labs software and those who did not use the software. In addition to statistical analysis, the researcher administered an open-ended questionnaire to collect qualitative data regarding students’ perceptions of their experiences using the virtual optics labs software.

The purpose of the study was based on the researcher’s desire to overcome observed imperfections associated with traditional optics labs through the development of a multimedia-based instructional tool that would serve as a virtual optics lab. The researcher also evaluates the effectiveness of the virtual optics lab in the learning process and explored user perceptions of the tool. Recommendations were made available to assist educators wishing to incorporate virtual labs as part of their optics curriculum.

The researcher hypothesized that the incorporation of the virtual optics lab tool with face-to-face lecture material would have, at minimum, reinforcement effects, if not a primary beneficial impact on students’ learning processes. To this end, the following research questions were posed:

1. What are the effects of virtual optics labs on the learning outcomes as measured by student performance in the end-of-lab quizzes?
2. How do the students perceive their experiences with the use of the virtual optics labs?
3. What recommendations can be made for educators who may consider the adoption of the virtual optics labs? (p. 46)

Students enrolled in the first year optometry program at a large independent university in south Florida served as the study’s participants. The experiment was divided into Part I \( (n = 112) \) and Part II \( (n = 103) \).
Four semi-randomly assigned course sections (A, B, C, and D) were divided into two groups with all course sections being taught by the same instructor. For the first part of the experiment, Section A and Section D served as the control group and received instruction in a traditional face-to-face laboratory setting. Section B and Section C served as the experimental group and received treatment using the virtual optics labs software in a computer lab. For the second part of the experiment, the two groups switched instructional methods with Section B and Section C serving as the control receiving traditional face-to-face instruction. Section A and Section D served as the experimental group and received instruction via the virtual optics lab software.

The multimedia-based virtual optics lab software consisted of two instructional Optics Labs: “Reflection and Refraction of Light at Plane Surfaces” and “Prism – To Investigate the Refraction of Light through Prisms.” Two weeks after the start of the semester, the researcher administered a 12-question diagnostic pre-test to students in each of the four lab sections to measure students’ basic optics knowledge prior to the study’s commencement during the fifth and seventh weeks of the semester. The researcher used ANOVA to identify between-conditions differences in the pre-test scores of the four lab sections. Results showed no statistically significant between-group differences prior to treatment ($p > 0.85$).

The researcher used ANOVA to compare between-group differences in the pre-test scores of the experimental group (Section B and Section C) and the control group (Section A and Section D). The results showed no statistically significant difference between the groups before the treatment ($p > 0.52$).
Following the completion of the second lab at the conclusion of Study Part I, the researcher administered diagnostic post-tests to the experimental and the control groups. ANOVA results showed no statistically significant difference between the experimental and control groups ($p > 0.30$).

Similarly, following the completion of the second lab at the conclusion of Study Part II, the researcher administered diagnostic post-tests to the experimental and the control groups. ANOVA results showed no statistically significant difference between the experimental and the control groups ($p > 0.60$).

With regard to students’ learning outcomes, the researcher failed to reject the null hypothesis and concluded the multimedia instruction provided by the virtual optics labs software was as effective as face-to-face optics lab instruction. The researcher stressed the study’s importance as a means to provide educators with valuable recommendations regarding the potential adoption of the virtual optics labs software for their instruction.

While the benefits of a virtual lab online learning environment provides students with strong visual learning opportunities, other means, such as student participation in asynchronous online discussion forums also provide students with vital learning opportunities. Using a previously developed multi-factor, discussion board metric suitable for comparative studies, Bliss and Lawrence (2009) examined student and instructor posts ($N = 6964$ posts) made in seventeen undergraduate online mathematics courses offered via the Center for Distance Learning at Empire State College in Saratoga Springs, New York over the duration of a 15-week semester. Only courses including small group and whole class discussions were included in the study. The researchers defined small group discussions as those in which groups of two to five students
participated in asynchronous text-based discussion. They defined whole class discussions as asynchronous text-based discussions open to all class members with the expectation of participation. The researchers held course content, individual student differences, and individual instructor differences as constant factors and, by doing so, they were able to examine the effect of discussion fragmentation on discussion board activity patterns.

Using paired t-tests for each measure, the researchers compared small groups and whole class discussion with regard to student participation, quantity of student postings, quality of student postings, extent of threading, and instructor presence. They found student participation to be significantly greater in small groups ($m = 13.99$) than in whole class ($m = 6.68$) discussions ($t = -6.656236, p < .001, df = 16$). The researchers examined the quantity of student postings and found a greater number of student posts in small-group discussions (7.28 per student) than in whole class discussions (2.87 per student). A paired t-test for the two sample means showed this difference to be statistically significant ($t = -10.14, p < .001, df = 16$). With regard to the quality of student postings, Educationally Valuable Talk (EVT) showed a mean of 1.77 for whole class discussions and 2.46 for small group discussions. A paired t-test showed the quality of Educationally Valuable Talk (EVT) posts to be statistically higher in small group discussions than in whole class discussions ($t = -2.712, p < .05, df = 16$). While the researchers did not report specific statistical findings for Extent of Threading, they indicated no statistically significant difference was found in the number of original threads that led to discussion in small group discussions compared to whole group discussions. Similarly, without providing specific statistical findings, the researchers stated no statistically significant difference was found in the number of instructor posts per student per discussion board in
small group compared to whole class discussions. The researchers concluded small group work may encourage student participation, greater quantities of posts, and greater quantities of educationally valuable posts.

Student engagement within an online learning environment is essential for success. Using hierarchical linear modeling (HLM) and multiple regression, Chen, Lambert, and Guidry (2010) examined online student engagement on a greater scale using a set of items developed by the National Survey of Student Engagement (NSSE) to investigate the impact of online learning technology on student engagement and self-reported learning outcomes in face-to-face and online learning environments. The NSSE is administered annually by the Indiana University Center for Postsecondary Research.

The researchers framed their study using the following research questions:

1. How often do college students in different types of courses use the web and Internet technologies for course-related tasks?
2. Do individual and institutional characteristics affect the likelihood of taking online courses?
3. Does the relative amount of technology employed in a course have a relationship with student engagement, learning approaches, and student self-reported learning outcomes? (p. 1223)

To investigate these questions, the researchers used data drawn from the 2008 administration of the NSSE. The study’s sample consisted of participating students enrolled at 45 baccalaureate degree-granting institutions in the United States. The researchers randomly selected the study’s 45 institutions from a pool of the 763 institutions that participated in the 2008 NSSE survey. The study’s 45 institutions
consisted of 14 (13%) public and 31 (69%) private. Of these institutions, 8 (19%) were classified in 2009 by the Carnegie Foundation for the Advancement of Teaching as doctoral institutions, 16 (38%) were classified as master’s institutions, and 18 (43%) were classified as baccalaureate institutions. The data set used in the study consisted of 17,819 respondents of whom 8,065 (45%) were first-year students and the remaining 9,754 (55%) were seniors. Of the respondents, 7,000 (35%) were male and 13,000 (65%) were female. The majority of the students surveyed (97% for first-year students and 87% for senior students) were enrolled full-time at their institutions.

To answer the first research question, “How often college students in different types of courses use the web and Internet technologies for course-related tasks” (p. 1223), the researchers conducted the Kruskal Wallis Test, a nonparametric equivalent of ANOVA to examine if statistically significant differences existed in students’ use of technology among different course delivery methods. With the assumption that institutions have a differential impact on a student’s course-taking behaviors and technology usage, the researchers used HLM to answer the second research question, “Do individual and institutional characteristics affect the likelihood of taking online courses?” (p. 1223). For the third research question, “Does the relative amount of technology employed in a course have a relationship with student engagement, learning approaches, and student self-reported learning outcomes?” (p. 1223), the researchers used Ordinary Least Squares (OLS) multiple regression analysis. The dependent variables for this analysis included four of the five NSSE Benchmarks of Effective Educational Practice: 1. level of academic challenge (LAC), 2. active collaborative learning (ACL), 3. student-faculty interactions (SFI), and 4. supportive campus environment. Additional dependent
variables included the three self-reported Gain Scales: 1. gain in general education, 2. gain in personal and social development, and 3. gain in practical competence. The final three dependent variables focused on deep learning scales: 1. higher order thinking, 2. reflective thinking, and 3. integrative learning.

The first three questions of the NSSE asked students to identify how many courses they enrolled in during the current academic year, how many of those courses used the online format as the primary means of course delivery, and how many of those courses were considered hybrid courses – a blend of online and face-to-face instruction. Of the 17,819 students who completed the survey, 2.1% completed all their courses solely online, 5.2% completed a combination of online and hybrid courses, 7.6 completed a combination of online and face-to-face courses. The vast majority of students, 84.8%, completed courses with at least some component of face-to-face instruction and, of those students, 20.8% enrolled exclusively in face-to-face courses. For analysis purposes, the researchers placed students into the following seven groups: 1. web only, 2. hybrid only, 3. face-to-face only, 4. web and hybrid, 5. web and face-to-face, 6. face-to-face and hybrid, and 7. all three delivery methods. For later analysis, the researchers further collapsed the seven groups to five: 1. web-only, 2. hybrid only, 3. some web, 4. face-to-face and hybrid, and 5. face-to-face only.

Anticipating that students who were enrolled in online and hybrid courses would demonstrate the greatest overall use of technology, the researchers examined first-year and senior student engagement in online learning activities. As anticipated by the researchers, students enrolled in online and hybrid courses used online learning tools and technology more often than their exclusively face-to-face counterparts. Of students
enrolled in online and hybrid courses, online students utilized synchronous and asynchronous communication tools more frequently for instructional or learning purposes. Compared to their face-to-face counterparts, online first-year and senior students also used electronic media more frequently to discuss or complete assignments.

The researchers expressed interest in the fact that students enrolled in blended hybrid courses utilized institutional online library resources more frequently than did their exclusively online or exclusively face-to-face counterparts based on instruction and guidance they may have received from their instructors during face-to-face class meetings. The researchers suggested this might result from students enrolled in hybrid courses being more familiar with conducting online research than their face-to-face counterparts. Alternatively, while students enrolled in online courses are familiar with technology use, they may lack instructor guidance regarding conducting online research using library resources.

Although the researchers attempted to use ANOVA to identify possible statistical differences in mean scores for seven questions focusing on student engagement in online learning activities posed to first-year and senior students, they abandoned the tests because the assumptions of ANOVA, specifically homoscedasticity, were only met in two of the 14 tests conducted. In response, the researchers employed the nonparametric Kruskal Wallis test to determine if statistically significant differences existed between mean scores. While the test indicated statistically significant differences in mean scores for each question among at least some student groups, the researchers noted that the excessively large number of respondents made it difficult to derive much meaning from the significant results due to the sensitivity of the tests to the high number of respondents.
The researchers built a HLM to investigate the impact of individual and institutional variables on students’ course-taking behaviors. Prior to this investigation, the researchers used the one-way ANOVA to estimate the proportion of variance between and within colleges/universities. The one-way ANOVA showed the proportion of variance between institutions ranged from 0.033 for first-year students to 0.157 for senior students. From these results, the researchers concluded that institutional variables have a greater influence on senior students than on first-year students with regard to their decision to enroll in online courses. The researchers stated that this result warrants further research to determine, more specifically, what institutional variables may affect students’ decisions to enroll in online courses.

The researchers created a random coefficient regression model to test and establish the individual-level independent variables before estimating the full, intercept- and slopes-as-outcomes model. The level 1 independent variables included students’ gender (0 = male; 1 = female), enrollment status (0 = full-time; 1 = part-time), ethnicity (0 = White/Caucasian; 1 = minority), first generation college student status (0 = at least one parent earned a baccalaureate degree; 1 = neither parent earned a baccalaureate degree), and a series of dummy-coded variables for major.

The researchers built the between-institution model by allowing the intercept to vary by institution. Next, the researchers “modeled the intercept with institutional characteristics” (p. 1227) using 2005 basic Carnegie classifications (doctorate granting institutions, master’s colleges and universities, baccalaureate colleges, and others). The researchers also included institution control (public or private) and locale or urbanicity (city, suburban, town, rural). The researchers avoided multicollinearity by omitting the
size of the institution because the institution size was highly correlated with the Carnegie classification within their sample \( r = .71, p < .001 \). With regard to the individual and institutional variables influencing students’ decision to enroll in online courses, first-year students and senior students are quite different. Enrollment in a private institution slightly increased the likelihood that a first-year student would enroll in an online course \( p < .05 \); however, enrollment in baccalaureate colleges and universities slightly reduced the chance of enrollment in online courses \( p < .05 \) compared with their counterparts enrolled in doctorate granting institutions. In contrast, institutional variables showed no statistically significant difference in relationship for seniors. In terms of individual variables, senior students appeared to be more affected by these variables than did their first-year counterparts. Results showed this was especially true for senior students who were enrolled in professional fields \( p < .001 \). With the exception of business majors who were slightly more likely to enroll in online courses than students in other majors, a student’s major seemed to have no relationship to the decision to enroll in an online course \( p < .05 \).

The researchers used OLS multiple regression analysis to investigate the impact of learning technologies on student engagement and outcomes. The variance explained by the models ranged from 12.3% to 32.1% for first-year students and 11.1% to 26.2% for senior students. Of the aforementioned variance, students’ use of technology serves as the greatest predictor.

The researchers noted the greatest majority of their study’s students were enrolled entirely or partially in classroom-based courses. In contrast, very few of the study’s students were enrolled solely in online courses with few students enrolled in hybrid-only
or hybrid and online courses. The researchers further noted their finding was consistent with the perception that students who enrolled in online courses were more likely to use web or Internet technologies to enhance their learning and communication with faculty and their peers. The researchers also noted that students who enrolled in hybrid courses more frequently utilized online library resources when completing assignments than did their solely online or face-to-face counterparts. While the researchers admit they do not know the result’s exact cause, they suggested the result might stem from the fact that solely online and face-to-face students may not be fully cognizant of the learning resources available to them. For this reason, the researchers suggested it would be prudent for institutions to provide online students with personal assistance to help them more effectively deal with academic difficulties and technical issues.

With regard to the second research question, the researchers concluded that individual and institutional characteristics do have small, but statistically significant effects on students’ decisions to enroll in online courses. While recognizing that employment, childcare, and financial support impact students’ decision-making processes, the researchers stated that their findings indicate racial and ethnic minorities and part-time students are more likely to enroll in online courses.

The researchers also noted that senior college students majoring in professional fields and first-year business students more frequently enrolled in online courses than did their counterparts majoring in other fields. They suggested future research should be conducted to determine the specific reason why minority and part-time students elect to enroll in online courses. If, as the researchers suspected, convenience serves as the determining factor, then this knowledge should encourage institutions to ensure their
online courses provide online students with the same high quality instruction, support, services, and other benefits enjoyed by their face-to-face counterparts. The researchers cautioned that a failure to do so could potentially create an unintended form of educational segregation as increasing numbers of minority, part-time, and working students elect to enroll in online courses as opposed to face-to-face course offerings.

With regard to the study’s third research question focusing on the relative amount of technology employed in a course and its potential relationship to student engagement, learning approaches, and student self-reported learning outcomes, the researchers noted that technology serves as an important aspect of student engagement and one that seems to have the greatest impact early in the college experience. As such, the researchers suggested it may be beneficial for institutions to incorporate a greater use of technology in lower-level courses to encourage greater student engagement in a broader spectrum of learning experiences. For this reason, the researchers suggested future research might investigate the nature of the positive correlation between technology and student engagement.

Overall, the researchers concluded the study’s results suggested a positive relationship between online learning technology, student engagement, and desirable learning outcomes. Findings showed that students enrolled in online courses tend to score higher in traditional student engagement measures and were more likely to engage in deep approaches to learning. However, in view of the observed rise in the enrollment of ethnic minority and part-time students in online courses, the researchers further underscored their belief that it is imperative for institutions to ensure high quality online learning experiences for all students.
Collaborative learning activities may serve to further encourage student engagement in the online course format. Using independent samples t-test and one-way ANOVA, Tsai (2010) compared three undergraduate compulsory Applied Information Technology: Networking course sections \((N = 169)\) taught by the same instructor, under the same course name, and presented to students via the same open-source learning management system (LMS). The researcher wanted to determine if students who participated in online collaborative learning with instructor initiation earned higher grades than students who did not receive instructor initiation. Tsai defined initiation as the “teacher’s assistance and effort to establish students’ essential knowledge and develop required skills in the initial stage of a course, to initiate students into a particular field of study” (p. 1138).

The study’s subjects consisted of 169 undergraduate students enrolled in a compulsory Applied Information Technology: Networking course in Taiwan. The first two course sections were drawn from an academic university and served as the experimental groups that received the treatment of online collaboration. In addition to peer interaction, Case 1 group students \((n = 68)\) also received instructor initiation focused on the field of website architecture. This initiation provided the students with a contextual framework that presented them with an overall view of the basic concepts allowing them to better understand the manner in which one skill built upon another. Case 2 group students \((n = 68)\) experienced unguided peer collaboration and did not receive the treatment of instructor initiation. Case 3 group students \((n = 33)\) served as the study’s control group and received traditional face-to-face instruction. This class of students was drawn from a university of science and technology and received traditional instruction. In
terms of gender, 52 participants were male and 117 participants were female. The mean age of the students was approximately 20 years of age.

At the start of the study, the researcher asked students to report prior web page programming experience. None of the students reported prior training or experience. The two credit-hour, semester-long Applied Information Technology: Networking course was composed of three content areas: 1. basic knowledge of Internet skills and usage, 2. conceptual knowledge of guidelines for creation of a business web site, and 3. advanced computing skills and website architecture. In addition to quantitative data, the researcher also collected qualitative data during the final week of the semester. Four student participants were randomly selected from the experimental groups and interviewed by the researcher.

During the study, students in each class section were required to build and present a business-quality website that would be evaluated according to specific web site usage and navigation criteria standards. Students in all three groups were assigned identical tasks. Within each course section, students were teamed in groups of 6 or 7 members to allow for peer collaboration and interaction.

Independent samples t-test comparing Case 1 (instructor initiation) and Case 2 (no instructor initiation) students’ computing grade scores showed significant difference ($p < 0.004$) with Case 1 students showing a mean score of 86.1824 compared Case 2 students who showed a mean score of 82.8382. Qualitative data collected from Case 1 students further underscored the importance of the instructor’s initiation by noting that the instructor’s online lessons and illustrations allowed students to gain a better understanding of the desired outcomes for the creation of their own business web site.
The researcher used one-way ANOVA to compare students’ computing skills under different conditions. The Case 1 group students who received the treatment of online collaborative learning with instructor initiation had the highest grades among the three groups (p < 0.027). Qualitative data collected by the researcher further underscored this finding as one student noted that collaborative learning with instructor initiation encouraged a greater sense of curiosity that encouraged the student to move beyond the course requirements during after school hours.

Based on these findings, the researcher concluded instructor initiation paired with collaborative learning could effectively assist online students in achieving higher levels of learning and, therefore, better prepare them to participate more fully and benefit more productively from collaborative learning experiences. Regarding the effects of online collaborative learning, an independent samples $t$-test comparing Case 2 students’ computing grades with Case 3 students’ computing grades showed statistically significant difference ($p < 0.000$) with Case 2 students showing a mean score of 82.8382 and Case 3 students showing a mean score of 69.4848. Based on this striking disparity, the researcher concluded online collaborative learning had a positive effect on students’ computing skills.

Next, the researcher conducted a one-way ANOVA using the dependent variable of computing skills to compare students’ computing skills under different conditions. The researcher found that students who received the treatment of online collaboration with instructor initiation had the highest grades among the three groups with the mean difference significant at the 0.05 level ($p < 0.027$).
The researcher concluded that the study provides teachers with a positive framework for improving student learning outcomes through the incorporation of collaborative learning practices combined with instructor initiation. The positive impact of instructor initiation in the online setting demonstrates the importance of actively engaging students and providing them with a conceptual framework upon which they can build as their studies progress.

Learning more about individual students’ perceptions of the online course experience provides further valuable insight to the ways in which online courses may be improved to encourage greater student retention and higher completion rates. Baxter (2012) conducted a small-scale qualitative research study to analyze the types of interventions that positively encouraged student success and completion within the online course environment. Set within the Open University in the United Kingdom, Baxter investigated the following research questions:

1. In what ways have student expectations influenced student progression so far?
2. Which factors have had the most influence on student motivation to succeed?
3. Which university initiatives have had the most positive influence on student motivation to succeed?
4. Have students experienced any drawbacks to progression between modules and if so how did students overcome them? (pp. 114-115).

In her study, Baxter examined online student identity based on a framework for student identity analysis developed by the researcher during a previous research study (Baxter, 2004). The framework consisted of the following eight facets that shape student identity: 1. faculty perception, 2. results of a trajectory of interrelated activities, 3. peer
interaction, 4. biographical background, 5. university expectations, 6. community influence, 7. academic expectations, and 8. personal beliefs stemming from cultural assumptions, childhood beliefs, language, and socioeconomic background.

The study’s sample ($N = 16$) was drawn from students enrolled in online courses at the Open University in the United Kingdom. The Open University enrolls approximately 200,000 students and employs approximately 7,000 associate lecturers. Approximately 65% of the University’s learning modules are offered online. The study’s student participants were self-selected and drawn from a grouping developed by the researcher during a previous study that was included in an internal report for a University project on student progression in which the following student groups were identified as having the greatest potential to progress through their programs of study to completion:

1. **Group A**: (2 students) Students beginning study post 2004 and completing a qualification (without credit transfer) (aged 18-25);
2. **Group B**: (2 students) Students beginning their study post 2004 and completing a qualification without credit transfer (aged 25+);
3. **Group C**: (3 students) Students beginning their study post 2004 and taking more than 12 months out before completing their qualification;
4. **Group D**: (3 students) Students whose study goal has changed, from doing a single module to getting a qualification since November 2011;
5. **Group E**: (3 students) Students from a large level 2 course who have progressed from level one to level 3; and
6. **Group F**: (3 students) Students from 2 widening participation initiatives.

(p. 113).
The researcher noted Group A students represented a shift in the University’s enrollment as it was now attracting a younger student population. Group B students represented the University’s largest student population. Baxter did not comment on Group C students; however, the researcher noted Group D students were important because they represented students who enrolled for a single course and then decided to continue their studies. The researcher identified Group E students as the most “problematic” (p. 114) because this group of students is transitioning from level one to level two and it is at this point that students often drop out of school. Group F students were drawn from the University’s Centre for Widening Participation as a means of examining how their experiences in the student retention program compared with students not participating in the initiative program.

The researcher acknowledged the study’s sample may appear overly positive towards the university due to the fact that students elected to be included in the study and may, therefore, have perceived the University’s online course environment in a more positive manner than would students who were randomly selected for inclusion. However, the researcher noted the study’s aim was to provide insights into factors that encouraged retention and completion and she did not believe an overly positive perspective would negatively impact the overall aims of the research. The study’s sample consisted of a greater number of females (60%) than males (40%) and the researcher suggested the reader may wish to consider the results in terms of this gender bias.

Following a case study format, Baxter conducted 16 qualitative face-to-face interviews in participants’ homes. The researcher selected the home environment because she believed a home setting would create a greater sense of comfort and, therefore, would
encourage participants to provide insightful responses to the interview questions. Each interview lasted from 60 to 75 minutes. Using a phenomenological approach to identity analysis, Baxter examined the manner in which subjects’ identities evolved over time in response to prevailing circumstances. The researcher noted that this approach is useful in the process of identifying underlying beliefs that directly influence actions and behaviors. The researcher coded responses to interview questions according to the corresponding student identity framework. The researcher then analyzed the coded data based on two overarching themes: 1. What makes students progress? and 2. Factors impeding progress.

Regarding student progression, the researcher investigated the ways in which students’ expectations influenced their progress early in their online experience. Baxter found that students’ early expectations were often inconsistent with their actual experiences in the online course environment. For example, some students indicated surprise when they realized they were required to interact with their classmates in the online environment and engage with them in group work. These students incorrectly assumed they would work independently in the online environment. Students also underestimated the amount of work necessary to successfully complete course requirements.

While some students stated they enjoyed the communication they experienced within the online course environment, other students expressed feelings of inhibition or intimidation. These students expressed frustration stemming from their attempts to communicate with their classmates without the usual visual physical cues and voice inflection they experience in face-to-face communication. Students further noted discomfort when engaging with their classmates in the online discussion forums,
especially when disagreements arose. As a result, these students limited their participation in the online discussions.

As students progressed to the next level of their programs of study, the researcher noted that they expressed more realistic expectations of requisite course workloads and appeared more confident in terms of their ability to cope with communication and required activities than did students who were at the start of their online learning experience. Baxter noted that these progressing students demonstrated greater self-confidence in terms of their overall learning than did students who were new to the online learning experience. The positive impact of tutor intervention surfaced at an early stage of the online experience. Students’ responses clearly indicated that, when experiencing frustration or requiring further clarification, it was tutor intervention that encouraged them to persist in their programs of study. Appropriate intervention, especially during the key points of transition from one level of study to the next, empowered students and encouraged them to move forward with their studies.

Baxter found certain characteristics such as positive past learning experiences appeared to positively influence student persistence. The researcher pointed out that this does not necessarily coincide with outstanding grades. She noted some students barely completed modules with passing grades; however, their confidence was encouraged in a variety of ways including positive response from classmates, family members, and tutors. Ultimately, Baxter noted these students recognized that even with all of the assistance provided to them by the Open University, their success as students was solely their own responsibility.
Baxter observed that students who gave their studies priority and organized their lives around their studies ensured their success by creating positive feelings about their independence and self-reliance as successful online learners. This was especially true for students who had negative experiences in online courses at different institutions, but who found a more positive learning experience with their Open University studies. Students also expressed pride in their ability to transition the knowledge they gained as a result of their studies to their work environment. In some cases, students explained that their learning helped them understand their business organizations more fully and, as a result, helped them cope more effectively with organizational changes.

With regard to University initiatives that had the most positive influence on student motivation to succeed, students expressed the importance of a sense of value for their money in terms of quality of provided materials, tutor support, and central staff support. While students initially expressed low expectations for social interaction, these feelings changed over time as the students realized how important those social connections with their peers could actually be in terms of their success and persistence. Baxter found that integration and contact with other students served as important motivating factors for students in groups A, F, and B.

Regarding factors impeding student progress, students expressed a great deal of frustration with online discussion forums and viewed these forums as impediments. At the same time, students also noted that appropriate interventions by tutors had alleviated many of their concerns with the online discussion forums. Interestingly, students expressed a desire to connect with their peers, but, not via the formal online communication venues. Some students noted an interest in utilizing social media outside
of the online course environment for these purposes. Overall, Baxter recognized the importance that students place on online interactions with their peers and tutors and the degree to which these interactions impact student identities. The researcher suggested the communication skills possessed by the online discussion moderator might be a instrumental in terms of encouraging and developing student success and persistence.

Baxter concluded that there are key times at which intervention by tutors can positively impact students’ developing identities and encourage their success. The researcher identified a disconnect between students’ initial expectations, their ultimate experiences, and subsequent growth serves as an important outcome of the study. This change was noted in all groups, but most predominantly in the younger age groups. Baxter suggested this may reveal how attitudes towards online learning are changing and improving over time. Baxter also recognized the need for students to engage with each other in the online environment to cultivate support and, perhaps, even friendships that might help gain positive feelings of connection that would lead to completion. A failure to encourage these connections ultimately leads to a lack of persistence. In view of the important connections existing between positive student identity and persistence, Baxter suggested future research studies focusing on online retention and progression should further investigate the impact of student identity.

Instructor initiation seems to have positive implications for encouraging student success. Another consideration regarding instructor interaction with students in the online setting involves the manner in which instructors provide feedback to students. Because students are removed from direct interaction with their instructors in the online setting, developing a rapport with students often proves challenging. Audio feedback rather than
written communication may prove to be a more useful means by which instructors can encourage greater student success. Using one-tailed t-test, Portolese Dias and Trumpy (2014) investigated the following research question: “Do students attain a higher level of instructor satisfaction on student evaluations when provided with audio group feedback, versus written group feedback only?” (p. 7). The researchers hypothesized students would report greater satisfaction with instructors when they received audio group feedback as opposed to written group feedback.

The study’s control group consisted of two online sections of a business communication course ($n = 49$) at Central Washington University offered during Fall 2012 quarter. The business communication course required students to write letters based on an instructor-provided prompt. Students enrolled in the two control course sections received both written individual feedback and written group feedback from the instructor. Group feedback focused on general comments regarding weekly assignments, upcoming assignments, and helpful tips for successfully completing those assignments. Individual feedback focused more specifically on grammatical, technical, and content issues related to individual assignment submissions. The researchers did not identify the course sections’ instructor/instructors.

The study’s experimental group consisted of two online course sections of the same business communication course ($n = 50$) at Central Washington University offered during Spring 2013 quarter. Students enrolled in the two experimental course sections received written individual feedback and audio group feedback from the instructor. The researchers noted that the content of the audio group feedback received by the experimental group was identical to the content of the written group feedback received by
the control group. Again, the researchers did not identify the course sections’
instructor/instructors.

After the conclusion of each term, the researchers examined student evaluation
scores using the following four measures: 1. Instructor seemed genuinely concerned with
whether students learned, 2. Instructor was actively engaged in the class, 3. Instructor
provided useful feedback on student work, and 4. Instructor provided timely feedback on
student progress. Researchers analyzed the results of students’ evaluation scores using a
one-tailed $t$-test to identify differences in student satisfaction levels between the control
and experimental groups. Of the four measures, only instructor’s interest in student
learning showed a statistically significant difference ($p = .04$) between the two online
feedback groups.

Although only one measure showed a statistically significant difference between
the treatment and the control groups, the researchers failed to reject the null hypothesis
and concluded audio feedback, group assignment preview, and group feedback may
enhance an instructor’s social presence and may positively impact students’ learning in
the online environment. The researchers suggested that audio feedback provides students
with important verbal cues that help them feel a more personal connection to the
instructor in the online environment. The researchers further suggested that, perhaps, the
difference between audio group feedback and written group feedback may not have been
different enough to impact students’ perceptions regarding the measures of instructor
engagement, timely feedback, and useful feedback.

The researchers suggested future research studies should include a larger sample
size comprised of several online course sections taught by different instructors. They
further suggested a study comparing audio feedback versus video feedback might also provide useful results in terms of greater instructor social presence. Other areas of study might focus on the time required for an instructor to provide audio feedback versus written feedback and grade differences between groups who received individual audio feedback versus individual verbal feedback. The researchers suggested these areas of inquiry may reveal the means by which students are more apt to apply instructor feedback.

While audio feedback, group assignment preview, and group feedback may enhance an instructor’s social presence and, therefore, positively impact students’ learning in the online environment, Mathieson and Leafman (2014) assert that the challenges involved in creating a successful online teaching and learning environment are different than those found in the face-to-face classroom. However, they note that this observed difference is neither better nor worse than the challenges faced by instructors in the traditional classroom environment.

While student perceptions of instructor social presence have been addressed in the literature, the researchers observed an examination of instructors’ perceptions of social presence in the online environment had not been well researched. In response, the researchers conducted a study using Cronbach’s alpha, a Mann-Whitney $U$ test, and Chi-square tests to examine and compare students’ and instructors’ perceptions of social presence within the online course environment, the importance placed on social communication in the online learning process, and the willingness of students and instructors to move beyond the online course environment to incorporate a social media tool outside of the established learning management system (LMS).
Using email messages as their formal source of communication, the researchers contacted all current students \((N = 2,715)\) and instructors \((N = 172)\) participating in exclusively or primarily online programs from a health sciences university comprised of two osteopathic medical schools, two dental schools, a school of health management, and a school of health sciences. The university offers eight exclusively online degree programs and two primarily online degree programs. The researchers invited the students and instructors to participate in an anonymous, cross-sectional survey administered via a professional survey software tool. The link to the survey instrument was sent to students and instructors by each program director.

The study’s sample size consisted of 282 students and 92 instructors. This represented a 10% and a 54% response rate, respectively. The researchers identified the university’s student population as being diverse in age (ranging from early 20s to more than 65), representing entry-level to post-professional status, residential, and exclusively online students.

The survey instrument consisted of items requesting demographic characteristics (age, sex, family status, race/ethnicity, hours worked per week) and 15 items gleaned from two previously validated instruments used to measure perceptions of social presence in the LMS. The survey also asked respondents to identify the frequency of their social communication with other students and their instructors (very often, often, sometimes, rarely, never). Finally, respondents were asked if they would use a social media tool if one were made available for their use outside of the formal online course environment (strongly agree, agree, uncertain, disagree, strongly disagree).
The researchers calculated an overall measure of social presence by averaging the social presence items for each participant. Cronbach’s alpha for the 15 social presence items was .88 for instructors and .87 for students. However, noting that social presence scores were not normally distributed, the researchers used medians and interquartile ranges (IQR) to summarize perceptions of social presence. To compare perceptions of social presence between students and instructors, the researchers used a Mann-Whitney U test. The researchers used two-tailed, Chi-square tests with the alpha set at .05 to compare student and instructor frequency of social communication with other course participants.

The researchers noted diversity in terms of student and instructor age, sex, family status, and race/ethnicity. The median hours worked per week among students was 40 hours indicating that they maintained full-time employment during their studies. In addition, the researchers found both students and instructors perceived high levels of social presence within the online course environment \( (m = 3.60, IQR = 3.07) \). For example, in response to specific questions, 86% of the respondents indicated that they felt comfortable interacting with other course participants in the LMS, 77% agreed that instructors moderated discussions in the online course environment, and 83% indicated that other course participants in the online environment acknowledged their point of view. While the aforementioned percentages indicated positive perceptions of social presence, only 38% of the respondents felt that the online course environment served as an excellent medium for social interaction and 65% felt that discussions conducted in the online course environment were more impersonal than discussions conducted in a face-to-face course setting.
When comparing students’ and instructors’ perceptions, the researchers identified statistically significant difference between students’ and instructors’ perceptions on six social presence items:

1. I feel comfortable disagreeing with other course participants while still maintaining a sense of trust (students, 66.8%; faculty, 83.5%; \( p = .002 \)),

2. Messages [online] are impersonal (students, 38.2%; faculty 22.0%; \( p = .005 \)),

3. I feel comfortable interacting with other course participants [online] (students, 84.2%; faculty, 94.4%; \( p = 013 \)),

4. I feel comfortable conversing through [the online] text-based medium (students 66.1%; faculty 79.3%; \( p = .017 \)),

5. I feel comfortable participating in [online] discussions (students, 85.1%; faculty, 93.5%; \( p = .037 \)), and

6. I am able to form distinct individual impressions of other participants [in the online course environment] (students, 60.9%; faculty, 72.5%; \( p = .044 \)) (pp. 9-10).

Furthermore, more than one-third of the students and the instructors indicated a level of comfort using social media. This prompted the researchers to suggest possible implications for increasing the use of social media in online courses.

The researchers observed differences in patterns of social communication between students and instructors. While two-thirds of instructors indicated they engaged in social communication with students often or very often, only one-quarter of students indicated that they engaged in social communication with other students often or very often. This pattern followed for 34% of instructors who indicated that they engaged in
social communication with other instructors often or very often compared with 18% of students who indicated that they engaged in social communication with instructors often or very often.

The researchers noted that more students indicated having less time available on a daily basis for social connections with other students and instructors than did instructors (7% students; 1% instructors; \( p = .009 \)). In contrast, one-fourth of instructors indicated having an hour or more daily for social connections, compared to 11% of students. More than 90% of both groups indicated having some time available for social interactions with students and instructors on a daily basis.

As previously noted, the researchers were interested in learning more about students’ and instructors’ attitudes regarding the use of social media outside of the online course environment. A slightly higher percentage of students (39%) than instructors (34%) indicated a willingness to utilize a social media tool outside of the online course environment with less than 25% of students and instructors indicating unwillingness to engage in social media. More than one-third of both groups indicated they felt uncertain about the use of social media due to a lack of specific knowledge regarding the type of social media tool, ease of accessibility, and perceived value.

As indicated by the findings, the researchers stressed the integral role that communication plays in the creation of a successful online learning environment. However, they recognized that the online setting creates communication-based challenges that are not experienced by students and faculty in a face-to-face setting. The researchers believed the differences between students’ and instructors’ perceptions regarding social
presence have definite implications for the future development of online courses and the
instructors who teach those courses.

The researchers suggested that the significantly lower levels of social presence
reported by students compared to instructors merits further investigation. The researchers
also noted that students’ apparent lack of comfort in terms of engaging in discussions and
disagreeing with their peers requires serious consideration. While instructors enjoy a
sense of control in terms of their interactions within the online course environment,
students often felt intimidated by the impersonal nature of the online environment. In
response to this finding, the researchers suggested it may be prudent to ensure instructors
are cognizant of this issue so they may work to establish an open atmosphere that is
empowering for students and encourages engagement and interaction. Social media may
potentially serve as a beneficial tool outside of the formal online course environment for
increasing social presence. As previously noted, the study’s findings indicated that more
than one-third of the students and instructors were willing to utilize a social media tool as
an enhancement to the online course environment. However, the researchers caution that
faculty and course developers must consider not only student characteristics (ex: age and
experience with technology), but also the important issues surrounding privacy, ethics,
and legality.

The researchers examined students’ and instructors’ attitudes regarding the use of
social media tools outside of the LMS. As the study’s findings revealed, students, more
than instructors, indicated that they did not necessarily believe they had a great deal of
excess time to devote to the use of a social media tool outside of the online course
environment. For this reason, the researchers cautioned against implementing a required
social media tool without first fully assessing students’ time availability, their desire to utilize such a tool, as well as the associated privacy and legal ramifications of using such a tool in the online academic setting.

Teaching a visual art course in a fully online setting presents a great deal of challenges for instructors and students. Visual art studies require the examination of artwork and discussions focusing on both formal compositional elements and contextual aspects regarding historical place. For these reasons, many researchers and institutions have largely dismissed teaching visual art courses in the online setting (Alter, 2014). However, as advances in online course delivery have progressed, online visual art studies have begun to expand and become a focus of research. Alter (2014), a visual arts education lecturer at the University of New England in Australia, developed an online visual arts education course and conducted a small-scale qualitative study investigating the attitudes towards online learning expressed by a group of students enrolled in a primary undergraduate unit. The researcher noted the study was prompted by the university’s decision to discontinue the supplemental face-to-face class sessions that had previously been available for students enrolled in the online program. As a result, the researcher wished to investigate the quality of student engagement in the new solely online visual arts course compared to the former online course with supplementary face-to-face instruction.

The study’s participants were drawn from 180 bachelor of primary education students enrolled in a semester-long, first-year, undergraduate primary teacher education unit. A number of students studying in the unit were preparing for primary teaching and had little or no background in the visual arts. Approximately two-thirds of the students
had not studied visual arts beyond eighth grade in secondary school. The majority of these online students were older and had been away from education for a number of years. The researcher suggested that the participants’ lack of visual arts training may have negatively impacted their ability to fully understand the course content and this lack of training may, in turn, serve as a limitation to the study’s findings.

The researcher set up an online discussion forum in which she asked students to share their perceptions of online course delivery in general and, more specifically, their perceptions of the online visual arts course in terms of organization and the support provided to them. The students were asked to respond to the following questions:

1. Do you as a distance education student perceive yourself as being disadvantaged compared to other students completing the same unit with face-to-face classes? If so, what might be the areas of disadvantage?

2. When you enrolled in this visual arts unit, did you have any thoughts as to how visual arts practice/learning may be taught effectively in a purely online environment?

3. After some weeks of doing distance study what are some of the challenges you face with this kind of learning structure and environment?

4. How important do you think it is to incorporate visual arts practice – for example, samples of artworks, artists practice samples, self directed practical tasks – when you are doing an online education unit?

5. Have you developed any personal strategies (over the time you have been doing distance studies) that assist you in dealing with online learning? (p. 57).
Of the 180 students participating in the study, only 27 students (15%) responded to the set of questions posted in the online discussion forum.

The researcher analyzed the students’ responses and developed codes for organizing the data. The researcher identified two distinct types of responses – those that provided a broad perspective of online learning experiences and those that addressed specific aspects of the visual arts curriculum course delivery. The majority of the students identified face-to-face instruction as being a more ideal learning environment; however, they noted that the online setting provided greater convenience for their life circumstances. Students most commonly felt face-to-face students experienced advantages in terms of asking many questions verbally, getting immediate answers to their questions, establishing a sense of identity as a college student, establishing a physical sense of belonging to a group, engaging directly with the works of art being discussed, gaining motivation through direct interactions, sharing the learning experience, and engaging in individual interaction with their instructor at the end of class.

The researcher noted students most frequently expressed concerns regarding the difficulty they experienced establishing relationships with their classmates and instructors. Students identified this issue as being fundamental to their ability to maintain motivation in the course. The researcher noted that two students had independently developed friendships with their classmates and established a face-to-face study group that met on a regular basis. These students expressed greater levels of confidence and motivation with their studies. Other students identified their participation in online discussion forums, bulletin boards, and chat rooms as being helpful in terms of giving them a sense of belonging to the class group. The students seemed to agree that their
learning experience was enhanced by lectures presented as short podcasts. The podcasts gave them a sense that their instructor was an actual person and it freed them from excessive amounts of onscreen reading. Students also commented favorably regarding the embedded multimedia presentations that enhanced the written course curriculum.

The researcher noted the majority of student respondents had not given a great deal of thought to how effectively a visual arts course could be taught in a fully online setting prior to their enrollment in the course. Only one student stated that a visual arts course should not be taught online. The majority of the students seemed to accept their study of art online. However, two students expressed disappointment that they had to view art online and weren’t able to discuss it synchronously with their instructor and classmates. The majority of the students commented favorably regarding the course’s inclusion of examples of artworks, artists’ practice samples, guided practical tasks, and virtual exhibitions of artifacts.

Based on these findings, the researcher concluded the success of online teaching and learning is rooted in the attitudes of both the instructors and students, especially in terms of the subject and the technology used to deliver content knowledge and skills to students. While noting instructors must expand their teaching approaches and maintain flexibility when teaching in a fully online setting, the researcher suggested future study should consider the benefits of a blended face-to-face and online approach to visual arts course delivery. This may prove to be the most effective manner in which to present course content to the greatest advantage of students.

A similar study with a visual art focus was conducted by Allen, Wright, and Innes (2014). Their qualitative study took place over a two-year period at the University of
Tasmania, an urban Australian university. The researchers framed their study with the following research question: “What perceptions do pre-service visual art teachers hold of their learning in a fully online learning environment?” (p. 5).

The study’s sample ($N = 10$) was comprised of one cohort of students studying in a Visual Art pre-service teacher education program in the Faculty of Education’s graduate level entry MTeach, a two-year course of study in which Visual Art students complete three discipline-specific units of study over three of the four course semesters. The researchers explained that due to the small number of students enrolled in the program, the MTeach program is only offered to Visual Art students in an online format. The sample’s students were invited to participate in the study via an email message with an attached invitation letter, an information sheet, and an informed consent form. The researchers worked to avoid the risk of bias or perceived coercion by employing research assistants to help with the two-stage data collection process.

The study’s first stage of data collection consisted of a 10-item questionnaire administered to participants online. Of the 10 questions, nine were open-ended and one used a five-point Likert scale. Of the ten students invited to participate, nine completed the online questionnaire. A graduate student obscured individual student’s identities, coded the data, and forwarded the data to the researchers for analysis.

For the study’s second stage of data collection, the researchers invited the nine students who completed the initial 10-question online questionnaire to participate in a semi-structured interview intended to glean more in-depth responses regarding students’ perceptions of their learning experiences in the fully online setting. Of the nine students, six accepted the invitation to participate in the interview. A research assistant conducted
all interviews. Four interviews were conducted via telephone and two interviews were conducted face-to-face. Anonymity was ensured through the use of the coded identifiers established for each participant by the research assistant during stage one data collection. The researchers noted that the method of stage one questionnaire distribution made it impossible for them to accurately match questionnaire and interview data for the six interview participants.

Following data collection, the researchers conducted a three-phase data analysis. First, the nine open-ended responses to the stage-one questionnaire were categorically analyzed by each of the three researchers who read through the data and assigned codes independently. The researchers then compared and contrasted their coding and refined the codes as necessary. Next, the researchers analyzed questionnaire responses to the one Likert scale question and developed a set of percentage ratings for those responses. Second, the researchers employed the same data analysis method to analyze data gleaned from stage-two participants’ interview responses. Third, the researchers looked for similarities between the themes generated from the two sets of qualitative data and then reviewed the whole data set once again to ensure they had accurately captured commonalities between themes and relationships among the themes.

The researchers identified the limitations associated with their study, noting the possibility of participant bias in terms of what they valued most from the specific program. The researchers suggested the fact that the participants provided predominantly positive responses and very few negative responses might indicate the potential for this bias. The researchers noted the measures they took to avoid the risk of bias or perceived coercion and further stressed they employed due diligence to ensure the authenticity of
their findings. The researchers also identified another limitation noting the research sample cannot be representative of all online students within their institution and a concern that objectivity may have been impeded by one of the researcher’s familiarity with the research sample. Finally, the researchers identified the study’s small sample size as yet another limitation. As previously noted, enrollment within the visual arts area of the pre-service teacher education courses at their institution had always been relatively low in comparison to other disciplines.

After analysis of the two qualitative data sets, the researchers found students’ responses showed a strong level of support for the assessment utilized in the visual arts program. Students reported they found the tasks to be helpful and relevant in terms of their future studies. The researchers noted that eight-of-the-nine students expressed feelings of initial apprehension regarding the course’s online format. A lack of experience with online technology, preference for face-to-face instruction, uncertainty about visual art course content served as the most common concerns expressed by students. However, the researchers found that by the time students reached the final unit, six-of-the-nine students reported they were no longer apprehensive about their online course experience and believed the course served as an excellent example of a well organized and developed learning experience. The researchers noted one participant expressed continuing concern regarding online learning, but did state the course did not exhibit many of the problems the individual had encountered while enrolled in other online courses. The researchers believe the students’ highly positive perspectives of their online experience may stem from the regular feedback and interaction they received from the online instructors.
Through their analysis of the coded data, the researchers identified three broad themes: 1. Collaborative learning and teaching, 2. Nature, structure, and sequence of tasks, and 3. Workplace readiness. In regard to collaborative learning and teaching, the students noted their interaction with others enabled them to gain a deeper understanding of important learning objectives. Students cited interactions with their classmates as beneficial in helping them gain new perspectives and becoming more open to new ways of seeing. Students seemed to appreciate the high degree of reflective practice associated with the online course’s collaborative assessment tasks. Students also commented favorably about the positive nature of the feedback they received from the instructor. The researchers noted the importance students consistently placed on timely, purposeful, and substantive instructor feedback. According to the student participants, this feedback motivated them to be active learners and helped them feel connected to the course. In regard to nature, structure, and sequence of tasks, the researchers noted a general consensus among student participants that the multi-layered assessments challenged them and provided a well-rounded learning experience. Four-of-six students indicated the assessment tasks provided structure and focus for their learning. Students also recognized the developing complexity of assessment tasks as they moved through their studies allowed them to build on their knowledge throughout the term.

The researchers believed the students’ observations confirmed the course’s deep learning structure. In regard to workplace readiness, the researchers noted the importance of this task for pre-service teaching students, especially in regard to Australia’s accreditation authorities who require increasing amounts of demonstrable evidence that program graduates have attained the requisite knowledge and skills to begin teaching as
soon as they enter the workforce. Student participants’ comments clearly recognized the importance of the authentic learning experiences they encountered in the online course and the manner in which those experiences would prepare them for successful workplace entry. Students also expressed appreciation for the aspects of the course that encouraged the development of their creativity and they identified the useful balance of creativity and scholarly research that they encountered in the online course.

The researchers readily acknowledged the research base that currently exists for evaluating students’ perspectives of online visual arts courses is limited and they believed their study provides strong student support for the online assessment tasks embedded in their visual arts program. However, the researchers also recognized the limitations involved with such a small sample size. The researchers concluded that the identification of the three key reasons why students viewed the online course so favorably contributes to our understanding of online students’ perceptions and expectations regarding the importance of collaborative learning and teaching, the nature, structure, and sequencing of tasks to engage students in deeper levels of learning and engagement, and the solid, practical application and fostered creative practice that prepared students well for entry into the workplace.

As the literature has shown, online education appears to be roughly equivalent to face-to-face instruction; however, most studies possess relatively small sample sizes. Attempting to overcome this limitation using ordinary least squares regression (OLS) and a mean-centered approach to overcome multicollinearity between first order variables and their respective interactions, Cavanaugh and Jacquemin (2015) utilized a dataset of more than 5000 courses taught by more than 100 faculty members over the duration of ten
academic terms at a large, public, four-year Midwestern university to compare grade-based learning outcomes between online and face-to-face courses on a grander scale while controlling for demographic and academic corollaries.

The study’s sample consisted of every course taught at the institution over a three-year duration in both online and face-to-face formats at least once by the same faculty member. Information gleaned from 140,444 students enrolled in 6,012 courses between the years 2010 and 2013. Of the courses, 1,997 were offered online and 4,015 were offered in face-to-face settings.

Despite maintaining similar total credit hour enrollments, mean student course attributes revealed students enrolled in online courses tended to be older, female, non-minority, and have higher academic grade point averages (GPAs). Using OLS, all independent variables (course format, student GPA, student credit hours, gender, minority, age), with the exception of minority status, were found to relate to course GPA. The researchers’ initial model used to predict student grades as a function of course format was positive and highly significant \( p = 0.020 \), explaining approximately 39% of the variability in course performance. The researchers suggested this result indicates that students enrolled in online courses may receive a grade point average that is 0.39 points higher than students enrolled in face-to-face courses.

The final saturated model indicated the majority of course grade variation might be attributed to a student’s GPA. The researchers suggested it is logical to assume that students with higher GPAs tend to earn higher grades in courses – regardless of the course delivery format. According to the final saturated model, interaction between course type and student GPA indicated that students with higher GPAs tend to
preferentially select face-to-face courses and this combination results in higher course grades. The researchers noted the overall effect of course delivery format in the final saturated model accounted for less than 0.07 points of variation in course GPA.

While the degree of difference existing between students’ grades in online and face-to-face courses is small, the researchers noted implications for advising and student success. While students with higher GPAs will perform better in an online format, students who struggle academically in a face-to-face course will also struggle in an online course. The researchers suggested future studies should incorporate additional academic and demographic variables to further expand the scope of inquiry. The researchers also noted limitations in regard to the fact the sample was drawn from a single institution and only included courses taught in both the online and face-to-face formats. The researchers suggested future studies should explore additional universities in the United States and abroad. The researchers also suggested separating courses by discipline to examine intra-institutional variation in grade performance.

Summary

Chapter II provided a chronological review of the literature focusing on research studies conducted in higher education settings comparing face-to-face and online instruction. The following chapter describes the study’s research methodology.
CHAPTER III
METHODOLOGY

This chapter provides a detailed description of the study’s research methodology. It includes research design, sample, context, procedure, instrumentation, data collection, data analysis, reliability, and validity.

Research Design

Much of the extant literature focusing on online learning tends to be more qualitative in nature (Kerr, Rynearson, & Kerr, 2006). While qualitative research serves as an effective means by which to gain insight into individual perceptions (Denzin & Lincoln, 2000) and it may, perhaps, serve as an appropriate research method for further studies, this study examined online learning from the broader perspective associated with quantitative research methods (Krathwohl, 1998; Gay, Mills, & Airasian, 2006).

This study utilized experimental analysis with a quasi-experimental design to compare knowledge achievement of students enrolled in online vs. face-to-face courses. More specifically, a design in which intact groups of students enrolled in online and traditional face-to-face introductory art appreciation course sections offered at a large public Midwestern, two-year, urban community college were studied.

In quasi-experimental studies, the use of pre-test and post-test instruments allows the researcher to measure scores before treatment and after treatment (Heiman, 2006;
Krathwohl, 1998). To this end, the researcher developed identical pre-test and post-test instruments to measure online and traditional face-to-face introductory art appreciation students’ knowledge of visual art at the beginning of the academic semester, prior to receiving any introduction to course content, and, again, at the end of the academic semester, after completing a full course of study.

Sample

The study’s sample ($N = 227$) was drawn from students enrolled in introductory art appreciation course sections. Along with music appreciation and theatre appreciation, the art appreciation course serves as an arts and humanities elective for many of the college’s degree programs. This introductory art appreciation course also serves as an Ohio Transfer Module course and is guaranteed to transfer to any of Ohio’s public institutions for arts and humanities credit. As a result, students enrolling in the introductory art appreciation course represent a broad range of majors and may also approximate the diversity, in terms of age, ethnicity, and college-readiness, found in the college’s greater student population. Of the college’s student population, 43.04% of the students are male and 56.95% of the students are female. A majority of the students, 60.94%, attend college on a part-time basis. Minority students comprise 23.30% of the total student population (National Center for Education Statistics, 2013, Table 312.20).

To achieve an adequate sample size, the researcher conducted the study over the course of three academic semesters (spring, summer, fall) in 2014. Each semester, the researcher used a convenience sample that included all students enrolled in two online introductory art appreciation course sections and two traditional face-to-face introductory art appreciation course sections. Over the course of the spring, summer, and fall
semesters, the researcher taught six online course sections with a total of 123 students and six face-to-face course sections with a total of 104 students. It should be further noted that the researcher designed and served as the course developer for the online introductory art appreciation master course. Each semester, the researcher maintains the online course master shell, revises course content, and assigns faculty members to teach each of the offered course sections.

The college’s online introductory art appreciation course sections were facilitated using the ANGEL learning management system. Introductory art appreciation online course sections have an enrollment capacity of 25 students per course section. The face-to-face art appreciation course sections are conducted in a variety of multimedia-equipped lecture halls located at the college’s urban campus and at its four satellite learning centers. All face-to-face course sections included in the research study were conducted at the college’s urban campus. In contrast to the online course sections, face-to-face introductory art appreciation courses have a slightly higher enrollment capacity of 35 students per course section.

**Context**

With an enrollment of 32,000 students, the two-year community college studied is comprised of a 55-acre comprehensive campus located in an urban setting with four satellite learning centers located in the surrounding suburban and rural communities. The college is composed of four academic divisions: Business and Public Services; Life and Health Sciences; Science, Mathematics, and Engineering; Liberal Arts, Communication, and Social Sciences. In addition to extensive remediation programs, the college also offers a strong honors program that attracts “solid students, who are eager to take
advantage of the low tuition for two years before moving on to a four-year college” (Greenhouse, 2009, para. 9). Accredited by the Higher Learning Commission, the college is a member of the North Central Association and the Ohio Association of Colleges. The institution is recognized by the League for Innovation in the Community College as a Vanguard Learning College. This distinction is awarded by the League to the top 12 two-year learner-centered institutions in North America. The New York Times reported this institution as “one of the best [community] colleges in the nation” (Greenhouse, 2009, para. 7). The institution offers 223 degree and certificate programs and serves degree/certificate-seeking students, university parallel program students, international students, and distance learning students.

Enrolling almost 6,000 unique students, the college’s distance learning (eLearning) division serves as the largest provider of online education in the state of Ohio and it offers more than 200 fully online courses – including fully online labs for Astronomy, Anatomy, and Physiology. Fully online Associate Degree programs are offered in Business Administration (Associate of Science), Business Management (Associate of Applied Science), Business Management/Supply Chain Management (Associate of Applied Science), Communication Studies (Associate of Arts), Health Information Management (Associate of Applied Science), History (Associate of Arts), Liberal Arts and Sciences (Associate of Arts), and Psychology (Associate of Arts). Fully online certificate programs are offered in Business Management, Supervisory Skills, and Supply Chain Management. Fully online short-term certificate programs are offered in Activity Programming, Business Transfer, Medical Coding, Pharmacy Technician, and Software Application for the Professional. Students enrolling in face-to-face and online
courses must maintain at least a 2.0 grade point average to remain in good academic standing.

The college boasts an outstanding distance learning (eLearning) division consisting of three departments that provide support for its online programs: Programs and Support, Learning Technology Support, Web Course Development. The Programs and Support Department provides educational and technical support for students enrolled in online courses and programs. The Learning Technology Department provides faculty and staff with training for the use of online learning technology. The Web Course Development Team provides faculty with technical and design support for the development of online courses.

The eLearning Division’s award-winning quality is evidenced by its receipt of an Instructional Technology Council (ITC) “Award for Excellence in Distance Education” (2005), an Ohio Learning Network (OLN) “Best Practices in Student Services Award” (2005), an ANGEL Impact Award for Exemplary ANGEL Program (2007), an ITC Outstanding “eLearning Program Award” (2011), and a Bellwether Award for “Pioneering Online Science Labs” (2011).

The eLearning Division’s online courses are designed and revised with a strict focus on Quality Matters (QM) Rubric Standards. Quality Matters is a peer-review process that certifies the overall quality of online courses (Quality, 2010). Courses submitted for formal QM peer review are evaluated in terms of Course Overview and Introduction, Learning Objectives, Assessment and Measurement, Resources and Materials, Learner Engagement, Course Technology, Learner Support, and Accessibility. To be awarded QM certification, a course must meet all of the rubric’s 21 essential 3-
point review standards and earn a minimum of 81 out of 95 points (85%). In 2010, the eLearning Division submitted three of the college’s established online courses, Introduction to Word, PowerPoint and Excel, English Composition I, and Interpersonal Communication, for formal QM peer review. Subsequently, each of the aforementioned online courses received QM certification. This process was completed by the distance learning division as a check to ensure the college’s internal reviews of its online course offerings aligned with those conducted by external QM reviewers. Since that time, all of the college’s online courses have been developed or revised in compliance with QM rubric standards and internally reviewed to ensure compliance prior to going live.

Faculty content experts working to develop new online courses or to revise existing online courses receive strong support from the eLearning Division’s comprehensive Web Course Development Team. The Web Course Development Team consists of one full-time Web Course Development Manager, four Instructional Designers, five Instructional Technologists, and one Graphics Designer. This support network ensures the college’s online course offerings adhere to QM Rubric Standards and utilize available technology to the fullest extent as a means to encourage active student engagement, retention, and academic success.

**Procedure and Instrumentation**

For the purposes of this study, delivery method (online or face-to-face) served as the study’s independent variable and student learning achievement served as the dependent variable.
Course Context

The introductory art appreciation course in question emphasizes the language of art and exposes students to many different art forms while challenging them to think critically about the art they encounter. To these ends, the course examines the question, “What is Art?” and explores the various impulses behind its creation. Additionally, students are exposed to a study of aesthetics, general styles, iconography, the themes and purposes of art, as well as the formal analysis of works of art through the use of the visual elements and the principles of design.

Pre-Test and Post-Test Instruments

The identical pre-test and post-test instruments were designed by the researcher and consisted of 40 multiple-choice and true/false questions (Appendix A). The researcher drew questions from the three established art appreciation examinations (initial exam, mid-term exam, final exam) that she developed based on the college-approved master course syllabus and the Art Department’s approved course text. From these examinations, the researcher selected questions that corresponded to the art appreciation course outcomes as listed on the master course syllabus. The specific course outcomes associated with the introductory art appreciation course focus on the student’s ability to explain the organizing principles of art, conduct knowledgeable analysis of artwork, discuss various themes and purposes of art as well as understand the motivations for its creation. Students must also demonstrate the ability to knowledgeably utilize terminology for the formal evaluation of art, identify major art periods and art styles, compare and contrast the working methods of artists and interpret iconography (visual images and symbols).
Pre-test and post-test questions were divided into four sections that reflected the course outcomes, or competencies, students are expected to demonstrate upon completion of the course. Each section consisted of 10 questions. The instruments’ first section focused on the Themes and Purposes of Art and required students to demonstrate their knowledge of the various themes and purposes of art as well as the motivations for its creation. The instruments’ second section focused on the Organizing Principles of Art and required students to demonstrate their knowledge of the visual elements and the principles of design. The instruments’ third section focused on Iconography and required students to demonstrate their understanding of the manner in which the images and symbols of various cultures and historical periods are used in art. The instruments’ fourth section focused on various art media (drawing, painting, sculpture) and required students to recognize and differentiate between various art media used throughout history and describe the steps used in the creation of a work of art. Participants were instructed to select only one answer per question.

Data Collection

Ethical Considerations

To ensure the ethical protection of human subjects, the researcher applied to the Institutional Review Boards of the two-year community college that would serve as the site for the research study and the University of Dayton. After reviewing the researcher’s application and determining that the method of data collection proposed was within the parameters of testing that would occur in a typical course, both Institutional Review Boards granted the researcher permission to conduct the research study and to collect the necessary data (Appendix B).
The researcher ensured individual student participant’s identities would remain anonymous during the course of the data collection process. The researcher assigned numbers as identifiers for each student participant. This practice maintained ethical confidentiality throughout the data collection process and beyond.

**Pre-Test and Post-Test Instruments**

During the first class meeting of each term, prior to presenting any course-related content, the researcher administered the paper-based pre-test instrument to students enrolled in the face-to-face course sections. The researcher developed the electronic pre-test instruments and made them available, on the first day of each term, for students enrolled in the online course sections. The researcher provided online students with explicit instructions to complete the pre-test assessment prior to completing any study of course-related content. Both online and face-to-face students were given 45 minutes to complete the test instruments. The researcher manually graded paper-based pre-test instruments for students enrolled in the face-to-face course sections. Electronic pre-test instruments completed by online students were graded automatically upon completion by the ANGEL learning management system using a researcher-developed testing key.

In contrast to face-to-face courses that meet in a lecture hall on campus during specific days and times, the online course sections open for student access on the first day of each term and allow students the freedom to work asynchronously in the online course environment. Students may enroll in online courses up to two days after the start of the academic term. Consequently, the researcher made the online pre-test instrument available for a limited timeframe during the first week of each term. This ensured that
students who enrolled after the start of the semester were given an equal opportunity to complete the pre-test instrument.

During the final class meeting of each term, the researcher administered the paper-based post-test instrument to students enrolled in the fact-to-face course sections. The researcher administered the electronic post-test instruments to students enrolled in online course sections during the final week of the term. The researcher manually graded paper-based post-test instruments for students enrolled in the face-to-face course sections. Electronic post-test instruments completed by online students were graded automatically upon completion by the ANGEL learning management system using a researcher-developed testing key.

**Data Analysis**

Students’ pre-test and post-test scores from the six online and six face-to-face introductory art appreciation course sections were entered into the Statistical Package for the Social Sciences (SPSS) for both descriptive and inferential statistical analysis. Analysis of Covariance (ANCOVA) was used to control for the effects of the pre-test covariate (Allen, 1997). The use of ANCOVA removed pre-existing differences in students’ pre-test knowledge between groups (Lowry, 1999-2011) and allowed the researcher to effectively compare post-test scores for students enrolled in face-to-face and online introductory art appreciation course sections and assess whether or not the means of online students’ post-test scores showed statistically significant difference from the means of face-to-face students’ post-test scores. Chi-square was used to examine categorical differences such as gender, number of terms of study completed, and major.
Reliability

To reduce measurement error, questions selected by the researcher for inclusion in the identical 40-question pre-test and post-test instruments were drawn from the three established art appreciation examinations (initial exam, mid-term exam, final exam) that the researcher developed based on the college’s master course syllabus and the approved course textbook. The researcher has administered various iterations of these examinations to students enrolled in her introductory art appreciation courses since 1998.

After completing the grading process for each class’s exam, the researcher reviewed and compared students’ responses to identify possible patterns of incorrect answers that might suggest a need for greater clarity in terms of question content or structure. Following the return of graded exams to students, the researcher solicited feedback from students asking them to share their thoughts regarding exam question structure, clarity, and content. Additionally, the researcher provided copies of her art appreciation examinations (initial exam, mid-term, final exam) to adjunct faculty for use in their courses and solicited feedback from these faculty regarding exam question structure, clarity, and content. This consistent use of student and peer feedback informed the researcher’s ongoing exam question revision process. As a result of this practice, the questions selected by the researcher for inclusion in the pre-test and post-test instruments had been used for formal student evaluation, tested, and refined over the course of 16 years.

The researcher was careful to ensure the questions selected for inclusion in the pre-test and post-test instruments accurately reflected the information that would be presented to face-to-face and online students in the course textbook, discussed during
face-to-face course lecture presentations, and presented to online students in course
lesson modules. The researcher selected questions that specifically reflected the course
outcomes, or competencies, students are expected to demonstrate upon completion of the
course.

Because the researcher taught all of the study’s face-to-face and online course
sections, graded all face-to-face paper-based pre-test and post-test instruments, and
designed the testing keys for online pre-test and post-test instruments inter-rater
reliability did not pose a threat during the course of the study.

Internal and External Validity

Writing Activities and Discussions

The researcher designed both the face-to-face and online courses. Because of this,
care was given to assure that the writing activity prompts, discussion groups, and
expectations were identical for both face-to-face and online courses. Students enrolled in
the face-to-face course sections completed writing activity prompts independently in the
classroom and then engaged in small group discussion with three additional classmates.
Each student participating in the in-class small group discussions shared his or her
response to the writing activity prompt and received feedback from group members. This
process replicated the writing activities and threaded discussions completed by students
in the online course sections.

Pre-Test and Post-Test Instruments

After carefully studying the art appreciation examinations (initial exam, mid-term
exam, final exam) and selecting appropriate representative questions focusing on the
course outcomes, or competencies, students are expected to demonstrate upon completion
of the course, the researcher created the identical pre-test and post-test assessment instruments. To strengthen internal validity, the researcher maintained the instruments’ contents throughout the course of the study and did not make any further revisions to the instruments during the data collection process (Willett, Singer, & Martin, 1998).

**Convenience Sample**

Typical of quasi-experiments, student participants in the research study were not randomly assigned to specific art appreciation course sections by the researcher. Instead, students elected to enroll in the online or traditional face-to-face introductory art appreciation course sections of their choice. Consequently, the research study’s entire sample served as a convenience sample as opposed to a truly random sample of the college’s greater student population. As noted by Shadish, Cook, & Campbell (2002), the use of a convenience sample creates a selection limitation and the researcher acknowledges this lack of randomization could threaten the study’s internal validity. However, because students typically enroll in their courses without prior knowledge of their fellow classmates’ identities or majors, the enrollment process itself may, in a sense, provide a limited degree of randomization. Further, because the art appreciation course serves as an arts and humanities elective for many of the college’s degree programs, students enrolled in the art appreciation course represent a broad range of majors that may be somewhat more representative of the college’s greater student population.

**Summary**

Chapter III provided a detailed description of the study’s research methodology. It included discussion of the research design, sample, context, procedure, instrumentation, data collection, data analysis, reliability, and validity. The following chapter describes the
study’s results and examines each of the research questions to determine the study’s findings.
CHAPTER IV

RESULTS

The purpose of this quantitative quasi-experimental study was to determine if students enrolled in an online introductory art appreciation course learned the same content as their face-to-face counterparts. To achieve this goal, the researcher compared the level of knowledge attainment of course outcomes in four different content areas: the themes and purposes of art, the organizing principles of art, interpreting iconography, and differentiating between various art media (drawing, painting, sculpture).

The researcher analyzed the data in order to answer the following research questions:

- How does the overall profile (gender, major, number of terms completed) of students enrolled in a face-to-face art appreciation course differ from that of students enrolled in an online art appreciation course?
- How does the gender profile of students enrolled in both the face-to-face and the online sections of the art appreciation course compare to that of students enrolled in courses in the greater academic division and the college?
- What impact does course format (face-to-face vs. online) of an introductory art appreciation course have on student achievement of
course outcomes: familiarity with the themes and purposes of art, recognition of the organizing principles of art, ability to interpret iconography, and familiarity with various art media?

This chapter presents the research study findings.

Data Source and Sample

Over the course of three academic semesters (spring, summer, fall) during 2014, the researcher collected data in the form of pre-test and post-test instruments in face-to-face and online courses conducted at a large public Midwestern, two-year, urban community college. The study’s sample included students enrolled in introductory art appreciation course sections taught by the researcher. Each semester, the researcher used a convenience sample that included all students enrolled in two online introductory art appreciation course sections and two traditional face-to-face introductory course sections. During the spring, summer, and fall semesters, the researcher taught 12 course sections (six online, six face-to-face) with a total sample size of 227 (face-to-face $n = 104$, online $n = 123$). The researcher used institutional data to determine students’ gender, major, and the number of academic terms completed at the institution.

Descriptive Results

Face-to-face and online student demographic data included gender, major, and academic terms completed at the institution.

Gender

Of the 227 participants, 131 were female (57.71%) and 96 were male (42.29%) (Table 4.1). Of the 131 females, 80 (61.06%) chose the online format, while 43 (44.79%) of the 96 males elected online. In contrast, fewer females ($n = 51$, 38.93%) enrolled in
face-to-face course sections, while more male students ($n = 53, 55.21\%$) elected face-to-face.

This analysis of the gender-related data for students enrolled in the study’s face-to-face and online course sections addresses Research Question 1.

Table 4.1

**Gender by Course Format (Study Sample)**

<table>
<thead>
<tr>
<th>Format</th>
<th>Face-to-Face (%)</th>
<th>Online (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>51 (38.93)</td>
<td>80 (61.07)</td>
<td>131 (57.71)</td>
</tr>
<tr>
<td>Male</td>
<td>53 (55.21)</td>
<td>43 (44.79)</td>
<td>96 (42.29)</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>123</td>
<td>227</td>
</tr>
</tbody>
</table>

The researcher moved beyond the study’s face-to-face and online art appreciation course sections to examine student enrollment by gender during spring, summer, and fall semesters 2014 at the greater academic division level to determine if the percentages of male-to-female students enrolled in courses were similar to the percentages of male-to-female students enrolled in the study’s face-to-face and online course sections.

During spring 2014 semester, 13,663 students enrolled in courses in the Liberal Arts, Communication, and Social Sciences (LCS) Division. Of those students, 5,546 (40.59\%) were male and 8,117 (59.40\%) were female. During summer 2014 semester, 6,151 students enrolled in courses in the LCS division. Of those students, 2,344 (38.10\%) were male and 3,807 (61.89\%) were female. During fall 2014 semester, 13,879 students
enrolled in courses in the LCS division. Of those students, 5,470 (39.41%) were male and 8,409 (60.58%) were female. During spring, summer, and fall semesters combined, 33,693 students were enrolled in courses in the LCS Division. Of those students, 13,360 (39.65%) were male and 20,333 (60.34%) were female (Table 4.2).

Table 4.2

*LCS Division Level Student Profile (Gender)*

<table>
<thead>
<tr>
<th>Term</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
<td>Female (%)</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>5,546 (40.59)</td>
<td>8,117 (59.40)</td>
</tr>
<tr>
<td>Summer 2014</td>
<td>2,344 (38.10)</td>
<td>3,807 (61.89)</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>5,470 (39.41)</td>
<td>8,409 (60.58)</td>
</tr>
<tr>
<td>Total</td>
<td>13,360 (39.65)</td>
<td>20,333 (60.34)</td>
</tr>
</tbody>
</table>

An aggregate comparison of student profiles (gender) by division during the study period shows male students represented 39.65% \( (n = 13,360) \) of the total student enrollment \( (N = 33,693) \). In contrast, female students represented 60.34% \( (n = 20,333) \) of the division’s total student enrollment \( (N = 33,693) \). These aggregate division percentages (39.65% male; 60.34% female) are consistent with the percentages of students enrolled in the study’s online art appreciation course sections consisting of 34.95% male students \( (n = 43) \) and 65.04% female students \( (n = 80) \). In contrast to the aggregate division percentages (39.65% male; 60.34% female), students enrolled in the study’s face-to-face art appreciation course sections showed a more equal student
enrollment gender distribution with 50.96% male \((n = 53)\) and 49.03% female \((n = 51)\) (Table 4.3).

This analysis of the data focusing on gender at the greater academic division level addresses Research Question 2.

Table 4.3

*Aggregate Comparison of Student Profile (Gender) by Division vs. Art Appreciation Courses (Face-to-Face, Online)*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
</tr>
<tr>
<td>Division</td>
<td>13,360 (39.65)</td>
</tr>
<tr>
<td>Face-to-Face</td>
<td>53 (50.96)</td>
</tr>
<tr>
<td>Online</td>
<td>43 (34.95)</td>
</tr>
</tbody>
</table>

The researcher examined student enrollment by gender at the greater college level during spring, summer, and fall 2014 semesters to determine if the percentages of male-to-female students were similar to the percentages of male-to-female students enrolled in the study’s face-to-face and online course sections. During spring 2014 semester, 22,102 students enrolled in courses in the college (Business and Public Services; Life and Health Sciences; Science, Mathematics, and Engineering; Liberal Arts, Communication, and Social Sciences). Of those students, 9,663 (43.72%) were male and 12,439 (56.27%) were female. During summer 2014 semester, 14,184 students enrolled in courses in the college. Of those students, 6,053 (42.67%) were male and 8,131 (57.32%) were female. During fall 2014 semester, 21,953 students enrolled in courses in the college. Of those students, 9,205 (41.93%) were male and 12,748 (58.06%) were female. During spring,
summer, and fall semesters combined, 58,239 students were enrolled in the college. Of those students, 24,921 (42.79%) were male and 33,318 (57.20%) were female (Table 4.4).

Table 4.4

*Student Profile (Gender) by College*

<table>
<thead>
<tr>
<th>Term</th>
<th>Male (%)</th>
<th>Female (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2014</td>
<td>9,663 (43.72)</td>
<td>12,439 (56.27)</td>
<td>22,102</td>
</tr>
<tr>
<td>Summer 2014</td>
<td>6,053 (42.67)</td>
<td>8,131 (57.32)</td>
<td>14,184</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>9,205 (41.93)</td>
<td>12,748 (58.06)</td>
<td>21,953</td>
</tr>
<tr>
<td>Total</td>
<td>24,921 (42.79)</td>
<td>33,318 (57.20)</td>
<td>58,239</td>
</tr>
</tbody>
</table>

An aggregate comparison of the college’s student profile (gender) showed male students represented 42.79% \( (n = 24,921) \) of the total student enrollment \( (N = 58,239) \). Female students represented 57.20% \( (n = 33,318) \) of the college’s total student enrollment \( (N = 58,239) \). In contrast to the aggregate college percentages, students enrolled in the study’s face-to-face art appreciation courses showed a more equal gender distribution with a student enrollment of 50.96% male \( (n = 53) \) and 49.03% female \( (n = 51) \) (Table 4.5).

This analysis of the data focusing on gender at the college level addresses Research Question 2.
Table 4.5

*Aggregate Comparison of Student Profile (Gender) by College vs. Art Appreciation Courses (Face-to-Face, Online)*

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
<td>Female (%)</td>
</tr>
<tr>
<td>College</td>
<td>24,921 (42.79)</td>
<td>33,318 (57.20)</td>
</tr>
<tr>
<td>Face-to-Face</td>
<td>53 (50.96)</td>
<td>51 (49.03)</td>
</tr>
<tr>
<td>Online</td>
<td>43 (34.96)</td>
<td>80 (65.04)</td>
</tr>
</tbody>
</table>

**Major**

Students enrolled in the study’s introductory art appreciation course sections represented diverse majors (business, engineering, healthcare, liberal arts, mathematics, public services, science, social sciences) from the college’s four academic divisions (Business and Public Services; Life and Health Sciences; Science, Mathematics, and Engineering; Liberal Arts, Communication, and Social Sciences). Additionally, students identified as having undeclared majors and high school students attending college classes as part of the Post Secondary Education Option (PSEO) were represented in the sample.

As shown in Table 4.6, the majority of the students ($n = 179$) were undeclared, business, healthcare, and liberal arts majors. Of the total sample ($N = 227$), 68 students (29.95%) were undeclared (21 face-to-face, 47 online), 52 students (22.90%) were liberal arts majors (35 face-to-face, 17 online), three students (01.32%) were science majors (one face-to-face, two online), and two students (00.88%) were mathematics majors (two face-to-face, zero online).
Table 4.6

Major

<table>
<thead>
<tr>
<th>Student Major</th>
<th>Face-to-Face (%)</th>
<th>Online (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>14 (13.46)</td>
<td>22 (17.89)</td>
<td>36 (15.86)</td>
</tr>
<tr>
<td>Engineering</td>
<td>14 (13.46)</td>
<td>5 (04.07)</td>
<td>19 (08.37)</td>
</tr>
<tr>
<td>Healthcare</td>
<td>3 (02.88)</td>
<td>20 (16.26)</td>
<td>23 (10.13)</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>35 (33.65)</td>
<td>17 (13.82)</td>
<td>52 (22.91)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2 (01.92)</td>
<td>0 (00.00)</td>
<td>2 (00.88)</td>
</tr>
<tr>
<td>Public Services</td>
<td>1 (00.96)</td>
<td>2 (01.63)</td>
<td>3 (01.32)</td>
</tr>
<tr>
<td>Science</td>
<td>1 (00.96)</td>
<td>2 (01.63)</td>
<td>3 (01.32)</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>7 (06.73)</td>
<td>5 (04.65)</td>
<td>12 (05.29)</td>
</tr>
<tr>
<td>PSEO/High School</td>
<td>6 (05.76)</td>
<td>3 (02.43)</td>
<td>9 (03.96)</td>
</tr>
<tr>
<td>Undeclared</td>
<td>21 (20.19)</td>
<td>47 (38.21)</td>
<td>68 (29.96)</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>123</td>
<td>227</td>
</tr>
</tbody>
</table>

This analysis of the major-related data above addresses Research Question 1.

Academic Terms Completed

A frequency distribution of the total sample (N = 227) shows that the number of academic terms completed by students ranged from one to 42 terms. Of the total sample, 119 students (52.42%) completed 1-5 academic terms, 72 students (31.72%) completed 6-10 terms, 22 students (09.69%) completed 11-15 terms, eight students (03.52%) completed 16-20 terms, and six students (2.64%) completed 21 or more terms (Table 4.7).
Table 4.7

*Number of Students by Academic Terms Completed (Face-to-Face and Online)*

<table>
<thead>
<tr>
<th>Terms Completed</th>
<th>Total (%)</th>
<th>Face-to-Face (%)</th>
<th>Online (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>119 (52.42)</td>
<td>59 (25.99)</td>
<td>60 (26.43)</td>
</tr>
<tr>
<td>6-10</td>
<td>72 (31.71)</td>
<td>29 (12.76)</td>
<td>43 (18.94)</td>
</tr>
<tr>
<td>11-15</td>
<td>22 (09.69)</td>
<td>10 (04.41)</td>
<td>12 (05.28)</td>
</tr>
<tr>
<td>16-20</td>
<td>8 (03.52)</td>
<td>2 (00.88)</td>
<td>6 (02.64)</td>
</tr>
<tr>
<td>21-42</td>
<td>6 (02.64)</td>
<td>4 (01.76)</td>
<td>2 (00.88)</td>
</tr>
<tr>
<td>Total</td>
<td>227</td>
<td>104</td>
<td>123</td>
</tr>
</tbody>
</table>

A frequency distribution of face-to-face students \((n = 104)\) shows the number of academic terms completed ranged from one to 42 terms. Of the face-to-face students, 59 students (56.73%) completed 1-5 academic terms, 29 students (27.88%) completed 6-10 terms, 10 students (09.62%) completed 11-15 terms, two (01.92%) students completed 16-20 terms, and four students (03.85%) completed 21 or more academic terms. Of the face-to-face students completing 21 or more academic terms, two students (01.92%) completed 21 terms, one student (00.96%) completed 25 terms, and one student (00.96%) completed 42 terms. (Table 4.8)
Table 4.8

*Number of Face-to-Face Students by Academic Terms Completed (1-42)*

<table>
<thead>
<tr>
<th>Terms Completed</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>59 (56.73)</td>
</tr>
<tr>
<td>6-10</td>
<td>29 (27.88)</td>
</tr>
<tr>
<td>11-15</td>
<td>10 (09.62)</td>
</tr>
<tr>
<td>16-20</td>
<td>2 (01.92)</td>
</tr>
<tr>
<td>21</td>
<td>2 (01.92)</td>
</tr>
<tr>
<td>25</td>
<td>1 (00.96)</td>
</tr>
<tr>
<td>42</td>
<td>1 (00.96)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>104</strong></td>
</tr>
</tbody>
</table>

A frequency distribution of online students \( n = 123 \) shows the number of academic terms completed ranged from one to 21 or more terms. Of the online students, 60 students (48.78%) completed 1-5 academic terms, 43 students (34.96%) completed 6-10 terms, 12 students (09.76%) students completed 11-15 terms, six students (04.88%) completed 16-20 terms, and two students (01.63%) completed 21 or more academic terms (Table 4.9).
Table 4.9  

*Number of Online Students by Academic Terms Completed (1-21+)*

<table>
<thead>
<tr>
<th>Terms Completed</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>60 (48.78)</td>
</tr>
<tr>
<td>6-10</td>
<td>43 (34.96)</td>
</tr>
<tr>
<td>11-15</td>
<td>12 (09.76)</td>
</tr>
<tr>
<td>16-20</td>
<td>6 (04.88)</td>
</tr>
<tr>
<td>21+</td>
<td>2 (01.63)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>123</strong></td>
</tr>
</tbody>
</table>

A comparison of the frequency distributions for face-to-face and online students shows similar results for 1-5 terms completed (59 face-to-face; 60 online), 11-15 terms completed (10 face-to-face; 12 online), 16-20 terms completed (two face-to-face; six online), and 21 or more terms completed (four face-to-face; two online). However, 14 more online students (n = 43) completed 6-10 academic terms than did their face-to-face counterparts (n = 29) (Table 4.8 and Table 4.9). This analysis of the data focusing on the number of academic terms completed addresses Research Question 1.

Because differences could create an internal validity problem, the researcher conducted an independent samples t-test to ensure that no statistically significant difference existed between the number of academic terms completed for students enrolled in face-to-face classes compared to students enrolled in online classes. No statistically significant difference existed.
Experimental Results

The researcher conducted a one-way between groups Analysis of Covariance (ANCOVA) to determine if a statistically significant difference existed between the post-test scores of face-to-face compared to online students in terms of the desired course outcomes for the four content areas: themes and purposes of art, organizing principles of art, interpreting iconography, various art media.

Although, as explained in Chapter III, the researcher planned to undertake ANCOVA analyses, a parametric statistical analysis was inappropriate because the Levene’s Test of Equality of Variances showed statistically significant difference existed between the mean variances of the post-test scores within the two groups for three-of-the-four content area outcomes: organizing principles of art, interpreting iconography, various art media. Because of this event, a nonparametric Mann-Whitney *U* Test was conducted in each of these cases. However, Mann-Whitney *U* does not account for pre-test scores; therefore, only post-test scores were used for this analysis. The researcher has also included the ANCOVA results for comparison purposes (Appendix C).

**Themes and Purposes of Art**

Levene’s Test of Equality of Error Variances showed no statistically significant difference (*p* = .170) exists at the .05 alpha level between the variances of face-to-face and online students’ post-test scores in terms of the themes and purposes of art course outcomes (Table 4.10). This result confirmed that the variances of the two groups were equal, which is a requisite assumption of ANCOVA.
When tested for their knowledge of the themes and purposes of art, face-to-face \((n = 104)\) students’ post-test scores averaged 6.11 \((sd = 3.288)\) on a 10-point scale. In contrast, online students’ post-test scores averaged 8.20 \((sd = 2.78)\) (Table 4.11).

A Test of Between-Subjects Effects showed a statistically significant difference \((p = .000)\) exists between the means at the .05 alpha level of significance for face-to-face and online students’ post-test scores focusing on the themes and purposes of art (Table 4.12).
Table 4.12

Tests of Between-Subjects Effects: Themes and Purposes of Art*

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>232.016</td>
<td>28.228</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
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<td>1</td>
<td>492.480</td>
<td>59.918</td>
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</tr>
<tr>
<td>p1_themes_purposes</td>
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<td>1</td>
<td>218.031</td>
<td>26.527</td>
<td>.000</td>
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<tr>
<td>Format</td>
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<td>1841.122</td>
<td>224</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14197.000</td>
<td>227</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>2305.154</td>
<td>226</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Dependent Variable: Post-Test: Themes & Purposes
a. R Squared = .201 (Adjusted R Squared = .194)

Organizing Principles of Art

Levene’s Test of Equality of Error Variances showed a statistically significant difference ($p = .000$) exists at the .05 alpha level between the variance of face-to-face and online students’ post-test scores in terms of the organizing principles of art course outcomes (Table 4.13). This result confirmed that the variances of the two groups were not equal and thus violated the assumption of ANCOVA requiring that the variances of the two groups are equal. Subsequently, ANCOVA could not be used. The researcher elected to use a nonparametric analysis. Therefore, the nonparametric Mann-Whitney $U$ Test was conducted.

Table 4.13

Levene's Test: Organizing Principles of Art*

<table>
<thead>
<tr>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.031</td>
<td>1</td>
<td>225</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Dependent variable: Post Test Scores: Organizing Principles of Art

127
Mann-Whitney $U$ Test results (Appendix C) showed a significant difference in mean post-test scores between the two groups for the outcome of the organizing principles of art ($p = .004$). See the original ANCOVA results (Appendix C).

When tested for their knowledge of the organizing principles of art, face-to-face ($n = 104$) students’ post-test scores averaged 6.94 ($sd = 3.684$) on a 10-point scale. In contrast, online students’ post-test scores averaged 8.32 ($sd = 2.684$) (Table 4.14).

<table>
<thead>
<tr>
<th>Format</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face</td>
<td>6.94</td>
<td>3.684</td>
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</tr>
<tr>
<td>Online</td>
<td>8.32</td>
<td>2.684</td>
<td>123</td>
</tr>
<tr>
<td>Total</td>
<td>7.69</td>
<td>3.247</td>
<td>227</td>
</tr>
</tbody>
</table>

Both tests of Between-Subjects Effects (Mann-Whitney $U$ and ANCOVA) showed a statistically significant difference between the means at the .05 alpha level for face-to-face and online students’ post-test scores focusing on the organizing principles of art (Appendix C).

**Iconography of Art**

Levene’s Test of Equality of Error Variances showed a statistically significant difference ($p = .005$) exists at the .05 alpha level between the variance of face-to-face and online students’ post-test scores in terms of the iconography of art course outcomes (Table 4.15). This result confirmed that the variances of the two groups were not equal and thus violated the assumption of ANCOVA requiring that the variances of the two groups are equal. Subsequently, ANCOVA could not be used. The researcher elected to
use a nonparametric analysis. Therefore, the nonparametric Mann-Whitney $U$ Test was conducted.

Table 4.15

Levene’s Test: Iconography*

<table>
<thead>
<tr>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.940</td>
<td>1</td>
<td>225</td>
<td>.005</td>
</tr>
</tbody>
</table>

*Dependent variable: Post Test Scores: Iconography

Mann-Whitney $U$ Test results showed a significant difference in mean post-test scores between the two groups for the outcome of the iconography of art ($p = .000$). See the original ANCOVA results (Appendix C).

When tested for their knowledge of the iconography of art, face-to-face ($n = 104$) students’ post-test scores averaged 6.41 ($sd = 3.426$) on a 10-point scale. In contrast, online students’ post-test scores averaged 8.30 ($sd = 2.722$) (Table 4.16).

Table 4.16

Post-Test Means and SDs: Iconography

<table>
<thead>
<tr>
<th>Format</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face</td>
<td>6.41</td>
<td>3.426</td>
<td>104</td>
</tr>
<tr>
<td>Online</td>
<td>8.30</td>
<td>2.722</td>
<td>123</td>
</tr>
<tr>
<td>Total</td>
<td>7.44</td>
<td>3.200</td>
<td>227</td>
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</tbody>
</table>

Both tests of Between-Subjects Effects (Mann-Whitney $U$ and ANCOVA) showed a statistically significant difference between the means at the .05 alpha level for face-to-face and online students’ post-test scores focusing on the iconography of art (Appendix C).
Various Art Media (Drawing, Painting, Sculpture)

Levene’s Test of Equality of Error Variances showed a statistically significant difference ($p = .002$) exists at the .05 alpha level between the variance of face-to-face and online students’ post-test scores in terms of the various art media art (drawing, painting, sculpture) course outcomes (Table 4.17). This result confirmed that the variances of the two groups were not equal and thus violated the assumption of ANCOVA requiring that the variances of the two groups are equal. Subsequently, ANCOVA could not be used. The researcher elected to use a nonparametric analysis. Therefore, the nonparametric Mann-Whitney $U$ Test was conducted.

Table 4.17

Levene’s Test: Various Art Media (Drawing, Painting, Sculpture)*

<table>
<thead>
<tr>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.518</td>
<td>1</td>
<td>225</td>
<td>.002</td>
</tr>
</tbody>
</table>

*Dependent variable: Post Test Scores: Various Art Media

Mann-Whitney $U$ Test results showed a significant difference in mean post-test scores between the two groups for the outcome of the various art media (drawing, painting, sculpture) ($p = .000$). See the original ANCOVA results (Appendix C).

When tested for their knowledge of the various art media (drawing, painting, sculpture), face-to-face ($n = 104$) students’ post-test scores averaged 6.88 ($sd = 3.578$) on a 10-point scale. In contrast, online students’ post-test scores averaged 8.59 ($sd = 2.758$) (Table 4.18).
Table 4.18

Post-Test Means and SDs: Various Art Media (Drawing, Painting, Sculpture)

<table>
<thead>
<tr>
<th>Format</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face</td>
<td>6.88</td>
<td>3.578</td>
<td>104</td>
</tr>
<tr>
<td>Online</td>
<td>8.59</td>
<td>2.758</td>
<td>123</td>
</tr>
<tr>
<td>Total</td>
<td>7.81</td>
<td>3.265</td>
<td>227</td>
</tr>
</tbody>
</table>

Both tests of Between-Subjects Effects (Mann-Whitney U and ANCOVA) showed a statistically significant difference between the means at the .05 alpha level for face-to-face and online students’ post-test scores focusing on the iconography of art (Appendix C).

Summary

Chapter IV provided a detailed description of the study’s results. It included discussion of the data source and sample, descriptive results (gender, major, academic terms completed), ANCOVA and Mann-Whitney U Test results for the themes and purposes of art content area, Mann-Whitney U Test results for the organizing principles of art, identifying iconography, various art media content areas, and an examination of each of the study’s research questions to determine the study’s findings. The following chapter will focus on the summary, conclusions, reflections on methodology, and implications for practice and future research.
CHAPTER V
SUMMARY, DISCUSSION AND CONCLUSIONS, REFLECTIONS ON METHODOLOGY, AND IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

Summary

The purpose of this study was to determine if students enrolled in an online section of an introductory art appreciation course section learned the same content as students enrolled in a section of a traditional face-to-face introductory art appreciation course, both sections offered at a large public Midwestern, two-year, urban community college.

The researcher compared student attainment of established course outcomes in both the online and the face-to-face settings: identifying the themes and purposes of art, identifying the organizing principles of art, interpreting iconography, and differentiating between various art media (drawing, painting, sculpture). The questions guiding this research were as follows:

- How does the overall profile (gender, major, number of terms completed) of students enrolled in an art appreciation course in a face-to-face setting differ from that of students enrolled in an online art appreciation course?
• How does the gender profile of students enrolled in both the face-to-face and the online sections of the art appreciation course compare to that of students enrolled in courses in the greater academic division and the college?

• What impact does course format (face-to-face vs. online) of an introductory art appreciation course have on student achievement of course outcomes: familiarity with the themes and purposes of art, recognition of the organizing principles of art, ability to interpret iconography, and familiarity with various art media?

**Discussion and Conclusions**

The following discussion and conclusions address the findings that answer the study’s guiding research questions.

**Gender**

Research Question 1 examined gender to determine if differences existed between face-to-face and online art appreciation course settings. Research Question 2 moved beyond course-level considerations to examine gender at both the greater academic division level and the greater college level.

Of the total number of female students participating in the study ($n = 131$), a greater number of females ($n = 80, 61.06\%$) enrolled in online courses than in face-to-face courses ($n = 51, 38.93\%$). This finding may support the idea that the online format provides a greater degree of personal convenience (Harasim, 2000; King, 2002) for female students in terms of clock-hour and location requirements. This convenience may be especially appealing for nontraditional female community college students who often
contend with family-related commitments and obligations while attending college. Thus, the online format frees these students from requisite travel to campus and other attendance-related demands associated with face-to-face courses (Tinto, 1993).

Interestingly, the results showed a similarity between the gender distribution percentages of students enrolled in courses at the greater academic division level (male, 39.65%; female, 60.34%) and the gender distribution percentages found in the study’s online art appreciation course sections (male, 34.95%; female, 65.04%). Similarly, an examination of the college-level enrollments by gender showed a greater percentage of female students enrolled in courses than males (female, 57.20%; male, 42.79%). It should be noted that division- and college-level student enrollment percentages by gender were not separated by course format (face-to-face, online), but, rather, represent combined enrollments of face-to-face and online course sections.

In contrast to the greater academic division-level of female distribution for courses, (60.34% female, \( n = 20,333 \); 39.65% male, \( n = 13,360 \)) and the college-level of female distribution for courses (57.20% female, \( n = 33,318 \); 42.79% male, \( n = 24,921 \)), the study’s face-to-face course sections showed a more equivalent gender distribution with 49.04% female (\( n = 51 \)) and 50.96% male (\( n = 53 \)). This result also differs from the gender distribution percentages found in the study’s online courses showing 61.06% female (\( n = 80 \)) and 44.79% male (\( n = 43 \)).

In response to Research Question 2, the results showed that the gender distribution of students enrolled in the study’s online art appreciation course sections were similar to the gender distributions of students enrolled in courses in the greater academic division and in the overall college, both showing a greater number of female
enrollees. In contrast, the study’s face-to-face art appreciation course sections showed a more equal female-to-male gender distribution than that of the greater academic division and of the college.

**Major**

Consistent with the discussion in Chapter III, the study’s findings showed that students enrolled in the introductory art appreciation course represented a broad range of the college’s majors (business, engineering, healthcare, liberal arts, mathematics, public services, science, social sciences), these majors in turn representing all of the college’s four academic divisions (Business and Public Services; Life and Health Sciences; Science, Mathematics, and Engineering; Liberal Arts, Communication, and Social Sciences). This diversity in majors and academic divisions strengthens the study’s findings despite the use of intact groups that may have created a threat of selection (causing selection bias), with the potential to negatively impact the study’s internal validity. The diversity of students’ majors also allowed for a greater generalization of the study’s results to the greater college population.

The large number of students with undeclared majors in the sample ($n = 68; 29.95\%$) was an unanticipated finding. In fact, this group represented the largest single group within the study’s sample ($N = 227$). Of the students with undeclared majors, $69.11\%$ ($n = 47$) were enrolled in online sections of the course and $30.88\%$ ($n = 21$) were enrolled in face-to-face sections. This finding suggests that students with undeclared majors who are seeking to enroll in an art appreciation course prefer the online course environment to the face-to-face format.
Academic Terms Completed

Of the study’s sample (N = 227), more than half (52.42%) of the students (n = 119) enrolled in both face-to-face and online sections of an art appreciation course were relatively new to the college, having completed only between 1-5 academic terms. Students who completed 6-10 academic terms (n = 72) comprised 31.72% of the study’s sample. When combined, these students (n = 191) comprised a commanding 84.14% of the study’s sample.

Interestingly, the number of students enrolled in the study’s face-to-face sections of the course who had completed 1-5 academic terms (n = 59) was consistent with the number of students who had completed 1-5 academic terms in the online sections of the course (n = 60). However, when comparing the number of students who had completed 6-10 academic terms in face-to-face and online sections, a greater disparity was revealed with more students electing to enroll in the course’s online sections (n = 43) than in face-to-face sections (n = 29).

These findings suggest that students who are newer to the college and thus more early in their college experience are more inclined to enroll in an introductory art appreciation course than are more seasoned students who have completed 11 or more academic terms. The implications of these findings provide valuable information for the college’s faculty who teach these art appreciation courses.

First, recognizing that the students most likely to enroll in art appreciation course sections are new to the college experience may help faculty take greater steps to encourage students to persist and succeed. For example, these students may respond positively to an active learning environment, one that combines lectures and small-group
activities conducted in the face-to-face setting. Furthermore, knowing that they will have to demonstrate their knowledge as they work collaboratively with their peers, these students may be enticed to engage more actively in the learning process. Similarly, faculty teaching in an online setting may work more conscientiously to ensure that lesson modules are clearly written and easy for neophyte online students to navigate. These faculty may also emphasize a greater use of collaborative discussion forums to encourage students to actively engage in discourse as they share their knowledge of the course content with their peers. In both face-to-face and online settings, these interactive experiences with peers encourage students to gauge their knowledge of the course content and challenge them to recognize diverse perspectives.

Second, it is likely that many of these students who are new to the college experience may not have completed college-level English courses and, therefore, may not be prepared to properly organize and write the formal college-level observational critique paper that serves as a final course requirement. Making faculty aware of this possible deficit in their students’ knowledge may encourage them to provide a greater level of instruction to help their students gain a better understanding of the written assignment’s structure and content requirements, with the ultimate goal being to further encourage student persistence and success.

The majority of students in this study completed 11-15 terms ($n = 22, 09.69\%$). Of the remaining students, eight (3.52\%) completed 16-20 terms and six students (2.64\%) completed 21-42 terms. The researcher assumed that students who had completed a greater number of academic terms would tend to be older students who may be less comfortable with the online course format and thus be more likely to enroll in face-to-
face course sections. While this assumption proved to be true for the one student in the sample who had completed 42 academic terms and who elected to enroll in a face-to-face course section, a comparison of face-to-face and online students completing 11-42 terms showed a greater number of students ($n = 20$) elected to enroll in online art appreciation course sections rather than in face-to-face course sections ($n = 16$).

Of these students, those who had completed 11-15 terms ($n = 22$) showed almost equal enrollments with the 10 students (4.41%) who elected to enroll in face-to-face course sections and the 12 students (5.28%) who elected to enroll in the online sections. Students completing 16-20 terms showed a preference for online course sections with six students (02.64%) electing to enroll in online course sections and only two students (00.88%) electing to enroll in face-to-face course sections. In contrast, the students who had completed 21-42 academic terms did show a preference for face-to-face course sections with four students (01.76%) electing to enroll in face-to-face course sections and two students (00.88%) electing to enroll in online course sections.

**Student Achievement of Course Outcomes**

Research Question 3 examined the impact that course format (face-to-face vs. online) had on the students’ achievement of the course outcomes: knowledge of the themes and purposes of art, familiarity with the organizing principles of art, ability to interpret iconography, understanding of various art media.

As discussed in Chapter IV, the researcher planned to undertake ANCOVA analysis; however, Levene’s Test of Equality of Variances showed significant differences in mean variances of the test scores within the two groups for three-of-the-four content area outcomes: familiarity with the organizing principles of art, ability to interpret
iconography, understanding of various art media. As a result, a parametric statistical analysis was inappropriate and the researcher elected to conduct a nonparametric Mann-Whitney $U$ Test.

**Tests of Between-Subjects Effects**

While accounting for students’ knowledge prior to taking the course, ANCOVA analysis showed a statistically significant difference between the online and face-to-face groups for students’ knowledge of the themes and purposes of art. In this case, the mean score for the online students was significantly higher than that of their face-to-face counterparts.

Levene’s Test of Equality of Error Variances showed a statistically significant difference between the variance of face-to-face and online students’ post-test scores in terms of their familiarity with the organizing principles of art, ability to interpret iconography, and understanding of various art media. This violation of the assumptions of ANCOVA prompted the researcher to conduct a nonparametric Mann-Whitney $U$ Test analysis. The Mann-Whitney $U$ Test showed statistically significant difference in mean post-test scores between the two groups for each of these content area outcomes. In each case, the mean score for the online students was significantly higher than that of their face-to-face counterparts. When compared to ANCOVA results, both tests of Between-Subjects Effects showed a statistically significant difference between the means at the .05 alpha level, with the online students’ scores being higher than that of their face-to-face counterparts.
Additional Considerations

Although not part of the original study, a comparison of face-to-face and online students’ course evaluations may serve as an important consideration regarding the present study’s findings. Many colleges and universities use students’ course evaluations when considering faculty members for promotion, tenure, and merit. Questions may arise regarding the potentially negative impact that online teaching may have on an instructor’s evaluations in terms of low student response rates (Gaillard, Mitchell, & Kovota, 2006). Subsequently, tenure-track and tenured faculty may avoid teaching online courses because they fear that low response rates may hinder their bids for promotion, tenure, and merit.

In regard to the present study, similarities between face-to-face and online students’ course evaluations may result from the fact that the researcher designed both course formats to be as similar as possible in terms of instructor, content, assignments, and assessments.

Again, although not part of the original study, the researcher noted high retention rates in the study’s online course sections. As noted in Chapter I, King (2002) stated that approximately one-third of the students enrolled in online courses fail to complete. While differences in institutional reporting practices make it difficult to directly compare retention rates among institutions, face-to-face courses typically show 10 to 20 percentage points higher retention rates than do online course offerings (Carr, 2000). However, the researcher noted an attrition rate of only 7 students, approximately .05 percentage points, across all six of the study’s online course sections. While further study would need to be conducted to examine this outcome more thoroughly, the study’s
greater retention rates for its online courses may result from the researcher’s active communication with students as a means to connect with them and prepare them to meet the course objectives in a knowledgeable and informed manner (Tyler-Smith, 2006).

Reflections on Methodology

This quantitative quasi-experimental study examining online learning was never intended to be exhaustive in nature. Rather, the researcher hoped to gain insight into the impact that course format (face-to-face vs. online) had on student achievement of knowledge in the four main areas of content as presented in introductory art appreciation course sections taught by the researcher at a large public Midwestern, two-year, urban community college. The researcher hoped the study’s findings would provide evidence that would not only answer the study’s guiding research questions, but also, and more importantly, serve as a point of departure for future inquiries.

The use of experimental analysis with a quasi-experimental design served as an effective means for efficiently gathering data from students enrolled in the researcher’s face-to-face and online courses over the duration of three academic terms. No such study focusing on the face-to-face and online introductory art appreciation courses had previously been conducted at the institution in question. For this reason, the researcher believed it was imperative to conduct a quantitative research study whose findings could be generalized to the greater population of students completing art appreciation courses or perhaps completing other courses whose face-to-face and online formats were offered at the institution. These findings, would, in turn, help to provide art department faculty with a greater understanding of the face-to-face and online art appreciation students’ profiles (gender, major, number of terms completed) and allow them to use this
knowledge to encourage greater student persistence and success. As the art department’s curriculum manager, the researcher also hoped to use the study’s findings to inform the introductory course’s future curricular development.

While a true experimental design would have been preferable from a methodological perspective, this approach would not have been practical for the current study; therefore, the quasi-experimental design in which intact groups of students enrolled in online and traditional face-to-face sections of an introductory art appreciation course allowed the researcher to collect data from a diverse student sample, to analyze that data using SPSS, and to gain more specific insight into the impact that course format had on students’ achievement of the art appreciation course’s outcomes (themes and purposes of art, organizing principles of art, interpreting iconography, various art media).

**Limitations**

The current study provided only a three-semester, snapshot view of six online and six face-to-face art appreciation courses taught by a single instructor, the researcher, at a large public Midwestern two-year, urban community college.

**Control**

While the perspective gained from three-semesters’ worth of the course sections provided only a snapshot view, it offers important information to the researcher, the art department, and the institution as a whole. Similarly, while the study was limited in scope because the course sections were conducted solely by an individual researcher and focused on face-to-face and online courses designed and taught by that researcher at only a single institution, the results carry a valuable beginning examination deserving of further studies and wider application.
To minimize cheating in the online course sections, the researcher provided online students with specific instructions for completing the pre-test and post-test instruments. The researcher instructed online students to complete the pre-test instrument prior to completing any course-related studies. As noted in Chapter III, the researcher implemented a timed test format with automatic submission at the conclusion of the allotted timeframe. Despite these safeguards, the researcher recognizes that it would be impossible to completely ensure that no cheating occurred during the testing process and considered this to be a limitation.

Although the researcher worked to control for any differences resulting from the two course delivery formats by ensuring that identical content was covered in both the face-to-face lectures and the online lesson modules, synchronous interactions occurring in the face-to-face environment differed from those occurring asynchronously online. Subsequently, these inherent differences created communication dynamics unique to each setting.

As a result, relationships with students in the synchronous face-to-face setting differed from the relationships cultivated online. While face-to-face students asked questions and received immediate feedback from the faculty member in the classroom, students working online did not have immediate access to the faculty member, especially when working online during the weekend.

Setting and Sample

The study’s setting—a public two-year, urban, community college in the Midwest—may also serve as a limitation. By design, the mission and scope of such a college differs from those of a public or a private four-year institution of higher learning.
Therefore, students enrolling in courses at this community college may differ in terms of profile, educational preparedness, and educational aspirations from students enrolling in courses at public and private four-year institutions of higher learning.

**Research Design**

As previously discussed in Chapter III, the current study lacked true randomization and was, thus, limited by its quasi-experimental nature. When electing the quasi-experimental design, the researcher recognized that this methodological limitation did not allow for potential student variables, such as gender, to be evenly distributed in a random manner among the study’s student groups. The researcher acknowledges that this design approach limited causality inferences.

Also as previously stated, the researcher worked to control for differences resulting from course delivery format by ensuring that identical course content was presented to students in both face-to-face lectures and in online lesson modules. The researcher controlled for potential differences in testing by ensuring that the questions comprising the seven unit quizzes administered to students in the online setting were drawn from the three examinations (initial exam, midterm exam, final exam) administered to students in the face-to-face setting.

**Implications**

The study’s findings serve as an excellent point of departure for future research focusing on gender distribution in face-to-face art appreciation course sections, on undeclared majors enrolled in online art appreciation course sections, the impact that a variety of teaching styles and approaches to interaction may have on students’ knowledge
achievement of the art appreciation course outcomes, and course achievement and multicultural nature of domestic students.

Gender Distribution in Face-to-Face Art Appreciation Course Sections

An examination of gender distributions in the division and the college showed a greater female-to-male enrollment ratio. Comparing the enrollment gender distributions of the study’s face-to-face and online art appreciation courses to that of the greater academic division and the college, the researcher found a more equivalent male-to-female enrollment ratio in the study’s face-to-face course sections. This more equivalent ratio may enrich the face-to-face learning environment by allowing the male perspective to play a greater role in class discussions and in small group activities. The following question thus results from the findings: Is the gender distribution of students in all face-to-face art appreciation course sections consistent with the present study’s face-to-face gender distribution?

A quantitative research study focusing on gender distribution in all of the college’s face-to-face art appreciation course sections would shed light on whether the roughly equivalent gender distribution found in the present study’s face-to-face art appreciation course sections is typical of all of the college’s art appreciation course sections or if the study’s findings are an anomaly.

Undeclared Majors

In terms of students’ profiles of their majors, the data revealed that the largest group of students enrolled in introductory art appreciation courses at the college were not students with discipline-specific majors, but, rather, students with undeclared majors. Of students with undeclared majors, a majority elected to enroll in online art appreciation
course sections instead of face-to-face course sections. Two questions result from these findings: 1.) Why do students with undeclared majors elect to enroll in the introductory art appreciation course? 2.) Why do a greater number of students with undeclared majors elect to enroll in an online art appreciation course section rather than a face-to-face course section?

In response to the first question regarding the enrollment of students with undeclared majors in the introductory art appreciation course, the researcher speculates that the college’s academic advisors may be directing these students, who tend to be new to the college experience, to enroll in the art appreciation course because it does not have a course prerequisite requirement and because it serves as a humanities elective that may apply to a broad spectrum of the college’s degree programs. Despite students’ apparent indecisiveness regarding selecting a specific major, the academic advisors may believe that the art appreciation course is both a safe and wise alternative for most students with undeclared majors because it allows these students to enroll in a course and make progress towards the completion of a college-level course that applies to a variety of degree programs.

A qualitative research study using a phenomenological method would allow the researcher to interview both online art appreciation students with undeclared majors and the students’ academic advisors in order to identify possible themes that may surface to provide insight into why so many students with undeclared majors elect to enroll in an art appreciation course.

In response to the second question regarding why a greater number of students with undeclared majors elected to enroll in an online art appreciation course rather than a
face-to-face course section, the researcher reflected on the fact that 65.04% of the students enrolled in the study’s online course sections were female. The researcher then speculated that many of the undeclared students enrolled in online course sections may be female students who are newer to the college experience and who may also have been attempting to juggle family-related and job-related responsibilities while attending college.

A mixed methods study combining quantitative and qualitative research methods (Cresswell, 2009) would allow the researcher to examine online art appreciation students’ profiles (gender, major, number of academic terms completed, overall grade point average, geographic location) and then use a phenomenological method to interview students with undeclared majors enrolled in online art appreciation course sections in order to identify possible themes that may surface providing insight into why so many female students with undeclared majors elect to enroll in online art appreciation course sections rather than in face-to-face art appreciation courses.

**Course Achievement and Multicultural Nature of Domestic Students**

A mixed methods study focusing on students who enrolled in follow-up courses with the researcher could serve as an additional avenue of investigation. Evaluating the sample quantitatively in terms of ethnicity, gender, and the multicultural nature of domestic students could show if differences exist in terms of overall course achievement. Qualitative interviews conducted by the researcher using a phenomenological method could provide further insight into students’ decision-making processes with regard to their continued art-related studies. This approach may also provide important insight into
students’ perceptions regarding the degree to which they believe the course content does or does not address multicultural concerns.

**A Variety of Teaching Styles and Approaches to Student Interaction**

As previously discussed, the present study focused on art appreciation course sections, both face-to-face and online taught solely by the researcher. While the consistency stemming from this approach strengthened the present study’s internal validity, it would be beneficial to examine differences in art faculty members’ teaching approaches. For example, some faculty members engage students more actively than do other faculty members. Some faculty adhere to a lecture-only approach in their course delivery, while others incorporate a variety of experiential learning activities that are designed to actively engage students in the learning process.

With regard to the aforementioned differences in teaching style and student interaction, the following question should thus be examined: To what extent will differences in teaching styles and approaches to student interaction impact students’ achievement of knowledge as evidenced in an introductory art appreciation course’s outcomes (themes and purposes of art, organizing principles of art, interpreting iconography, various art media)? Expanding the scope of the present study to include all face-to-face art appreciation course sections taught by a variety of art department faculty members would help determine the degree to which different teaching styles and approaches to student interaction impact student outcomes in the four content areas.

**Conclusion**

In sum, the present study’s results coincide with the literature showing that online instruction serves as an effective educational modality. As noted in Chapter II, the
majority of the literature included in the chronological review of research studies focused on non-art-related disciplines. The inclusion of two recent small-scale qualitative Australian research studies that focused on the delivery of visual art courses in an online format further underscored the apparent research gap. Subsequently, the present study becomes even more noteworthy because its findings provide a quantitative view of the effectiveness of online visual art instruction at a large public Midwestern, two-year, urban community college.
REFERENCES


Rovai, A. P. (2003). In Search of higher persistence rates in distance education online programs. *Internet and Higher Education. 6*, 1-16.


Chicago: The University of Chicago Press.


APPENDIX A

INSTRUMENTS

ART 1110, Art Appreciation – Introduction to Art & Art Media                                    Term: SP14, SU14, FA14

Pre-Test Assessment: 40 Questions           Name: ___________________________ Section #: ___

Course Outcomes: Measurable and/or competencies students will demonstrate upon completion of the course.

1. Themes & Purposes of Art: Describe and discuss the various themes and purposes of art, as well as the motivation for art.
2. Organizing Principles of Art: Explain the organizing principles of art.
3. Iconography: Describe and discuss how iconography (of various cultures and historical periods) is used in art.
4. Various Art Media: Recognize and differentiate various art media used throughout history and describe the steps in the creation of a work of art.

Themes & Purposes of Art:

1. Stonehenge was constructed between 2000-1500 BCE on Salisbury Plain, England during the:

   ___ A) Impressionist Period      ___ B) Neolithic Period      ___ C) Paleolithic Period
   ___ D) Mesolithic Period        ___ E) Post-Impressionist Period

2. The Post-Impressionist artist, Vincent van Gogh, was born in:

   ___ A) Italy       ___ B) France   ___ C) Holland       ___ D) China    ___ E) Denmark
3. Vincent van Gogh painted *The Starry Night* as a means to express his personal feelings as he stood on the outskirts of a small village in France and looked up at the night sky. This is an example of the manner in which artists give tangible form to feelings and ideas.

____ A) True    ____ B) False

4. The Prayer hall of the Great Mosque in Cordoba, Spain was built to serve the needs of a small group of people - the king and his court.

____ A) True    ____ B) False

5. Henri Rousseau painted *The Dream* based on his observations of the world's great jungles.

____ A) True    ____ B) False

6. In terms of their role in society, one important task for artists has been to record and commemorate events that help us remember our history.

____ A) True    ____ B) False

7. Sainte-Chapelle was built to house the French King Louis IX's collection of:

____ A) fine sculpture.    ____ B) relics.    ____ C) gold coins.    ____ D) sacred manuscripts.    ____ E) rare books.

8. The largest of the Great Pyramids at Giza, that of Khufu, originally reached a height of 480 feet, roughly the height of a 50-story skyscraper.

____ A) True    ____ B) False
9. Religious images may serve to focus the thoughts of the faithful by:
   ___ A) giving concrete form to abstract ideas.
   ___ B) serving as a conduit through which sacred power flows.
   ___ C) serving as a dwelling place for a deity.
   ___ D) All of these answers are correct.
   ___ E) None of these answers are correct

10. A theme is like a thread running through the entire history of art.
    ___ A) True    ___ B) False

**Organizing Principles of Art:**

11. ________ art is descriptive of art in which the forms of the visual world are purposefully simplified, fragmented, or otherwise distorted.
    ___ A) naturalistic    ___ B) stylized    ___ C) representational    ___ D) nonrepresentational
        ___ E) abstract

12. Nonrepresentational art is also known as nonobjective art.
    ___ A) True    ___ B) False

13. In linear perspective, parallel lines receding into the distance seem to converge, until they meet at a point on the horizon line where they disappear. This point is known as the ______.
    ___ A) diminishing point    ___ B) point of no return    ___ C) isometric point
        ___ D) vanishing point    ___ E) convection point

14. Complementary color harmonies involve colors directly opposite each other on the color wheel. _____ and _____ are examples of a complementary color harmony.
    ___ A) red & purple    ___ B) red & blue    ___ C) red & yellow    ___ D) red & orange
        ___ E) red & green
15. Shape:
   ____ A) is a two-dimensional form.
   ____ B) occupies an area with identifiable boundaries.
   ____ C) may be created by line.
   ____ D) may be created by a shift in texture.
   ____ E) All of these answers.

16. Mass is a three-dimensional form that occupies a volume of space.
   ____ A) True    ____ B) False

17. The subtle shading in da Vinci's drawing, *The Virgin and Saint Anne with the Christ Child and John the Baptist*, is achieved through a technique that uses value to model the imagery. This technique is called:
   ____ A) cross-hatching    ____ B) stippling    ____ C) hatching    ____ D) pointillism
   ____ E) chiaroscuro

18. On the Color Wheel, Primary Colors are:
   ____ A) blue, red & orange    ____ B) violet, blue & red    ____ C) orange, green & violet
   ____ D) red, green & yellow    ____ E) red, yellow & blue

19. _____ means that certain areas of the composition are purposefully made less visually interesting, so the areas of emphasis stand out.
   ____ A) Subordination    ____ B) Perceptication    ____ C) Isometrication    ____ D) Diminuation
   ____ E) Miniature
20. With _____, the implied center of gravity is the vertical axis, an imaginary line drawn down the center of the composition. Forms on either side of the axis correspond to one another in size, shape and placement.

___ A) optical balance    ___ B) symmetrical balance    ___ C) isometric balance
___ D) asymmetrical balance    ___ E) linear balance

**Iconography:**

21. _____ means "describing images" and involves identifying, describing and interpreting subject matter in art.

___ A) Stylized    ___ B) Trompe l’oeil    ___ C) Style    ___ D) Installation    ___ E) Iconography

22. The Italian word for "pity" is:

___ A) gesso    ___ B) vanitas    ___ C) genre    ___ D) trompe l’oeil    ___ E) pietà

23. The iconography related to Jan van Eyck's *Arnolfini Double Portrait* has been interpreted differently by different researchers/iconographers.

___ A) True    ___ B) False

24. Johannes Vermeer's painting, *Woman Holding a Balance*, first appears to be a simple genre scene; however, closer inspection reveals the inclusion of a Last Judgment scene that causes the painting to have a deeper significance.

___ A) True    ___ B) False

25. The term "iconoclasm" is derived from the Greek word for "image breaking."

___ A) True    ___ B) False
26. The subjective nature of perception explains why a single work of art may mean different things to different people.

___ A) True  ___ B) False

27. The sculpture of the Hindu god Shiva in his guise as Nataraja, Lord of the Dance, is an example of the manner in which artists create places for some human purpose.

___ A) True  ___ B) False

28. This equestrian monument depicts the Roman emperor:

___ A) Augustus  ___ B) Titus  ___ C) Octavian  ___ D) Marcus Aurelius  ___ E) Caesar

29. Eugene Delacroix's Liberty Leading the People leaves no doubt regarding:

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30. Picasso's large-scale painting, *Guernica*, depicts an event that took place during the Spanish Civil War. A coalition of conservative, traditional and fascist forces led by General Francisco Franco attempted to topple the liberal government of the fledgling Spanish Republic.

____ A) True    ____ B) False

**Various Art Media:**

31. Drawing materials generally are divided into two categories:

____ A) pen media & ink media
____ B) brush media & ink media
____ C) dry media & liquid media
____ D) pencil media & crayon media
____ E) none of these answers.

32. All Drawing media are based on a powdered coloring material known as _____ that is mixed with a substance that enables it to adhere to the drawing surface.

____ A) pigment    ____ B) gouache    ____ C) primer    ____ D) solvent    ____ E) binder

33. Ink diluted with water and applied with a brush is known as a wash.

____ A) True    ____ B) False

34. A single line may change, perhaps starting as a fine thread, broadening into thickness and then tapering down again. Such thick-and-thin lines are referred to as calligraphic or gestural.

____ A) True    ____ B) False
35. Fresco paintings are created by mixing pigments with water and applying this mixture to a plaster support.

   ____ A) True   ____ B) False

36. A binder is an ingredient that ensures the paint, even when diluted and spread thinly, will adhere to a surface.

   ____ A) True   ____ B) False

37. This paint medium uses either milk or egg yolk as a vehicle:

   ____ A) Watercolor   ____ B) Gouache   ____ C) Tempera   ____ D) Encaustic   ____ E) Oil

38. *Contrapposto* means "counterpoise" or "counterbalance."

   ____ A) True   ____ B) False

39. A freestanding sculptural work that is finished on all sides and can be viewed from any angle is known as sculpture in the round.

   ____ A) True   ____ B) False

40. Low relief is also known as:

   ____ A) contrapposto   ____ B) terra cotta   ____ C) sans-relief   ____ D) bas-relief   ____ E) high relief
Course Outcomes: Measurable and/or competencies students will demonstrate upon completion of the course.

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APPENDIX B

IRB APPROVALS

Institutional Review Board (IRB)
COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS IN RESEARCH
1700 S. Patterson Blvd, Room M5250
300 College Park
Dayton, OH 45469-0104

APPLICATION FOR EXEMPTION

**** Please be sure your project is eligible for Exemption before using this form ****
Visit http://www.udayton.edu/research/compliance/irb/apply/index.php

Instructions
Please use this form for your Institutional Review Board (IRB) application by directly entering information into each section or copying and pasting into the appropriate sections from your own document. Please direct all QUESTIONS and submit all APPLICATION MATERIALS Electronically to IRB@UDayton.edu.

1a. DATE OF SUBMISSION: November 8, 2013

1b. PRIMARY INVESTIGATOR INFORMATION

Name: Kelly Joslin
Department: Doctor of Educational Leadership Program
Contact Phone: (937) 430-6195
Email (PLEASE USE UDAYTON.EDU ADDRESS): joslink1@udayton.edu
Position in University (if student, must indicate faculty sponsor): Student
Faculty Sponsor Name: Dr. Barbara De Luca
Faculty Sponsor Department: Associate Dean for Graduate Education and Research & Associate Professor, Department of Educational Leadership
Faculty Sponsor Email: bdeluca1@udayton.edu

2. PROJECT TITLE: Art Appreciation in Face-To-Face and Online Settings: An Analysis of Course Effectiveness

3. PROJECT TIME FRAME – Anticipated beginning and ending dates of Research:

Project Start Date: 01/06/2014   End Date: 12/14/2014
4. PROJECT EVALUATION - Please Check ALL of the following that apply.

Target Populations Include:

☐ Athletes
☐ Children 0-12 (Parental Consent required)
☐ Children 13-18 (Parental Consent required)
☐ Developmentally disabled
☐ Elderly
☐ Elected officials
☐ Mentally ill
☐ Non-English speaking persons
☐ Military personnel
☐ Persons convicted of a crime
☐ Persons in treatment for a physical, mental, or emotional ailment
☐ Persons on parole
☐ Persons over the age of 18 ONLY
☐ Persons with English as a second language
☐ Physically impaired
☐ Political appointees
☐ Pregnant women
☐ Prisoners
☐ Teachers
☐ UD staff
☐ UD students
☐ College Students (non-UD)
☐ Victims of crime

Site of Data Collection:

☐ Classroom
☐ Health care facility
☐ Public place
☐ Off-campus
☐ Military or government-operated installation
☐ Non-UD campus
☐ UD campus
☐ Other – Specify: Online course sections

Type of Data Collected/Method of Storage:

☐ Archives
☐ Audio-recordings will be made (must be noted in consent document!)
☐ Collection of existing data or records
☐ Data will be collected anonymously
☐ Data will be kept confidential
☐ Data will be linked to participants through code numbers
☐ Data will be linked to participants through pseudonyms
☐ Data will be stored anonymously
☐ During the data collection, participants will be deceived
☐ Medical records (HIPAA releases and HIPAA Training may be required)
☐ Photographs will be taken (must be noted in consent document!)
☐ Publicly available data
☐ Specimens or data collected for non-research purposes
☐ Participant data will be stored with participant’s identity
☐ Video recordings will be made (must be noted in consent document!)
Instrument/Method of Data Collection:

- Deception will be used
- Focus groups
- Includes follow-up contact with participants
- Includes interaction with children
- Includes observation of children
- Interviews – e-mail/text/on-line
- Interviews – face to face
- Interviews – telephone
- Non-UD personnel will collect data
- Observation of public behavior
- Oral History
- Psychological tests
- Questionnaires
- Reason for Research:
- Faculty/Staff research
- Undergraduate honors thesis
- Undergraduate research
- Graduate research – masters thesis
- Graduate research – doctoral dissertation
- Graduate research – non-thesis
- Classroom project
- Other reason for research (specify)

Reason for Research:

- Research on established educational practices, using normal educational practices
- Students will collect data
- Participants will be compensated
- Surveys – anonymous
- Surveys – online
- Surveys – paper
- Uses educational or aptitude tests
- Use of physiological devices

Does Your Research Involve Any of the Following Topics?

- Alcohol use
- Drug use
- Emotional stress
- Illegal activities
- Gambling
- Law enforcement
- Public welfare programs
- Sexual habits
- Sexual orientation
5. PROJECT STAFF

Please list personnel, including students, who will be working on this protocol (insert additional rows as needed). This includes anyone who interacts with participants or handles non-anonymous data.

<table>
<thead>
<tr>
<th>Name, Title &amp; Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kelly Joslin, Associate Professor, Art History &amp; Chairperson, Art Department, Sinclair Community College</td>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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</tbody>
</table>

6. RESEARCH ABSTRACT - In two or three sentences, provide a brief description in LAY language of the aims of this project.

Response:
Because it is unclear whether students enrolled in an online introductory art appreciation course learn the same content as their face-to-face counterparts, this study will compare the level of student attainment of established course outcomes related to identifying the themes and purposes of art, the organizing principles of art, interpreting iconography and differentiating between various art media in online and face-to-face settings.

7. RESEARCH QUESTION OR HYPOTHESIS – In one or two sentences, describe the question you hope to answer with your research?

Response:
1. What is the profile of students enrolled in an introductory art appreciation course offered by a large Midwestern public two-year urban community college?

2. How does the profile of students enrolled in an art appreciation course in a face-to-face setting differ from that of students enrolled in an online art appreciation course?

3. How does the profile of students enrolled in art appreciation courses (face-to-face vs. online) compare to that of students in the college, the division and the department?

8. STUDY POPULATION AND RECRUITMENT - Describe the study population making sure to address the following: inclusion and/or exclusion criteria, numbers of participants, how will participants be approached and recruited, attach electronic copies of advertisements/brochures used for recruitment.

Response:
This study will utilize group comparison analysis with a quasi-experimental design. More specifically, a nonequivalent groups design in which intact groups of students enrolled in face-to-face and online introductory art appreciation course sections offered via a large Midwestern public two-year urban community college will be studied.

The study's sample will be drawn from students enrolled in introductory art appreciation course sections. The introductory art appreciation course serves as one of the college's “Top 45 Courses” in terms of overall enrollment and supports many of the college's degree programs. As a result, students enrolling in the introductory art appreciation course represent the diversity found in the college's greater student population in terms of age, ethnicity and college-readiness.
To achieve an appropriate sample size, the study’s participants will include all students enrolled in four online introductory art appreciation course sections and four face-to-face art appreciation course sections. Students will not be recruited. Each course section will be taught by the researcher. Although actual enrollment in individual online and face-to-face course sections will vary, the study could have a sample size of 280 students - 140 online students and 140 face-to-face students over the course of two consecutive academic terms.

9. PROCEDURES/METHODS - Describe procedures involving human participants for this protocol. Include electronic copies (if possible) of all surveys and outcome measures used.

Response:
This study will employ a pre-test/post-test design. The pre-test and post-test instruments consist of 40 questions drawn from the approved course text and department exam files. The instruments’ questions correspond to the official course outcomes as listed on the college-approved master course syllabus. The specific course outcomes associated with the introductory art appreciation course focus on the student’s ability to identify the themes and purposes of art, the organizing principles of art, interpret iconography and differentiate between various art media. Questions are presented in multiple-choice and true/false format. Participants will be asked to select one answer per question. Online pre-test and post-test instruments are identical to the pre-test and post test instruments used in face-to-face courses.

10. RISKS - Describe the risks to participants (risks listed here should be included in the consent document. What steps will be taken to minimize risks?

Response:
The information gathered from the pre-test and post-test instruments corresponds to information gathered from students via exams and writing assignments during non-study-related introductory art appreciation courses. The researcher will employ numeric values to identify students; thereby, maintaining confidentiality and avoiding foreseeable risks, discomforts and inconveniences. Anonymity and the use of aggregate data for reporting purposes will further protect individual students from any psychological, social or legal risks that might result from participating in the research.

11. CONFIDENTIALITY/DATA MANAGEMENT - How will participant data and responses be managed, stored and reported? How will participant identity and confidentiality be protected? Will participants be audio taped, photographed or videotaped during this study? (If so, please note this in the consent document.)

Response:
The researcher will personally collect and manage all data associated with students’ responses. Data identifying individual students will not be shared with other individuals or published in a manner that discloses students’ identities. To maintain confidentiality, numeric values will be used to identify research study participants. Participants will not be audio taped, photographed or videotaped during the course of the research study.

12. ATTACHMENTS/APPENDICES. These can be sent by e-mail to IRB@udayton.edu. (Check all that apply)

☐ Consent forms will be used and are attached for review (Use UD consent form template; for anonymous surveys, use Invitation to Participate template only).
☐ Consent forms will not be used (Must justify request for waiver).
☐ Advertisements used to recruit participants (e-mail, brochure, fliers, etc.)
☒ Survey or questionnaire to be used in this research.
13. OTHER APPROVALS - CHECK ALL that apply and submit copies with application

☐ Has this protocol been submitted to any other IRBs? If so, please list along with protocol title, number, and expiration date.

X If you will be collecting data OFF-CAMPUS, please provide documentation of approval by a site administrator (e.g., school principal). This can be sent by e-mail to IRB@udayton.edu.

X If you are a STUDENT, please provide documentation that your faculty advisor (1) has read your IRB application, and (2) approves of the research as proposed. This can be sent by e-mail by the faculty advisor to IRB@udayton.edu.

14. IS THIS PROJECT EXTERNALLY FUNDED? (If so, please indicate the funding source)

Response:
No.
November 15, 2013

Kelly Joslin

University of Dayton

300 College Park

Dayton, OH 45469

SUBJECT:  “Art Appreciation in Face-To-Face and Online Settings: An Analysis of Course Effectiveness”

Dear Kelly,

The Institutional Review Board has reviewed the subject proposal and has found this research protocol is exempt from continuing IRB oversight as described in 45 CFR 46.101(b)(1).* Therefore, you have approval to proceed with the study. In addition, the requirement to document informed consent has been waived.

REMINDEERS TO RESEARCHERS:

• As long as there are no changes to your methods, and you do not encounter any adverse events during data collection, you need not apply for continuing approval for this study.
The IRB must approve all changes to the protocol prior to their implementation, unless such a delay would place your participants at an increased risk of harm. In such situations, the IRB is to be informed of the changes as soon as possible.

The IRB is also to be informed immediately of any ethical issues that arise in your study.

Please let me know if you have any questions. Best of luck in your research!

Best regards,

Mary S. Connolly, PhD
Chair, Institutional Review Board (IRB)
Office for Research
University of Dayton
Dayton, OH 45469
(937) 229-3493
(937) 620-7151 cell

Email: IRB@udayton.edu

http://www.udayton.edu/research/compliance/irb/index.php

*Exempt under 45CFR46.101(b)(1): Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
Thanks, Laura, for supporting UD student research. Please let us know if you have any questions or concerns during this research project period.

My best,
Mary

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Mary S. Connolly, Ph.D.
Chair, IRB
Office for Research
University of Dayton
300 College Park
Dayton, OH 45469-2320
(937) 620-7151 cell
IRB@udayton.edu

On Wed, Nov 6, 2013 at 1:32 PM, Mercer, Laura <Laura.Mercer@sinclair.edu> wrote:

Hello,
Per your request for site administrator approval for data collection - Kelly Joslin will be provided the opportunity to collect data on Sinclair’s campus pending UD and subsequent Sinclair IRB approval. Thanks
Laura

Laura Mercer | Director - Research, Analytics and Reporting Sinclair Community College | 444 West Third Street | Dayton, OH 45402 937.512.4571 | Laura.Mercer@Sinclair.edu
Sinclair Community College
Institutional Review Board

EXEMPT PROTOCOL SUMMARY FORM
ACTIVITIES EXEMPT FROM COMMITTEE REVIEW

Research activities involving human subjects in the following categories may be exempt from review by Sinclair’s Institutional Review Board. The principal investigator/project director is authorized to make the first determination of eligibility for exemption; however, the College bears the responsibility for concurring in that determination based on notice provided by the principal investigator to the Institutional Review Board.

The following exemptions do NOT apply when (a) deception of subjects may be an element of the research; (b) subjects are under the age of eighteen; (c) the activity may expose the subject to discomfort or harassment beyond levels encountered in daily life; or (d) fetuses, pregnant women, human in vitro fertilization, children, or individuals involuntarily confined or detained in penal institutions are subjects of the activity.

EXCEPT FOR THE ABOVE EXCLUSIONS, the federally-approved Categories of Exemption are:

1. Research conducted in established or commonly accepted educational settings involving normal educational practices, such as: (a) research on regular and special education instructional strategies; (b) research on the effectiveness of or the comparison among instructional techniques curricula, or classroom management methods.

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects’ responses outside the research reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects’ financial standing, employability, or reputation.

3. Research involving the use of educational tests (cognitive, diagnostic, aptitude, or achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under Category 2 if: (a) the human subjects are elected or appointed public officials, or candidates for public office, or (b) federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

4. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified directly or through identifiers linked to the subjects.

5. Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (a) public benefit or service programs; (b) procedures for obtaining benefits or services under those programs; (c) possible changes in or alternatives to those programs or procedures; or (d) possible changes in methods or levels of payment for benefits or services under those programs.

6. Taste and food quality evaluation and consumer acceptance studies: (a) if wholesome foods without additives are consumed, or (b) if a food is consumed that contains a food ingredient or at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe by the U.S. Food and Drug Administration or approved by the U.S. Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

Exempting an activity from review does not absolve the investigator(s) of the activity from ensuring that the welfare of subjects in the activity is protected and that methods used and information provided to gain subject consent are appropriate to the activity.

Questions about whether a research activity may be exempt from human subjects review can be directed to the Director, Research Analytics & Systems Development or to the Senior Director of Advancement.
### Exempt Protocol Summary Form

Art Appreciation in Face-To-Face and Online Settings: An Analysis of Course Effectiveness

<table>
<thead>
<tr>
<th>Title of Research Project</th>
<th>Kelly Joslin</th>
<th>Art</th>
<th>5313</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Investigator/Project Director</td>
<td>Department</td>
<td>Phone Extension</td>
<td>Email</td>
</tr>
<tr>
<td>Co-investigator/Student Investigator</td>
<td>Department</td>
<td>Phone Extension</td>
<td>Email</td>
</tr>
<tr>
<td>Co-investigator/Student Investigator</td>
<td>Department</td>
<td>Phone Extension</td>
<td>Email</td>
</tr>
</tbody>
</table>

Anticipated Funding Source: None

Projected Duration of Research: 12 months

Projected Starting Date: 01/06/2014

Other organizations and/or agencies, if any, involved in the study:
University of Dayton – Doctoral Dissertation Research Study

Exempt under code (see definitions on page one – check one) 1 ☒  2 ☐  3 ☐  4 ☐  5 ☐  6 ☒

SUMMARY ABSTRACT: Please supply the following information below: BRIEF description of the participants, the location(s) of the project, the procedures to be used for data collection, whether data will be confidential or anonymous, disposition of the data, who will have access to the data. Attach copy of the Informed Consent Form and/or the measures (questionnaires) to be used in the project.
**Research Abstract:** Because it is unclear whether students enrolled in an online introductory art appreciation course learn the same content as their face-to-face counterparts, this study will compare the level of student attainment of established course outcomes related to identifying the themes and purposes of art, the organizing principles of art, interpreting iconography and differentiating between various art media in online and face-to-face settings.

**Research Questions:**

1. What is the profile of students enrolled in an introductory art appreciation course offered by a large Midwestern public two-year urban community college?
2. How does the profile of students enrolled in an art appreciation course in a face-to-face setting differ from that of students enrolled in an online art appreciation course?
3. How does the profile of students enrolled in art appreciation courses (face-to-face vs. online) compare to that of students in the college, the division and the department?
4. What is the impact of the course offering platform (face-to-face vs. online) on student achievement in an introductory art appreciation course?

**Study Population:**

This study will utilize group comparison analysis with a quasi-experimental design. More specifically, a nonequivalent groups design in which intact groups of students enrolled in face-to-face and online introductory art appreciation course sections offered via a large Midwestern public two-year urban community college will be studied.

The study’s sample will be drawn from students enrolled in introductory art appreciation course sections. The introductory art appreciation course serves as one of the college’s “Top 45 Courses” in terms of overall enrollment and supports many of the college’s degree programs. As a result, students enrolling in the introductory art appreciation course represent the diversity found in the college’s greater student population in terms of age, ethnicity and college-readiness.

To achieve an appropriate sample size, the study’s participants will include all students enrolled in four online introductory art appreciation course sections and four face-to-face art appreciation course sections. Students will not be recruited. Each course section will be taught by the researcher. Although actual enrollment in individual online and face-to-face course sections will vary, the study could have a sample size of 280 students - 140 online students and 140 face-to-face students over the course of two consecutive academic terms.

**Procedures/Methods:**

This study will employ a pre-test/post-test design. The pre-test and post-test instruments consist of 40 questions drawn from the approved course text and department exam files. The instruments’ questions correspond to the official course outcomes as listed on the college-approved master course syllabus. The specific course outcomes associated with the introductory art appreciation course focus on the student’s ability to identify the themes and purposes of art, the organizing principles of art, interpret iconography and differentiate between various art media. Questions are presented in multiple-choice and true/false format. Participants will be asked to select one answer per question. Online pre-test and post-test instruments are identical to the pre-test and post test instruments used in face-to-face courses.

**Risks:**

The information gathered from the pre-test and post-test instruments corresponds to information gathered from students via exams and writing assignments during non-study-related introductory art appreciation courses. The researcher will employ numeric values to identify students; thereby, maintaining confidentiality and avoiding foreseeable risks, discomforts and inconveniences. Anonymity and the use of aggregate data for reporting purposes will further protect individual students from any psychological, social or legal risks that might result from participating in the research.
Confidentiality/Data Management:

The researcher will personally collect and manage all data associated with students’ responses. Data identifying individual students will not be shared with other individuals or published in a manner that discloses students’ identities. To maintain confidentiality, numeric values will be used to identify research study participants. Participants will not be audio taped, photographed or videotaped during the course of the research study.

RESPONSIBILITIES OF THE PRINCIPAL INVESTIGATOR:

• Any additions or changes in procedures in the protocol will be submitted to the IRB for written approval prior to these changes being implemented.
• Any problems connected with the use of human subjects once the project has begun must be communicated to the IRB Chair.
• The principal investigator is responsible for retaining informed consent documents for a period of three years after the project.
• The principal investigator should include with the IRB submission a confirmation that the research has been approved by the Sinclair chairperson(s) and Dean(s) of the academic area(s) where the research will be conducted.
• The principal investigator shall notify the Sinclair IRB chairperson when the research proposal has been approved or modified by another institution’s IRB.
• The principal investigator will provide a copy of the final research results to the chairperson of Sinclair’s IRB.

_________________________________  ____________________________________________
Principal Investigator                                  Co-Investigator/Student Signature (if appropriate)
Signature

_________________________________  ____________________________________________
Chair/Immediate Supervisor                                  Dean/Director
Signature

Signature of IRB Committee Chair: Date: __/__/__

IRB Chair:       [ ] Approved       [ ] Approved with Conditions       [ ] Refer to Full Committee
Check 1 box:
November 25, 2013

Kelly Joslin

Art

Sinclair Community College

444 West Third Street

Dayton, OH 45402-1460

RE: Art Appreciation in Face-to-Face and Online Settings: An Analysis of Course Effectiveness

Dear Kelly:

As chair of the Sinclair Institutional Review Board for the Protection of Human Subjects (IRBO005624), Sinclair’s IRB has reviewed the proposal noted and has approved this protocol as it meets the criteria for exempt review established by the U.S. Department of Health and Human Services, category 1. As such, this proposal has been determined to be exempt from the full IRB review under Section 101, subsection b.1 and compliant with Sinclair protocols.

Any serious adverse events or issues relating from this study should be reported immediately to the IRB. Additionally, any changes to protocols or informed consent documents must have IRB approval before implementation.

If you have any questions or concerns, please feel free to contact me. Good luck with your venture.

Sincerely,

Laura A. Mercer

Director, Research, Analytics and Reporting

Chair, Sinclair Institutional Review Board

Phone: 937-512-4571 laura.mercer@sinclair.edu
APPENDIX C

ORIGINAL RESULTS

*Mann-Whitney U Test: Course Outcomes*

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The distribution of Post-Test: Themes &amp; Purposes is the same across categories of Format.</td>
<td>Independent Samples Mann-Whitney U Test</td>
<td>.000</td>
<td>Reject the null hypothesis</td>
</tr>
<tr>
<td>2. The distribution of Post-Test: Organizing Principles is the same across categories of Format.</td>
<td>Independent Samples Mann-Whitney U Test</td>
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<td>Reject the null hypothesis</td>
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<tr>
<td>3. The distribution of Post-Test: Iconography is the same across categories of Format.</td>
<td>Independent Samples Mann-Whitney U Test</td>
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<td>Reject the null hypothesis</td>
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<td>4. The distribution of Post-Test: Various Art Media is the same across categories of Format.</td>
<td>Independent Samples Mann-Whitney U Test</td>
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<td>Reject the null hypothesis</td>
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</table>
**ANCOVA Tests of Between-Subjects Effects: Organizing Principles of Art***

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<tbody>
<tr>
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<tr>
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</table>

*Dependent Variable: Post-Test: Organizing Principles of Art

a. R Squared = .097 (Adjusted R Squared = .089)

---

**ANCOVA Tests of Between-Subjects Effects: Iconography***

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<tr>
<th>Source</th>
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<th>Sig.</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>p3_iconography</td>
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</tr>
</tbody>
</table>

*Dependent Variable: Post-Test: Iconography

a. R Squared = .165 (Adjusted R Squared = .158)
**ANCOVA Tests of Between-Subjects Effects: Various Art Media (Drawing, Painting, Sculpture)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
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<th>Mean Square</th>
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<th>Sig.</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

*Dependent Variable: Post-Test: Various Art Media

a. R Squared = .172 (Adjusted R Squared = .164)