

THE NET-GENERATION INTERIOR DESIGN STUDENT: AN EXPLORATORY
STUDY ASSESSING LEARNING AND ENGAGEMENT WITHIN A COMPUTER
SIMULATION ENVIRONMENT

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Abstract

The first purpose of this experimental study was to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics. The second purpose was to determine the level of engagement of interior design students using traditional pencil-and paper instructional strategies compared to computer simulated instructional strategies to learn business ethics. The data offered both quantitative and qualitative evidence of preferred instructional strategies and what characteristics contributed towards level of engagement.

Net-generation learners, born between 1982 and 2000, have been exposed to technology their whole lives and have come to expect the integration of various forms of multi-media instructional strategies within the classroom. Many studies have been conducted that integrate and analyze computer simulation and/or gaming with higher education, but research is very limited within the field of interior design.

The study included 21 undergraduate interior design students. Analysis was both quantitative and qualitative in nature including descriptive statistics, frequencies, independent sample *t*-tests, ANCOVA statistical analysis, and questionnaires with both Likert-type and open-ended question formats. Even though statistical results were not found to be significant and were inconclusive, overall results indicated that the computer simulated case studies created an authentic, dynamic, and empowering learning environment that engaged the learners.

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CHAPTER 1: INTRODUCTION

Background and Context of the Problem

Contemporary society has experienced a change in the college student profile. Presently, students pursuing degrees in higher education have grown up with digital technology and, more specifically, computer simulations and games; they are always “connected” or utilizing some form of technology. Due to the prominence that technology has with these college students, or ‘digital natives,’ they often expect instructors, sometimes called ‘digital immigrants,’ to also be “connected” and effective in their use of digital teaching methods. Students’ attitudes and aptitudes have been shaped by information technology (IT) and media-rich environments so much that this generation of college students (ages 18-22) tend to be experiential learners – they prefer to learn by doing as opposed to learning by listening (Oblinger, 2004).

The group of college students noted above has been recognized as the net-generation or millennials (McMahon & Pospisil, 2005). Having been born between 1982 and 2000, they are described as having a focus on social interaction and connectedness with friends, family, and colleagues. They prefer group-based approaches to study and social activities, have an information technology mindset, a highly developed skill in multi-tasking, and a focus on immediacy. This generation of students prefers technological and collaborative experiences that exhibit clear objectives, enhance motivation and engagement, and involve authentic learning activities (Oblinger, 2004).

Each year Beloit College produces a Mindset List[®] (Beloit College, 2007; 2008) that notes factors separating the generation of first-year students from those who precede

it, and many factors highlight the ever-presence of information technology. For example, it could be assumed that most students entering college between 2006 and 2008 are wireless, yet always “connected;” believe that “Google” has always been a verb and Global Positioning System (GPS) satellite navigation systems have always been available; think music has always been “unplugged” and caller identification has always been available on phones; and trust that virtual reality will always be available when the real thing fails. These characteristics only highlight the speed at which evolving digital technology has become a focus for net-generation students and people throughout the world. But more importantly, it highlights the perceived generational gap between students and teachers, a gap that has widened due to students’ perceptions and level of comfort with information technology and digital media.

The profile of today’s college students fits many different disciplines and areas of study, including that of undergraduate interior design students. A study completed by Martinson and Zollinger (2006) identified the dominant learning style of undergraduate interior design students at one university to be concrete sequential. Concrete sequential learners, as defined by Gregorc (2003), prefer learning methods that utilize direct, hands-on experiences such as computer-assisted instruction and workbooks. Comparatively, a study that observed relationships between learning styles and instructional methods (Lim & Guerin, 2006), found Kolb’s practical learning style of converger highly associated with computer-assisted multimedia instruction. Interior design is a discipline that is constantly changing due to information technology. Interior design students, as with other net-generation students, feel the need to be “plugged in” at all times. So, how can

instructors engage these net-generation learners and create effective learning situations in which they achieve and are engaged? It seems obvious that the instructors, or digital immigrants, need to expand their repertoire of teaching methods instead of relying on traditional, static approaches such as lecture using text-based visual notes from PowerPoint® slides and assignments such as reading textbooks and case studies.

Dede (2005) posits that higher education institutions can prosper by using emerging technologies to deliver instruction matched to the increasingly net-generational learning styles of their students. Examples of digital-based technology learning include the following:

- Fluency in multiple media and in simulation-based virtual settings;
- Communal learning involving diverse, tacit, situated experience, with knowledge distributed across a community and a context as well as within an individual;
- A balance among experiential learning, guided mentoring, and collective reflection;
- Expression through nonlinear, associational webs of representations; and
- Co-design of learning experiences personalized to individual needs and preferences. (p. 7)

One such form of digital technology used to accommodate the net-generation learning style for simulation-based virtual settings (Dede, 2005) is electronic interactive simulation gaming. Dede suggests that rapid advances in information technology are reshaping the learning styles of many students in higher education. Games and interactive

computer simulations are part of growing up in the United States, and sales continue to climb. Video game sales were approximately \$17.94 billion in 2007, up 43 percent from 2006 (Ortutay, 2008). Interactive computer simulations and games represent an informal learning environment, and a number of researchers and educators have utilized them as an effective means of teaching this next generation of students (Cagiltay, 2007; Connolly, Stansfield, & McLellan, 2006; Hill, Ray, Blair, & Carver; Kiili, 2005; Lainema & Nurmi, 2006; Lowerison, Sclater, Schmid, & Abrami, 2006; McMahon & Pospisil, 2005; Whitehouse, 2005).

However, the use of technology itself does not solely motivate students who have grown up in the realm of technology all their lives. Thus, learning strategies and methods that are engaging to the learners must be created (Kiili, 2005). What do computer simulations and games teach, and how can they be used within an educational theoretical framework for learning?

Computer simulations and games have changed the learners' cognitive skills such that net-generation students have used them to reinforce problem-solving strategies such as observation, hypothesis, and trial and error (Hostetter, 2002). The theoretical foundation for simulations, games, and other forms of interactive, problem-based and experience-based learning has been around for years, but literature is conflicting in regards to developing a definite model or framework from which to develop computer simulations and games. However, from the earlier "ancestral" influences of Dewey, Lewin, Piaget, and Bruner, experiential learning, as synthesized by Kolb (1984), is more than evident in computer simulations and games utilized today.

The theoretical lenses of problem-based learning and experiential learning are the primary frameworks for computer simulated gaming and learning in this study, due to their focus in higher education and integration with the development of various computer simulated environments. In addition, flow theory (Csikszentmihalyi, 1975) will be integrated. Flow describes a state of complete engagement or absorption in an activity and refers to the optimal experience of the learner (Csikszentmihalyi, 1991). Characteristics of experiential learning, as detailed by Kolb (1984), include that learning is best conceived as a process, not in terms of outcomes; learning is a continuous process grounded in experience; learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world such as concrete experience and abstract concepts; learning is an holistic process of adaptation to the world; learning involves transactions between the person and the environment; and learning is the process of creating knowledge. These five characteristics will be described in greater detail in the following chapter.

In addition, computer simulated environments must be situated in a rich context, one that is reflective of business world contexts so that this learning process can occur and enable transference to environments beyond the educational setting. Net-generation students also seek the affective domain of engagement and the desire to feel and be absorbed in the social context of learning.

So one asks, how can this be accomplished? An educator often cannot start the student with an “authentic” task, such as immersing them in an actual high-risk situation, but must simplify the task while still maintaining its essence (Lainema & Lainema,

2007). The holistic domain of business practice, specifically the content area of ethics, is an example of a “real-world” authentic context. This area could also be called business “know-how” (Lainema & Lainema, 2007) and, though a common term in business practice literature and educational textbooks, it is extremely difficult to find any exact definition.

The principles of professional business practice cover topics including, but not limited to, defining a profession, professional preparation via examination and continuing education, legal responsibilities, career options, basic business formations, business plans, management and organizational structures, financial accounting, marketing, compensation and fees, and the basics of searching for a job. In addition, many undergraduate-level professional business practice classes include the content area of ethics. An ethics course is typically required by most universities in their undergraduate liberal arts requirements. In addition, many graduate degrees also require a research ethics course as part of degree requirements.

The depth of coverage for the topic of ethics, among various disciplines, is limited and many college business practice textbooks only dedicate a small section of a chapter or a smaller chapter to the content of ethics. Many fields of study within higher education approach the content of teaching professional ethics in a traditional manner by reading information presented in a textbook, reviewing short case studies, and discussing the material in class. However, because students’ primary area of study and personal experiences from which to draw influences from are so varied among disciplines, and

base knowledge of the students is not known, the content area of ethics is one that is challenging to teach effectively.

Conveying business practice knowledge and more specifically, the content area of professional ethics, through various disciplines including interior design, is challenging. The accelerating speed of business practice, due to increased information technology advancements, also contributes to the challenges of teaching ethics to interior design students. It seems clear that, as educators, if students could be immersed in a computer simulated learning environment where ethical problems and business complexity are presented in an authentic manner, they would garner relevant knowledge that could later be applied in the actual working environment and other concrete experiences.

Business ethics case study computer simulations for undergraduate interior design students could enhance learning through various types of interaction. If used realistically, the experiential nature and the intensity and motivational aspects of the activity should make the learning experience superior to any other learning activity (Lainema & Lainema, 2007). A dynamic, effective, engaging, and authentic interactive learning environment would provide self-directed learning experiences that encourage cognitive challenge and active problem-solving.

For higher education to better meet the needs and expectations of net-generation students, and for the purposes of this study of undergraduate interior design students, computer simulated learning needs to be integrated into effective, engaging, and professional business-related learning environments.

Statement of the Problem

The college student of today has a technology-enhanced profile and educators' teaching practices need to reflect the net-generation's changing expectations, needs, and learning profile. The desire to create real-world experiences and complex learning environments is timely and necessary, especially given the preponderance of digital immigrant educators. Relying only on lecture and other didactic instructional strategies to engage the current generation of IT learners could prove ineffective.

The integration of computer simulation in design-related disciplines within higher education was found to be very limited. During the review of literature, no research pertaining to computer simulations or gaming in the interior design business practice classroom was found. Specifically, there was none related to ethics. Interior design graduates go to work in professional business environments upon graduation from their undergraduate degree. They are faced with ethical decisions from their beginning work experiences yet the amount of carryover from classroom to practical application is limited. It seems there is a better teaching method to reach these students, warranting further investigation.

Also, as stated earlier, interior design is a discipline that is constantly changing due to the influx of information technology. For example, Sketch-Up[®], Revit[®], and other computer building information modeling programs are changing the way interior designers conceptualize, design, and specify materials and products for interior environments; product and construction specifications can be accessed 24/7 from websites; and project bidding and construction management tracking tools are also

computerized and provide real-time advantages. Related specifically to ethics, the reliance an interior design professional has on sharing drawings via the Internet increases the potential for possible unethical behavior, including drawings that are proprietary. In addition, the holistic domain of business practice, specifically the content of professional ethics, is a topic that is challenging to teach undergraduate interior design students; there has been reliance on creating realistic scenarios from textbooks and pencil-and-paper case studies.

If computer simulated scenarios were information technology-driven and used as a supplementary learning strategy for net-generation interior design students, it could enhance their learning, support higher engagement levels that millennial students desire, and most importantly, better prepare them to achieve success in actual business practice experiences so they can make solid decisions in potentially high-risk ethical situations.

Objectives and Purpose of the Study

The first purpose of this exploratory study was to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics. The second purpose was to determine the level of engagement of interior design students using traditional pencil-and paper instructional strategies compared to computer simulated instructional strategies to learn business ethics.

Research Questions

The following research questions and corresponding hypotheses were proposed to guide the investigation:

1. Do effects on achievement differ between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics?
2. Does the level of engagement differ between interior design students using traditional pencil-and paper instructional strategies compared to computer simulation instructional strategies used to learn business ethics?

Definition of Terms

To add clarity, following is a list of terms used and how they are defined for the purpose of this study.

digital immigrants – Persons who do not intrinsically or naturally use technology and other forms of digital media.

digital natives – Persons who intrinsically use technology and other forms of digital media.

game – A system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome (Salen & Zimmerman, 2004).

information technology (IT) – The application of computers and other electronic media devices to support the transmission of information.

millennial students – See net-generation students. Term used interchangeably within research study.

net-generation students – Students who prefer technological experiences that exhibit clear objectives, enhance motivation, and involve authentic learning activities (Oblinger, 2004). In addition, they have an information technology mindset along with a highly

developed skill in multitasking and a focus on immediacy (McMahon & Pospisil, 2005).

simulation – An operating representation of central features of reality, meaning that it must represent an actual situation, either a real-life or an imaginary one that could conceivably be developed from the real world and is also dynamic and on-going in flow (Salen & Zimmerman, 2004).

CHAPTER 2: REVIEW OF LITERATURE

The literature review consists of five sections. The first section includes an overview of net-generation learners, including their characteristics and demographics; expectations net-generation students have of higher education and the workplace; and a comparison and contrast of digital natives and digital immigrants. The second section addresses various definitions and taxonomies of games, both non-electronic and electronic forms, and also expands on simulations. The third section reviews foundational and theoretical underpinnings of games in education, including problem-based learning and experiential learning. The fourth section reviews current trends of electronic learning in higher education, and the effects of games and simulations as learning machines related to effectiveness, motivation, engagement, and flow. The final section reviews current practices for interior design education with a focus on ethics.

Profile of the Net-Generation Learner

Characteristics and Demographics

A new generation of learners has entered higher education. Much has been written about the unique characteristics of net-generation or millennial students (Dede, 2005; McMahon & Pospisil, 2005; Oblinger, 2004; Prensky, 1998; Levinsen, 2007). The world in which net-generation students have grown up is rich with technology, information, and digital media that they have been exposed to from a very young age (Levinsen, 2007). To today's college student, technology refers to computers, televisions, cell phones, personal data devices, and anything digital. Net-generation students, those born between 1982 and 2000, started using computers as teenagers, and most were using computers by the time

they were 16 to 18 years of age (Oblinger, 2004). In a recent national survey, 86% of college-age students acquired a computer before starting college and 17% (approximately one million) planned to purchase a computer within the next 12 months (Student Monitor, 2008).

Technology has been and will continue to be a major part of everyday life for millennial students. For example, for this student group, an average of 19 hours per week is spent online, nine of ten students own a cell phone, and 88% of students access the Internet at least daily (Student Monitor, 2008). Prensky (2004) estimated that by the time individuals reach 21 years of age, they will have spent 5,000 hours reading, 10,000 hours playing video games, 10,000 hours on cell phones, 20,000 hours watching television, and have sent 250,000 e-mails. Why are people drawn to technology and gaming?

People have been drawn to games over the years due to their social and cultural interactive nature. This interactive characteristic has transitioned from physical, face-to-face games to digital games, but still the same social forces apply. Children have grown up playing games, whether face-to-face, using the computer, video, or Internet. Core concepts of games are deeply rooted with meaningful play (Salen & Zimmerman, 2004). The initial appeal of games is fun, but are there deeper elements that may provide new instructional strategies for educators? This digital instructional strategy needs to be developed after considering characteristics of the net-generation.

As a reflection on the amount of time spent with technology, net-generation students have become multi-task oriented. They have adapted to continuous multitasking and switch from one activity to another quickly, having become accustomed to fast

everything, from food to downloads. Net-generation minds have adapted to speed and thrive on it. Prensky (1998) described cognitive style changes within the net-generation by stating that they have had far more experience at processing information more quickly (using twitch speed) than their predecessors (using conventional speed). Yet, when net-generation learners enter the college classroom or the workplace, instructors or employers typically put them in traditional classroom settings and bring in speakers to lecture to them (Prensky, 1998). Prensky went on to review the cognitive styles of linear processing versus parallel processing: linear processing indicates the ability or need to carry out one task at a time, whereas parallel processing occurs when various tasks can be carried out at the same time. Research on the net-generation is mixed on whether multitasking results in an easily distracted style of gaining information or a sophisticated form of synthesizing information (Dede, 2005). Both higher education and the corporate workplace could benefit from additional insight into the learning characteristics and needs of the net-generation.

Expectations in Higher Education and Workplace

How can instructors in higher education and employers in the workplace shift to meet the needs of the net-generation? Has interface with multiple technology tools affected the net-generation's learning styles? Net-generation students approach the educational experience much like they do the rest of the world, by redefining the role technology plays. The face of higher education must balance the expectations of this technologically-savvy student generation with the perspectives of an older generation of faculty (Campbell & Oblinger, 2007).

Some researchers (Dede, 2005) found that due to many emerging technologies such as multiuser virtual environments (MUVE) and augmented realities with mobile wireless devices, new “millennial learning styles” have emerged. Dede went on to cite that the standard “world to desktop” interface is now complemented by “multiuser virtual environments in which people’s avatars interact with each other, computer-based agents, and digital artifacts in a simulated context, and also by augmented realities in which mobile wireless devices infuse overlays of digital data on physical real-world settings” (p. 7).

Presently, many instructors design and deliver instruction that has a “one size fits all” approach to content, pedagogy, and achievement/assessment. The student takes a passive role; the instructor, an active role. Assessment consists of tests, writing papers, and other individual performance methods. Dede (2005) predicted that in the future, student projects will often involve products based on new forms of media such as developing a simulation or web page to express basic understanding and comprehension of a particular profession, rather than authoring a paper. In the same sense, employers of millennial students also will need to be cognizant of how they manage, train, connect with, and retain them once they have entered the workplace.

Chester (2002) wrote that workplace training of the net-generation should be made fun and stimulating. It should be engaging by actively involving the net-generation in the learning process and by making material look fresh by integrating interesting color and varying graphic mediums. Information should also be dynamic, non-sequential, and most importantly, clear and succinct about what and how to do something and to follow it

up with an explanation as to *why* it is important. Chester (2002) also stated that management techniques, in general, should include less rigid strategies, and net-generation employees will look for more authenticity and connectedness within their workplace. This apparent generation gap, whether focusing on net-generation employees and their employers or on net-generation students and their instructors, needs to be continually addressed. Literature has continued to create new linguistic terms to further define this generation gap.

Digital Natives and Digital Immigrants

Current linguistic terms surrounding the integration, or lack thereof, of technology in higher education includes “digital natives” and “digital immigrants.” *Digital natives* have been defined as people who are digitally literate, intuitive, and instinctive compared to *digital immigrants*, who may use digital technology, but are less intuitive and instinctive in doing so (Cameron, 2005). Regardless of the language surrounding various generations, the age of digital technology has become all-encompassing, and today’s generation gap appears to be less about ideological or demographic differences and more about demonstrated comfort and ability with the tools of everyday living (Cameron, 2005). These tools for instructors in higher education are teaching and learning tools. How have digital immigrant instructors addressed their ability to create effective and engaging learning environments for digital natives?

Current research has uncovered the phenomena of digital immigrants teaching digital natives. Levinsen (2007) explained this changing relationship between students and instructors and how it is representative of the current industrial society’s top-down

educational practices conforming to the information society's more flexible and horizontal network educational practices. Most instructors were born into an industrial society where mobile information technology was not everyday practice. When faculty members were students themselves, most experienced learning environments characterized by face-to-face contact, print-based media, and limited interaction (Campbell & Oblinger, 2007). This experience is compared to the unfolding information society where first generation students live every day with information technology, and these tendencies could be considered innate. How can digital immigrants be prepared to better address the learning needs of digital natives?

In a study by Becker (2007), a graduate-level digital game-based learning course was designed and taught to instructors. The study was formed around the argument that instructors "cannot be expected to embrace digital games as tools for learning without confidence in their own abilities to use games effectively to enhance learning, or without a sound understanding of the games' potential as well as its limitations" (p. 482), thus bridging the generation gap between digital immigrants and digital natives. The course structure followed a typical graduate seminar-style course where participants had weekly readings, presentations, and an instructional development project with overall content including an introduction to digital games and gaming for instruction and learning. A unique characteristic of this study was that the participants got to play various games thus expanding their experience base of gaming. The study concluded with the course being very well-received by the participants and the hope that future instructors would be able to use digital games and develop them as both authentic and effective learning mediums.

Another study of 831 undergraduate faculty from various disciplines within the State of California conducted by Harley (2007) found that only 19% used digital resources such as simulations in their teaching. Additionally, he found that 66% did not use digital resources in teaching situations because they did not have time to use or learn them. The majority of faculty (75%) did not use digital resources because they did not see a match between using them and their own preferred approaches to learning.

There is a need to identify teaching media that will benefit both the digital immigrants and the digital natives, and how this determination will affect the future of higher education. Higher education faculty need to harness the electronic medium of simulations and games so digital natives are engaged, and discipline-based pedagogy is effective and authentic. Digital immigrants must leverage technology and continually reassess their role in the learning process (Campbell & Oblinger, 2007). Before engaging in a full discussion of gaming in higher education, a look at the literature surrounding educational definitions and taxonomies of simulations and gaming is necessary.

Defining Games for Education

There are many different definitions within the literature explaining what characteristics comprise a game and what activities make a game. This section will start by reviewing the definition of the word *game* used for this research study, as well as others found in the literature; continue by detailing activities that make games; and conclude with detailed categories, or taxonomies, of games.

For the purpose of this study, the word *game* will be defined as a system in which players engage in an artificial conflict, defined by rules that result in a quantifiable

outcome (Salen & Zimmerman, 2004). The key elements of this definition are that a game is a *system*; *players* interact with the system; a game is an instance of *conflict*; the conflict in a game is *artificial*; *rules* limit player behavior and define the game; and every game has a *quantifiable outcome* or goal.

Salen and Zimmerman (2004) deciphered the definition into more detail. A system is a set of parts that interrelate to form a complex whole. There are many ways to frame a game as a system including mathematically, socially, culturally, and representationally. In addition, there are four elements all systems share, which include objects, attributes, internal relationships, and the environment; and these exist in three framing levels: formal, experiential, and cultural. Lastly, systems can be open, where environmental exchanges occur, or closed, where the system is isolated from its environment.

Looking more closely at the definition of game and its reference to players interacting with the system in its most basic sense, the interactive nature of a game is achieved by designing action that leads to an outcome with players involved in active play experiences. The player typically has a choice or the opportunity to construct a choice either through an internal (within the system) event or an external (outside the system and represented by the player) event.

In addition, all games embody a contest of powers, and this contest can take many forms, from cooperation to competition or from solo, non-physical conflict with a game system to multiplayer social conflict. It is the tenet of conflict that is most central to games (Salen & Zimmerman, 2004). Conflict, however, does not have to be real within

games, but can be artificial. Games maintain a boundary from the real world in both time and space, and it is the artificial characteristic that is one of games most defining features.

Games would not be games without both rules and a quantifiable outcome. Rules, as stated by Salen and Zimmerman (2004), are a crucial part of games and provide the structure out of which play emerges by delimiting what the player can and cannot do. Quantifiable goals or outcomes are needed at the conclusion of a game because a player has to have either won, lost, or received some sort of numerical score. It is the characteristic of a quantifiable outcome that usually distinguishes a game from less formal play activities.

In Salen and Zimmerman's review of games (2004), Partlett, a game historian, defined game by separating it into informal and formal and categories. An informal game is described as undirected play, whereas a formal game is described as a twofold structure based on ends and means. Ends are viewed as a contest with an endpoint as its goal, and means are the agreed-upon rules and materials by which one wins the contest. Both the idea of winning and the idea of doing so by means of rules are key concepts to defining game.

Compared to the previous concrete definition, Huizinga's 1944 anthropologic view of game is focused on the element of *play* (Salen & Zimmerman, 2004). Huizinga asserted that play is outside ordinary life, is not serious, is utterly absorbing, is not to be associated with material interest or profit, takes place in its own boundaries of time and space, proceeds according to rules, and creates social groups that separate themselves

from the outside world. This definition considers the abstract qualities of play but does not specifically differentiate between *game* and *play*.

Crawford (1982), a pioneering computer game designer, while not specifically stating a definition of game, listed four primary elements that define the category of things we call games: representation, interaction, conflict, and safety. Representation is a closed formal system that subjectively represents a subset of reality where the game is self-sufficient in structure and has rules. Interaction is based on the social and personal world of cause and effect by which all things are tied together and games provide this interactive element. Conflict arises naturally from the interaction in a game, and the player actively pursues a goal by overcoming obstacles. Safety, the last element iterated by Crawford, means a safe way to experience reality.

More recent definitions of game have developed with a focus on computer-based games. Dempsey et al. (2002) described a game as a set of activities involving one or more players that has goals, constraints, payoffs, and consequences. Furthermore, they stated that a game is rule-guided and artificial in some respects and has some aspect of competition. Similar to characteristics of previous definitions, Prensky (2001) reiterated that a game contains six structural elements including rules, goals, outcomes and feedback, competition or challenge, interaction, and representation or story.

It has not been substantiated by the literature if all elements, even those elements above and beyond those noted by the cited authors, need to be included in a definition of games. What is clear by the review is that there are other activities like games.

Taxonomies and Genres of Games

Researchers have not been able to agree on whether other game-like activities are actually games. This lack of agreement has led to overlap among definitions. There are many similarities between simulations and games. The term “simulation game” has often been used to describe an object that has characteristics of both.

For the purposes of this study, the definition of *simulation game* by Salen and Zimmerman (2004) will be used and is described as an operating representation of central features of reality. It assumes that an actual situation or real-world event must be represented, either from real life or an imaginary situation and that it must be operational via an on-going process. Simulations show genuine cause and effect, and while they can be explored, they contain no definite goal (Beasley, 2004). Other researchers have also described key differences between simulations and games including Crawford (1982):

A simulation is a serious attempt to accurately represent a real phenomenon in another, more malleable form. A game is an artistically simplified representation of a phenomenon ... the game designer simplifies deliberately in order to focus the player's attention on those factors the designer judges to be important. The fundamental difference between the two lies in their purposes. A simulation is created for computational or evaluative purposes; a game is created for educational or entertainment purposes. There is a middle ground where training simulations blend into educational games. (chap. 1)

Another game-like activity similar to simulation is that of role-playing. One type of role-playing game can involve the computer and can either be a single-player or multi-

player adventure game where the player controls and evolves a character over time within a narrative setting. The second type of role-playing game can be paper-based tabletop role-playing game. This type usually involves dice, rulebooks, statistics, and a fair amount of strategic play. Role-playing utilizes many of the game elements as previously noted with the exception of a quantifiable outcome (Salen & Zimmerman, 2004).

Another game-like activity is puzzles. As described in Salen and Zimmerman (2004), puzzles are first described as different from games because puzzles have a correct answer or outcome, such as a crossword puzzle. In a crossword puzzle, the puzzle designer creates the correct answer, and the player's activity consists of trying to reconstruct the answer. However, even though the conflict is between the player and the system rather than between a set of players, a crossword puzzle is a game. One could almost look at them as a special subset of games.

More holistically, games have been segmented into specific genres, each with different educational potential. These genres include action, fighting, driving or flying, sports, 3D shooter, card or board, strategy, fantasy role playing, adventure, multiplayer, massively multiplayer online role-playing games, and various combinations (Quinn, 2005). In addition, researchers have also tried to classify games, both non-electronic and electronic into taxonomies. A taxonomy is a way of organizing a large number of related objects, and some of these taxonomies are relevant to this study.

Earlier taxonomies, such as those developed by Crawford (1982), start by defining five major regions of games: board, card, athletic, children's, and computer. Crawford then proceeded to divide computer games into two broad categories: skill-and-

action games (emphasizing perceptual and motor skills) and strategy games (emphasizing cognitive effort). Each major category has several subcategories. Skill-and-action games include combat, maze, sports, paddle, race, and a miscellaneous sub-category. Strategy games include adventure, Dungeons and Dragons, wargames, games of chance, educational and children's games, and interpersonal games. Creating a taxonomy of games more recently, Prensky (2001) broke down computer games as action, adventure, fighting, puzzle, role-playing, simulation, sports, and strategy. Prensky's taxonomy is closely related to the genres noted by Quinn (2005).

Regardless of their definitions, genres, and taxonomies, games have been around for a very long time. As instructional tools, they were first used in China as early as 3000 B.C. (Dempsey et al., 2002), and they are now transforming educational settings, including higher education. Another issue to investigate is gaming models. Gaming models can be based on frameworks and other theoretical underpinnings or be developed less formally. Several studies address this issue.

Theoretical Models of Gaming and Learning for Education

Games have been a very influential part of society for quite some time. In recent years, however, there has been an influx of games used in the arena of higher education. Unfortunately, it seems that educational games are seen as new magic tools that will integrate computer-assisted learning in the classroom (Kiili, 2007) or as frivolous distractions that don't warrant serious attention by higher education professionals. Games have been used to satisfy the basic requirements of learning environments and can provide an effective, engaging, and authentic format for learning to occur (Connolly,

Stansfield, & McLellan, 2006; Druckman & Ebner, 2008; Herrington, Oliver, & Reeves, 2002; Kumar & Lightner, 2007; Lainema & Lainema, 2007; Ruben, 1999; Solvie & Kloek, 2007; Whitton & Hynes, 2006). However, there is some evidence that higher education often has not managed to develop students' abilities to apply their knowledge in complex, ill-defined practical situations (Kiili, 2007). Kiili (2007) surmised that the real state of educational game research does not provide enhanced and engaged learners because research is mainly directed to the game *design* issues and not the *learning* issues. Part of this misconception has to do with the term *game theory*.

The term game theory has been used loosely in the past and has often been assumed to be a theoretical approach to games. However, game theory means something quite different and specific; it is a theoretical branch of economics that can be traced back to the work of two mathematicians, Oscar Morganstern and John Von Neumann (Salen & Zimmerman, 2004). Salen and Zimmerman described game theory as the mathematical study of decision making. It looked at how people behave in specific circumstances that resemble very simple kinds of games. The theory was intended to be used as a scientific and rational approach to the study of economics and was, at its conception, being introduced at a time when Marxism was the prominent ideological approach. Even though game theory has not risen as the prominent methodology in economics, it still can be used, in part, for game design and the relationship between decisions and outcomes (Salen & Zimmerman, 2004). What is still required to substantiate the argument for integrating gaming with learning is a theoretical base.

Educational games are argued to enhance learning, engage learners, and provide learning methods that correspond with students' learning styles (Dede, 2005; Prensky, 2001). However, educational game research does not provide an account for the promises because game research seems to be primarily focused on the game design issues, thus separating it from learning (Kiili, 2007). Kiili went on to argue that most educational games resemble digital exercise books and do not utilize the powerfulness of games as an interactive context-free media. Current research is calling for consistent theoretical underpinnings for game-based research. A common denominator within many of the studies is the proposal that theoretical frameworks for electronic game-based research be centered around a problem-based or experience-based framework grounded in experiential learning theory (DiPietro et al., 2007; Kiili, 2007; Lainema & Lainema, 2007; Spectre & Prensky, 2001).

DiPietro et al. (2007) hypothesized that providing a foundational research framework for educational gaming has been difficult to attain due to two reasons. First, the diversity of academic fields using electronic game research, such as media literacy, psychology, computer science, and education, is so great that multiple perspectives have resulted. Secondly, even though research on gaming is not necessarily new, there has been a recent resurgence with electronic gaming, and the research base from which to draw important implications for teaching and learning is limited.

Having presented the problems with attaining a framework, DiPietro et al. (2007) goes on to propose one. They developed a five-element framework for understanding educational gaming: pedagogy, psychology, media effects, genre, and design. The

pedagogy element relates to teaching practices and strategies used in association with the use of electronic games in classrooms. Many factors should be considered when a teacher wants to use electronic games in the classroom, with the most important factor being pedagogical strategies for student game play to provide maximum learning opportunity. For example, the type of hardware and games selected in relation to the content and student population must be considered.

DiPietro et al.'s (2007) second element of the framework is *psychology* and was defined as research focusing on the mental and cognitive processes engaged during electronic game play. Looking at electronic game environments from a psychological perspective provides direction for understanding the potential for supporting learning. The researchers reiterated the values of both the active learning environment and the social world context.

The third element of *media effects* was defined as the research focusing on the effects and impact of electronic game play on players. The study noted that more research needs to be conducted to study the effects of game play in regard to violence, gender-based effects, and mental and physical states.

The fourth element of *genre* was defined as research focusing on the structural elements that make up electronic game communities including their style, form, and content. The genre elements form a game's narrative structure and support the player's transition into a flow state. It is within this flow state that opportunities for game-based interaction and engagement increase, thus allowing the player to have greater control over the action and make changes to reflect upon it. As players are engaged in a game

space and interact with its narrative structure, personal values, opinions, and identities can be explored illustrating a synthesis between player and game.

The final element of the gaming framework proposed by DiPietro et al. (2007) is *design*. It is defined as research focusing on the strategies of electronic game design that support playability and player enjoyment. For a game to be most effective in its delivery of content, it must be consistent with the types of games students play to produce the same types of enjoyment and interest that sustains play. They recommended considering new forms of interaction that reflect effective teaching strategies when designing an educational game.

Regardless of the exact elements that lead to the development of a framework for educational gaming, a common thread with many of the studies is that of problem-based and experience-based learning and gaming.

Problem-Based Learning in Gaming

The overall goals of collaborative problem-based learning are to develop content knowledge in complex domains, as well as skills in problem solving, critical thinking, and collaboration. Values upon which this theory are based include: learning to use naturally effective collaborative processes; critical-thinking and problem-solving skills; rich social contexts and multiple perspectives for learning; learning environments that are situated, learner-centered, integrated, and collaborative; authenticity, ownership, and relevance of the learning experience for students; cultivating supportive, respectful relationships among learners, and between learners and instructors; and developing a desire for life-long learning and the skills to sustain it (Nelson, 1999). Traditionally,

problem-based learning has been used in vocational education and real-life situations and can also be utilized in educational games (Kiili, 2007).

The problem-based gaming approach emphasizes the meaning of authentic learning tasks, experiential learning, and collaboration. Authenticity, another key value of learning situations and tasks, is assumed to be a very important factor in facilitating higher order learning. In games, the storyline and the game world can be used to contextualize the problems included, thus emphasizing the collaborative nature of problem solving (Kiili, 2007). Authenticity in learning can also include providing realistic situations that are of relevance to the learner. However, in addition to the components of authenticity and relevance, a gaming model also needs to consider its overall strategic blueprint.

As detailed in Killi's study (2007), the underlying framework for the problem-based gaming process starts with strategy formation by the players. The player tries to form an appropriate playing strategy, based on prior experiences, to solve the problems or scenarios that the game provides. If the prior knowledge about the subject domain and the game genre is inadequate for that, the player may start the gaming process by simply exploring the game world. However, after strategy formation, the player tests the strategy and possible hypotheses in the game world and observes the consequences of those actions. One of the most important constructs to problem-based games is reflection, which occurs after an active experimentation phase. The outcome of the reflection phase may be personal synthesis, appropriation of knowledge, validation of hypotheses laid

during playing strategy formation, or a new strategy to be tested. It should be noted that reflection may take place either in isolation or with collaboration with other people.

Killi (2007) observed that after reflection occurs, the game is divided into a private and a shared world, but stressed that ultimately, regardless of collaboration or not, critical reflection and knowledge construction occur in the private world. It is this outcome of the reflection process that determines the player's behavior in the game. Does the player continue to apply the previously formed playing strategy or focus attention on changed variables of the game world to create better playing strategies? If the performance of the player is based on only one particular strategy, the gaming strengthens only those schemata that are related to this strategy. Killi also recommended that from a creative problem solving and comprehensive learning point of view, it is important that the player tries to test different kinds of strategies to expand knowledge on the subject matter and optimize the playing strategy. Comparatively, literatures indicated experiential learning theory was another appropriate basis for game development.

Experience-Based Learning in Gaming

Traditional education was guided by the paradigm of didactic instruction, but now there is an emphasis on experiential learning as a philosophical, theoretical, epistemological, and pedagogical approach to electronic gaming and learning in education (Gosen & Washbush, 2004; Kiili, 2005; Lainema & Lainema, 2007; Ruben, 1999). As stated by Kolb (1984), the experiential learning model

pursues a framework for examining and strengthening the critical linkages among education, work, and personal development. It offers a system of competencies

for describing job demands and corresponding educational objectives and emphasizes the critical linkages that can be developed between the classroom and the “real world” with experiential learning methods. (p. 4)

From earlier influences of Dewey, Lewin, and Piaget, experience-based learning has become widely accepted as an effective method of instruction in higher education (Kolb, 1984). Dewey, an early educational philosopher and often called “father of education,” stressed the attempt for unity through relationships between the processes of actual experiences and education. Lewin, even though the scope of his work was broad, was best known for his work on group dynamics and the methodology of action research. Through this early work, the applied technology for experiential learning evolved in a variety of tasks such as structured exercises, simulations, cases, and games (Kolb, 1984).

In addition, Piaget’s theory described how intelligence can be shaped by experience, not by innate individual characteristics but as a product of the interaction between the person and the environment. His work emphasized the importance of understanding the structure of a subject being studied, the need for active learning as the basis for true understanding, and the value of inductive reasoning in learning (Woolfolk, 2004).

Similar to the work of Piaget, Bruner, an American cognitive psychologist, hypothesized that learning would be more meaningful, useful, and memorable for students if they focused on understanding the structure of the subject being studied instead of specific facts and details. The active nature of this principle was a key element to his theory and is currently tied to experience-based education. Students must identify

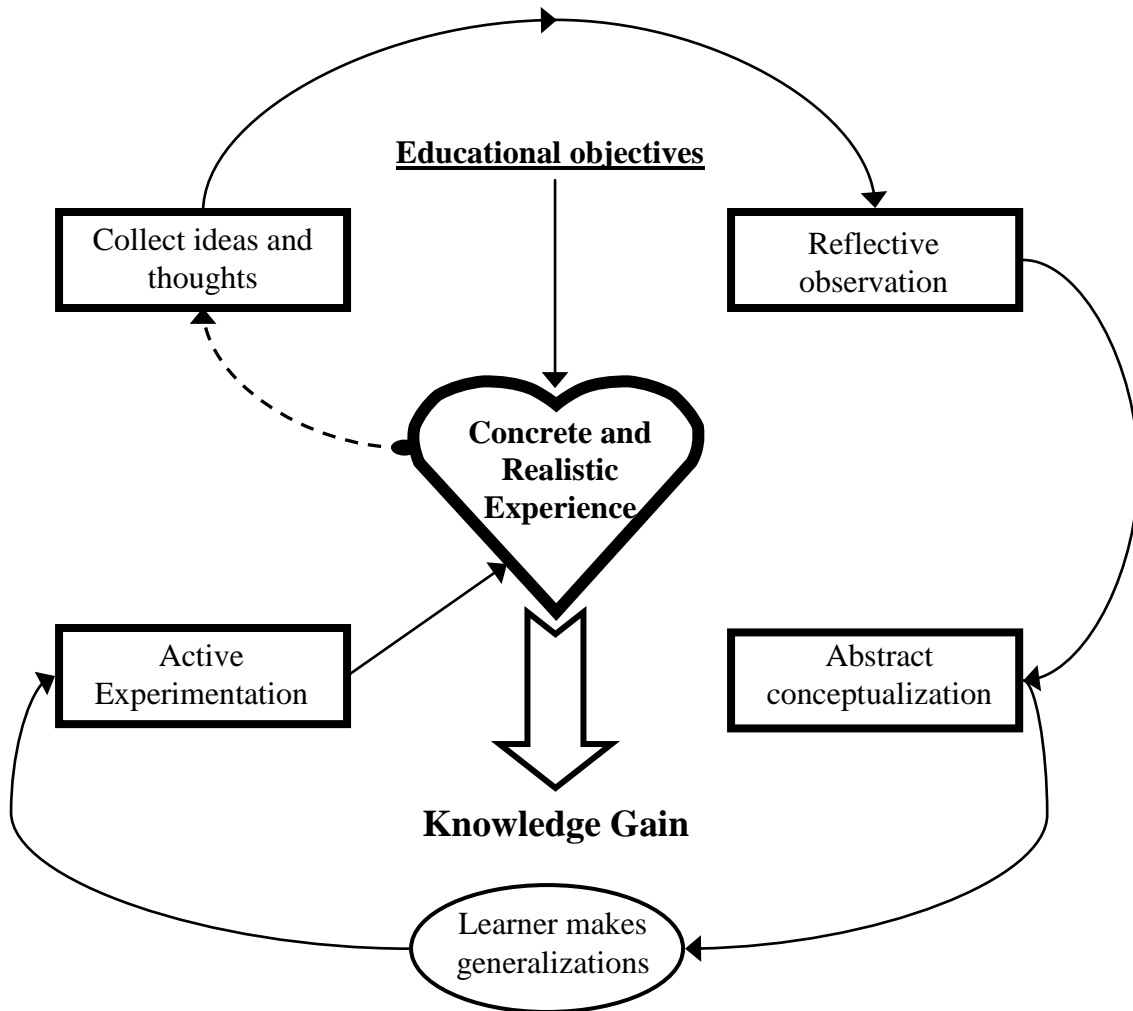
key principles for themselves rather than simply accepting the instructors' explanations, termed *discovery learning*. This process will lead to inductive reasoning, which takes place by using specific examples to formulate a general principle (Woolfolk, 2004).

Contemporary characteristics of experiential learning, all grounded by the earlier work of Dewey, Lewin, Piaget, and Bruner, include that learning is best conceived as a process, not in terms of outcomes; learning is a continuous process grounded in experience; learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world such as concrete experience and abstract concepts; learning is an holistic process of adaptation to the world; learning involves transactions between the person and the environment; and learning is the process of creating knowledge (Kolb, 1984).

Core values surrounding this theory include the need for direct experience and reflective observation. Kolb's (1984) four-stage experiential learning model is central in the theory of experiential learning and has inspired developers of digital learning environments. According to the model, learning begins with a concrete experience and is followed by collection of data; then reflective observation occurs about that experience. It is within the abstract conceptualization stage that the learner begins to make generalizations, draws conclusions, and forms hypotheses about the experience. In the final stage, the hypotheses and ideas are tested through active experimentation in new circumstances. Figure 1 was developed to illustrate the basic theoretical model of experiential learning. It is the continuous and cyclical nature of this model that supports

learning and the goal-directed action of the learner (Kiili, 2005) and upon which this study will be grounded.

Figure 1. Theoretical model of experiential learning.



Numerous studies have recently integrated experiential-based and/or problem-based frameworks for inquiry including educational simulation, gaming, and/or technology (Connolly, Stansfield, & McLellan, 2006; Kiili, 2007; Lainema & Lainema, 2007; Oblinger, 2004; Ruben, 1999; Solvie & Kloeck 2007). More specifically, the study

by Lainema and Lainema (2007) utilized the tenets of experiential-based learning to frame their study on advancing acquisition of business know-how. They created a learning environment based on a concrete experience that illustrated complexity within an authentic manner to provide relevant knowledge that could be later applied in the actual working environment. Using a simulation provided the learner the opportunity of facing a realistic problem as a professional. It was both the constructs of active experimentation and learning-by-doing that supported the theory of experiential learning in this study. In addition, the study included gaming elements advancing expertise knowledge acquisition within the context of business practice. The elements included empowerment, learning by doing, authenticity, intensity, complexity, and collective experience.

It is the hope that when one learns, learning occurs by transferring from one situation to another. Oblinger (2004) states that if learning is individually constructed, the attitudes, beliefs, and knowledge a learner brings into a new situation matter, and this existing learning becomes the foundation for whatever learning and situations follow. Learning information in a context of use enables people to move beyond rote learning and acquire the competence to use and re-use knowledge in new situations. This ability to transfer learning is critical for competence (Oblinger, 2004). Key points from each of the cited frameworks will serve as the research framework for developing the proposed electronic simulation game in this study, detailed further in Chapter 3. Further insight, however, still needs to be reviewed on current trends, practices, and benefits of electronic game-based research and disciplines currently utilizing this learning medium.

Current Trends in Electronic Simulation/Game-Based Research

There is a growing body of evidence to support the integration of technology and electronic-based simulations and gaming in higher education (Becker, 2007; Connolly, Stansfield, & McLellan, 2006; Dede, 2005; Kiili, 2007; Lainema & Lainema, 2007; Oblinger, 2004; Solvie & Kloeck 2007; Levinsen, 2007; Whitton & Hynes 2006; Williamson-Shafer, Squire, Halverson, & Gee 2005). Research studying the effectiveness and cognitive gain of educational use through computer games and simulations has been conducted in various disciplines including math, health and medicine, science, geography, engineering, military, education, geography, reading, physics, history, social studies, business and business management, and design (Engenfeldt-Nielsen, 2007).

The role of computers in education has changed over the past several years and advances stem largely from the increased power, accessibility, and graphic capabilities of current computers (Vogel et al., 2006). Games/simulations can be used for quick demonstrations in the midst of a classroom lecture or more ambitious ones might be used over one or more class periods as central learning activities (Oblinger, 2004). They can also function as out-of-class self-directed learning exercises or homework assignments, allowing students to work through challenges on their own. They could also be used with possible problems as a final examination, testing what the student learned by applying it to a specific task, activity, or design problem. An overarching question still remains: Are there differences in learning effects with utilizing electronic simulations in educational environments?

Effects of Electronic Games as Learning Machines

Gaming related to effectiveness, motivation, engagement, and flow.

Oblinger (2004) cited a number of ways that electronic simulation and gaming could be used in higher education by suggesting the following: using small-scale games for quick demonstrations in conjunction with lecture, as homework assignments, as immersion environments with multiplayer games, and as simulations for creating a virtual world of decision making to promote active learning, to name a few. Game play in genres such as role-playing, simulation, and real-time strategy can be applied to address a range of cognitive and metacognitive skills (Wideman et al., 2007). Computer simulation tools such as Interactive Scenario Builder and Pachyderm have been used in higher education to create effective and engaging learning experiences (K. Brown, personal communication, April 21, 2008).

Simulations, games, effectiveness, motivation, and engagement are sometimes hard to quantify due to the subjective nature of the medium and limited quantifiable outcomes. However, a meta-analysis was conducted by Vogel et al. (2006) comparing studies that hypothesized cognitive gains or attitudinal changes while assessing traditional classroom teaching versus computer gaming and/or interactive simulation teaching. Of the number of participants ($n = 8,549$) included in the meta-analysis, overall data suggested significantly higher observed cognitive gains in participants who learned through the use of interactive simulations or games versus those who learned through traditional teaching methods. This difference could also be considered an overall view of effectiveness as measured by achievement. In addition, a main effect was also found

suggesting that participants' attitudes (motivation and engagement) toward learning when using the computers were significantly better than those who learned through traditional teaching methods.

Motivation has not only been used as a measure of gaming effectiveness by the players, but also has been used in the design of educational computer games. One of the main reasons often cited by researchers for the potential value of educational simulations and games is the positive motivation of students to play them (Whitton & Hynes, 2008). Malone and Lepper (1987) presented a theory of intrinsic motivation in the design of educational computer games. They postulated that this characteristic is created by four elements including fantasy, challenge, curiosity, and control of three interpersonal factors: cooperation, competition, and recognition. Additional work regarding motivation and computer gaming was completed by Dempsey, Haynes, Lucassen, and Casey (2002). This study was directed at examining the educational potential of 40 different computer games including simulations, adventure, puzzles, board, card, and arcade. They examined which aspects of these games were either motivating or distracting. The study failed to address the fact that some adults may not be as motivated as others to play computer games. Similar to perceived motivational aspects of digital simulations and games is the attribute of engagement.

Student/learner engagement is an ongoing challenge for classroom instructors, and has been a highlighted area of inquiry. Hake (1998) studied the effects of engagement and cognitive gain for over 6,500 students in an introductory physics class by comparing traditional lecture methods with interactive hands-on activities. The pre-

test and post-test experiment demonstrated larger cognitive gains in conceptual knowledge for students in the interactive engagement treatment group. Also, the interactive engagement group demonstrated more advanced problem solving skills and positive effects of engagement compared to the traditional lecture group. A recent two-part study by Kumar and Lightner (2007) investigated perceptions of interactive classroom teaching techniques for 62 college faculty members and 45 corporate trainers. The first part included a survey about their current teaching and training methods, and the second part focused on an intervention. For the intervention, five faculty members were mentored to change traditional lectures to interactive games within their classrooms. The 68 students of the five faculty instructors who used interactive games to replace a lecture rated the experience as generally more positive than the lecture.

Characteristics of engagement and what makes a learning activity engaging are mixed. However, a study completed by Herrington, Olivier, and Reeves (2002) proposed patterns of engagement for creating authentic learning environments. The study noted there is “increasing evidence that in order to fully engage with an authentic task or problem-based scenario, students need to engage with a process that is familiar to moviegoers through the suspension of disbelief” (p. 60). Stated another way, students must accept the fundamental basis for the simulated world in which they are immersed before engagement is possible. Literature uncovered another construct related to engagement, particularly within gaming environments’ flow.

The intention of developing educational gaming models linked with experiential learning is to facilitate flow experience (Kiili, 2004). Past research has demonstrated that

the flow state can have positive impacts on learning (Webster, Trevino, & Ryan, 1993) and should be considered when developing digital educational gaming models.

Csikszentmihalyi (1975) first introduced the concept of flow through studying people in activities such as rock climbing, chess, and dance. During optimal experience within the state of flow, a person is in a psychological state where he or she is so involved with the experience that nothing else matters. In general, flow is described as a state of complete engagement in an activity, resulting in this optimal experience (Kiili, 2004). The integration of flow for increased engagement is demonstrated within the experiential gaming model discussed in Chapter 3.

Overall, higher education is seeing a predominant surge toward the implementation of electronic simulation and gaming to create effective, engaging, motivating, and authentic learning environments. Even though simulations and games have been implemented in various disciplines as learning devices, the review of literature identified limited information within the discipline of design education, specifically interior design.

Current Practices for Interior Design Education

Education for interior design is situated within six dynamic knowledge categories: human environment needs; interior construction, codes, and regulations; design; products and materials; professional practice; and communication (Martin & Guerin, 2006). Both the practice of interior design and the education of interior design undergraduate students use these categories as defining and pedagogical elements. Specifically, the knowledge category of *human environment needs* looks at understanding human behavior and how

humans interact with the built environment and with one another through exploring topics such as programming, research, human behavior and design theories, accessibility issues, and cultural factors and influences.

Other key knowledge area elements that define the profession and education of interior design include interior construction, fire and life-safety principles, codes, regulations, lighting design, and interior space planning. In addition, practitioners must master the design process and integrate it with design theory and evidence-based design, specifying appropriate products, materials, finishes, furnishings, fixtures, and equipment, color principles, and communication via oral, written, and graphic methods (Martin & Guerin, 2006).

The knowledge category of *professional practice*, which includes elements such as construction administration, business practices, consultant work, ethics, legal responsibilities, and project management is used as the premise for this study. Specifically, the focus is on business practice including the content of ethics.

The study of ethics is the study of human conduct and moral values and may refer to a set of values or moral systems. It comprises duties and standards of conduct for individual persons, groups, and professions; includes writings and treatises on ethics; and entails critical reasoning with respect to moral considerations (Wasserman, Sullivan, & Palermo, 2000). Professional ethics for the interior design student includes topics such as ethics in the business environment, professional conduct, and disciplinary procedures, and it is often addressed in a business practice class (Piotrowski, 2008).

A commonly used resource by undergraduate interior design programs for the study of professional ethics has been the textbook by Piotrowski (2008). One chapter has been dedicated as an overview of ethical concepts and issues related to the professional practice of interior design. Ethical definitions, terms, and concepts have been explained and reviewed in the context of interior design practice. In addition, various examples of ethical situations have been presented to the student in the form of mini-scenarios to formulate realistic content.

Frequently, ethics content within an interior design business practice class has been delivered by combining the didactic teaching method of lecture with the self-directed teaching method of reading and responding to various written case studies. Current teaching methods within interior design minimally utilize interactive technology and have yet to step into an educational gaming model. The following case study is an example used to evaluate an interior design student's application and knowledge of ethic principles (Wasserman, Sullivan, & Palermo, 2000):

XYZ Interior Designers were to be interviewed by the church building committee as a potential firm to design the interior of a church. The firm understood that it was one of four firms under consideration. Before the interview, the designers learned that the church had a contract with an architecture / engineering / interior design firm to provide consultant services to support the church in its effort to procure the proposed building site. XYZ Interior Designers indicated to the church committee that it was not interested in being interviewed while another firm was under contract. The attorney for the church informed XYZ Interior

Designers that the consulting architecture/engineering/interior design firm would not be considered for the design of the proposed church. Once the property had been procured, the architecture/engineering/interior design firm would be released. XYZ Interior Designers then agreed to be interviewed. The firms were interviewed at the current church office by the chairperson of the building committee. During the interview, in response to a question, the XYZ Interior Designers made it clear they would not disclose a fee for professional services before the church implied that XYZ Interior Designers was the selected firm. A few days later, however, the chairperson of the church requested XYZ Interior Designers submit a fee proposal without any assurances beyond the statement they were on a short list of two firms and under serious consideration. At that time, XYZ Interior Designers submitted a fee proposal. After not hearing further from the church committee for approximately 30 days, XYZ Interior Designers called the building committee chairperson to get an update on the status of the final selection process. To the designers' surprise, they were informed that a contract had already been negotiated with another firm. The chairperson told them that the decision had been difficult, particularly in the light of the design strengths of XYZ Interior Designers and their strong client references. XYZ Interior Designers later learned that their fee proposal had been provided during the 30-day period to the other firm under consideration, which they agreed to accomplish the requested services for \$5,000 less than XYZ Interior Designers had proposed.

XYZ Interior Designers pondered whether they had any legal or professional recourse.

Examples of questions the student would use to formulate their response for a case study learning exercise include the following: Did the owner and/or firm to whom a contract was awarded act in an ethical manner? Did the designers violate their own ethics in submitting their fee proposal when they did (Wasserman, Sullivan, & Palermo, 2000)?

Teaching and learning of ethics has gone beyond the profession of interior design, and at a university level has, within the past years, become a predominant focus. All colleges and universities teach ethics across their undergraduate curricula, yet not many institutions do so deliberately or make explicit attempts to coordinate the various ethical lessons (Matchett, 2008).

University instructors have wrestled with the challenging goal of incorporating millennia of cross-cultural ethics research into the demanding environment of a college or university classroom (Woody, 2008). Literature indicated recent approaches to teaching ethics has been varied, from requiring at least one course taught by a specialist in philosophical ethics to those that offered ethics units of study in an array of courses taught by faculty with no formal training in ethical theory or practice. Literature noted the majority of institutions do not have coordinated ethics across the curriculum, but that some institutions require students to take at least one course in “ethics” or “values” or “contemporary issues” (Matchett, 2008). Also, more pre-professional majors have been designed to familiarize students with the necessary codes of ethics in those fields, for example, interior design.

Topical areas that should be included for teaching ethics to interior design students include professionalism, rights and responsibilities of employees, and values and virtues. Ethics content dealing with professionalism should specifically address behavior that is considered to be un-professional, such as looking for a different job while “on the clock” at a current work place or using photographic materials of projects in a personal portfolio when the employee did not even contribute to the project. Ethical rights and responsibilities should include content of contractual agreements between employee and employer, employee responsibilities to his or her current employer, or the employer’s responsibilities to the employee, to name a few. Lastly, ethical values and virtues should also be included in the curriculum for teaching interior design students professional ethics. The topic of values and virtues should include ethical content such as what an employee does when personal values and virtues negatively impact professional decisions and job responsibilities and if these personal values and virtues should be disclosed to the employer, and when. If ethics curriculum for interior design students includes these content areas, they will be better equipped for assessing potential ethical situations and making ethical and rational judgments in the work place. Interior design students should have the opportunity to be exposed to a variety of instructional strategies when learning about the topic of business ethics.

Due to the graphic nature of the interior design profession, interior design students are visual learners and given the current net-generation of learners in higher education, it seems appropriate to further study the integration of computer simulation in the interior design classroom environment with a focus on business ethics content.

Summary

In summary, there is a multitude of research pertaining to simulation and gaming in higher education, especially due to the emergence of the net-generation or millennial student. Computer simulations, when modeled after an experiential learning viewpoint including effectiveness, engagement, authenticity, active learning by doing, reflection, complexity, and collective experience have the potential to enhance the learning outcomes of undergraduate students, specifically, interior design students. There are a limited number of studies that concentrate on integrating computer simulations within interior design undergraduate education. The lack of research plus the need to effectively teach net-generation students constitutes the basis of the exploratory study for a) determining if there are effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics , and b) determining the level of engagement of interior design students using traditional pencil-and paper instructional strategies compared to computer simulated instructional strategies to learn business ethics.

CHAPTER THREE: METHOD

Research Design

The purposes of this exploratory study were to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics and also to determine the level of engagement of interior design students using traditional pencil-and-paper instructional strategies compared to computer simulated instructional strategies to learn business ethics. The computer simulated scenarios were designed around problem-based and experiential learning theories and presented participants with in-depth interactive case studies. The participants were undergraduate interior design students at a mid-western land grant university. The independent variables were generally defined as instructional strategies and were either traditional pencil-and-paper scenarios or computer simulated scenarios. The two dependent variables were generally defined as achievement, as measured through differences in pre-test and post-test scores, and engagement, as measured with Likert-scaled questionnaires and four open-ended questions. The experiment included random selection for the instructional strategy provided to the students.

Description of Population and Sample

The target population of this study was undergraduate interior design students in the United States where business ethics content was part of the educational requirements for degree attainment. The accessible population of this study was undergraduate interior design students in the United States at a mid-western land grant university (see Appendix

A for letter of consent). The sample selection process for the participants was purposive, also termed a non-probability sample (Gall, Gall, & Borg, 2003). The study did not involve stratification of the population.

The sample of this study was selected from undergraduate interior design students taking a business ethics content class during the spring 2009 semester. Random assignment was used to distribute sample participants into either a control group or treatment group. Based on prior enrollment reviews conducted by the researcher, it was approximated that the total number of participants would range between 21 and 27. This study had 21 participants.

Instrumentation

Because the research design included two dependent variables, achievement and engagement, more than one type of instrumentation was administered. A generally accepted prescription for assessing experiential learning and simulations is to utilize pre-tests, post-tests, control and treatment groups, experimental control of treatment variables, and random assignment for groups (Kiili, 2005). However, prior to introducing the pre-test instrument, all 21 of the study participants were given a two-hour lecture and discussion opportunity on ethics by the instructor / researcher. Content included in the ethics lecture included defining ethics, the history and philosophical / theoretical tenets of ethics, and how to analyze potential ethical situations by assessing values and virtues, consequences and contingencies, and rights and responsibilities of each situation. Additionally, ethics and professional responsibility for design professionals were reviewed including ethical concepts such as conflict of interest, social responsibilities,

proprietary information, kickbacks, commissions, professional codes of conduct, and potential disciplinary procedures. At the end of the lecture, a reading from the course textbook was assigned to the study participants that reviewed ethics and professional practice issues. Based upon the lecture and textbook reading, these were the core ethical concepts upon which the following instruments were developed.

For the dependent variable of achievement, the data collection procedure commenced with pre-test scores, consisting of 15 ethics-based multiple choice questions (see Appendix B for pre-test), administered to both the control and treatment groups prior to any business ethics content instruction. After the pre-test was administered, both the control and treatment groups received identical lecture-based instruction on business ethics content during scheduled class time. Outside of scheduled class time, both groups completed the supplementary instructional strategy: the control group completed the pencil-and-paper ethics case study exercises (see Appendix C) and the treatment group completed the case study exercises in computer simulated scenarios (see Appendix D). It should be noted that regardless of the method of instructional strategy, the content of the case studies was the same. After completing the randomly assigned instructional strategy, a post-test (see Appendix E) was administered to both the control and treatment groups to assess overall effectiveness in terms of achievement with scores tabulated and mean scores examined.

The dependent variable of engagement was measured through the data collection procedure of a survey. The advantages of survey design in educational research include convenience and rapid turn around of tabulation results (Gall, Gall, & Borg, 2003). After

the supplementary instructional strategies and post-test were administered to both the control and treatment groups, an engagement survey was administered to each group. Both survey questionnaires (see Appendices F and G) contained five scaled Likert-type questions, four open-ended questions, and three demographic questions. The questions were worded to address either the control group pencil-and-paper instructional strategy or the treatment group computer simulated instructional strategy. More detail follows on each of the instruments.

Pre-test Construction

A pre-test was developed by the researcher and consisted of 15 questions on the general topic of professional ethics as well as specific ethics-based content pertaining directly to the professional practice of interior design including professionalism, employee rights and responsibilities, and values and virtues. Content was based on the ethics lecture and textbook reading. The pre-test began with directions for the study participants. Questions were divided into three sections. The first section included close-ended multiple-choice questions; the second section included true or false questions; and the third section included matching-set questions. Between the three sections, there was a balance of lower-order questions such as comprehension and basic understanding of ethical concepts and terminology along with higher-order questions such as evaluation and analysis of ethical situations to further evaluate cognitive qualities.

Pencil-and-Paper Case Studies for Achievement

Traditional pencil-and-paper ethics content case studies were received by each student in the control group as an out-of-class instructional strategy. Excerpts of interior

design and architectural related case studies from Piotrowski (2008) and Wasserman, Sullivan, and Palermo (2000) were utilized and adapted to create the final pencil-and-paper case studies. The case studies were situated to address the professional responsibility and ethical conduct of an interior designer based on various realistic design-related problems.

The pencil-and-paper case studies started with directions for completion and questions the student should consider when reading through each case study. These questions included the following:

- 1) Does this case study present an ethical situation? If so, why? If not, why not?
- 2) What would you do in this situation if you were the designer?
- 3) What would you do if you were aware of a design coworker engaging in such activity?
- 4) What would you do if you were aware of a design colleague engaging in such activity at a different company?
- 5) Does this situation fall under specific IIDA (International Interior Design Association) or ASID (American Society of Interior Designers) codes of ethics? If so, which specific items?

Three case studies were presented with overall content related to professionalism, employee rights and responsibilities, and values and virtues. Various graphic images were embedded within the text of the case studies to provide iconic reflection opportunities for the students. In addition to the questions at the beginning of the case studies, as noted above, specific and different questions directly related to the ethics

content of the case study of professionalism, employee rights and responsibilities, or values and virtues were utilized following each of the three case studies. After reading through the case studies and reflecting on the content, students were directed to write down their responses to the questions either directly on the case studies or on a separate piece of paper.

Computer Simulated Case Studies for Achievement

Computer simulated ethics content case study scenarios were utilized by each student in the treatment group as an out-of-class instructional strategy. As done with the traditional pencil-and-paper case studies, the computer simulated case studies were also situated to address the professional responsibility and ethical conduct of an interior designer based on various realistic design-related scenarios. These were also developed from the same excerpts of interior design and architectural related case studies from Piotrowski (2008) and Wasserman, Sullivan, and Palermo (2000). The overall content of the computer simulated case studies and questions were parallel to the traditional pencil-and-paper case studies and questions but the computer simulated scenarios did allow for additional interaction between the student and the simulated design professional.

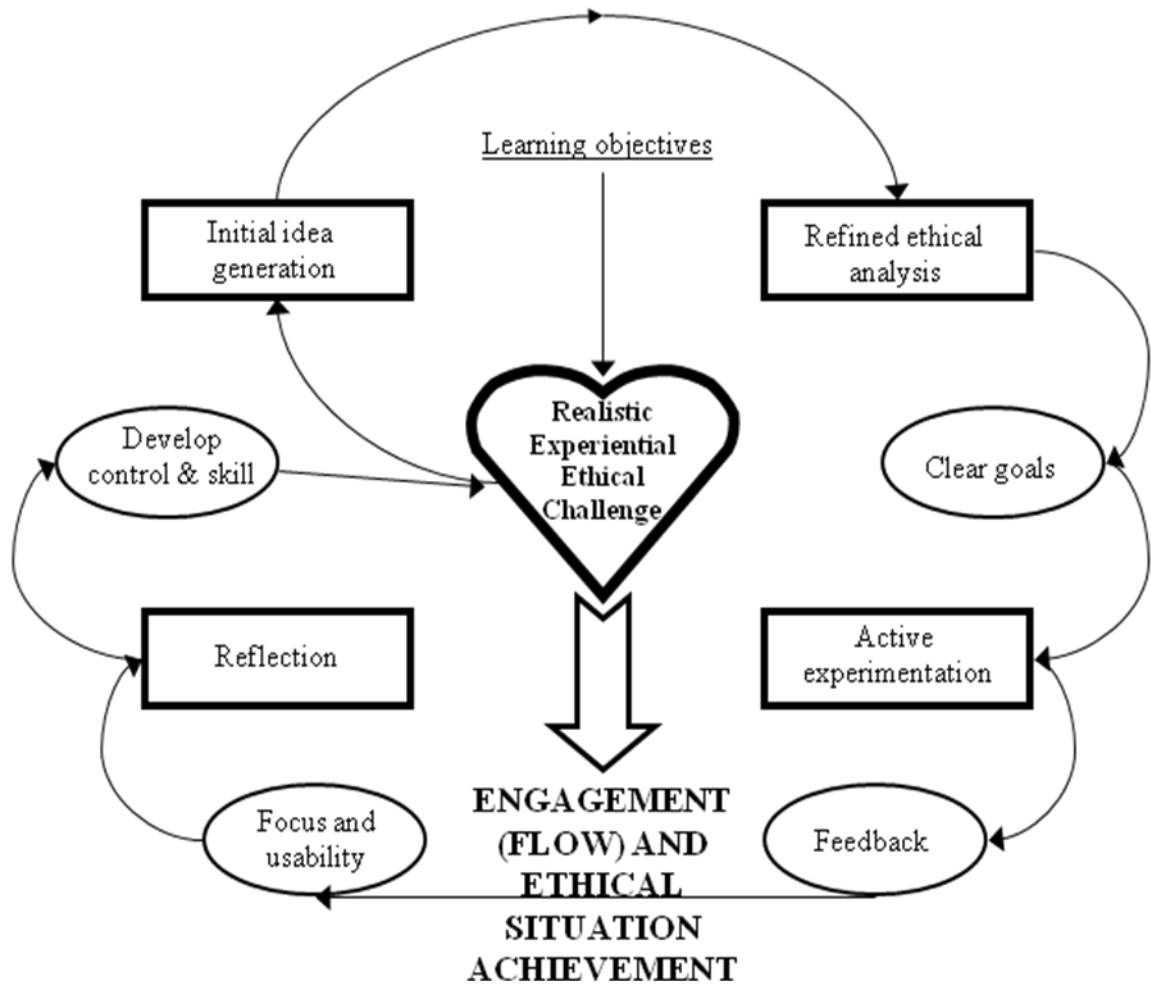
The computer program utilized for the computer simulated case studies was Interactive Scenario Builder (ISB) and was originally developed by the Center for Spirituality and Healing at the University of Minnesota in 2007. The web-based experiential tool was adapted for this study to create simulated interpersonal interactions with virtual people in simulated high-risk realistic ethics-based situations, thus giving the

student a platform to make ethical decisions, possibly some mistakes, yet do so in a safe environment.

The theoretical frameworks of problem-based learning, experiential learning, and flow theory were used to design the research model for simulated case studies. Adapted from Kiili's (2005) experiential gaming model, and constructs of experiential learning theory, the experiential simulation flow model integrated constructs of each theory to support this research (see Figure 2 for research model). The main purpose of the model was to show the link of computer simulation with experiential learning in order to facilitate flow experience and engagement.

The concrete realistic ethical challenges (three scenario case studies) were situated on educational objectives, forming the heart of the model. The task of the heart was to sustain the engagement and motivation of the learner by pumping appropriate challenges and questions to this learner via active experimentation. This is where the students would select questions to ask the virtual person throughout the simulated case studies. In the model, rectangles show basic constructs of experiential learning and ovals represent criterion for computer simulation development including clear goals, feedback, focus and usability, and development of control and skill. The model is cyclical and continually evolves to address different realistic and experiential ethical challenges.

Figure 2. Experiential computer simulation research model.



Adapted from Kiili (2005).

A total of three case studies were developed using Interactive Scenario Builder with overall content related to ethical topics important for interior design students including professionalism, employee rights and responsibilities, and values and virtues. The computer simulated case study scenarios, due to the structure of the computer program, allowed the students to interact with the virtual people from each of the three case studies, access different screens, ask questions of the virtual person, reflect on the

content and interaction, and develop a course of action based on how they believed the virtual person should develop sound, ethical resolutions for each challenge presented (see Appendices H, I, and J for select screen shots of each scenario). The primary theoretical constructs of experiential learning integrated into the research model, their associated variables, measures, and related components from the simulated scenarios were summarized in Table 1.

Table 1

Select Theoretical Constructs, Variables, and Measures of Computer Simulations

Theoretical Construct	Variable(s)	Measure	Component Considered
Active experimentation	Achievement / knowledge gain	Score on exam and interactive question-and-answer within simulation	Post-test questions and appropriateness of responses in simulation
Reflection	Achievement and engagement	Score on exam, course-of-action for the design professional, and reflection within simulation	Post-test questions and responses from simulated course-of-action
Realistic content	Achievement and engagement	Score on exam and engagement questionnaires	Post-test questions and engagement questionnaires

Post-test Construction

A post-test was developed by the researcher and was identical in content to the pre-test with only one exception. To reduce the chance of study participants' responses to the post-test would be the same as those for the pre-test due to rote memorization, the order of the questions and the order of the answer choices were shuffled. The post-test was administered in class two days after the participants completed their respective case studies.

Questionnaire Construction for Engagement

To measure undergraduate interior design student's perceived levels of engagement for both the traditional pencil-and-paper case study learning strategy and the computer simulation case study learning strategy, a questionnaire was administered to students in both the control group and treatment group. Two separate questionnaires were developed for this study. In general, questions and wording for the control group referred to the pencil-and-paper case studies and questions for the treatment group referred to the computer simulated case studies. Otherwise, each of the two questionnaires was identical in format, overall content, and wording, with the exception of "pencil-and-paper case studies" in lieu of "computer simulated case studies."

Each questionnaire started with a general description of the intent of the survey, followed by directions for completion. Each questionnaires consisted of three parts. The first part utilized a Likert-type rating scale of 1-5 with *1 = strongly disagree*, *2 = disagree*, *3 = neutral*, *4 = strongly agree*, and *5 = strongly agree* for five close-ended questions related to the constructs of problem and experiential-based learning and

engagement. Questions included: 1) Computer simulated case studies improved my problem-solving skills regarding professional ethics, 2) Computer simulated case studies were an engaging format for learning, 3) Computer simulated case studies increased my motivation to learn, 4) Computer simulated case studies provided me with a real-world learning experience that was meaningful, and 5) Computer simulated case studies were enjoyable. The same questions were used for the control group but instead referred to “pencil-and-paper case studies” as shown in Table 2.

Table 2

Questions for Pencil-and-Paper Engagement Questionnaire

	1 = Strongly Disagree	2 = Somewhat Disagree	3 = Neutral	4 = Somewhat Agree	5 = Strongly Agree
1. Traditional pencil-and-paper case studies improved my problem-solving skills regarding professional ethics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Traditional pencil-and-paper case studies were an engaging format for learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Traditional pencil-and-paper case studies increased my motivation to learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Traditional pencil-and-paper case studies provided me with a real-world learning experience that was meaningful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Traditional pencil-and-paper case studies were enjoyable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part two of the questionnaire consisted of four open-ended questions to garner qualitative and holistic perceptions of the students by asking them to indicate what they believed contributed most and least to their learning experiences and what they believed contributed most and least to their engagement levels for each of the strategies. Due to the estimated lower number of study participants, less than 30, the researcher was advised not to conduct smaller, focus group interviews as it would be difficult to develop themes from the qualitative data (S. Green, personal communication, November 25, 2008).

Part three of the questionnaire consisted of three demographic-type questions regarding age, approximately how much time the student spent on the computer (not for school-related work) as a child/teenager (ages 10-17), and approximately how much time the student currently spends on the computer for non-school-related work.

Pilot Test

A pilot test was conducted to reduce ambiguity and increase clarity within the study. Specifically, the pre-test, post-test, pencil-and-paper case studies, engagement questionnaires, and computer simulated case studies went through a trial version. The pilot test included a sample of individuals from the population from which the study participants were selected (Gall, Gall, & Borg, 2003). These ten undergraduate interior design students, who completed the same class the previous semester, were asked to review and comment on intent and directions of the instruments, overall clarity and wording, and note any additional recommendations. In addition, they were asked to comment on the overall usability of the computer simulated case studies. In general, only

minor wording in written instruments was modified in accordance with the results of the pilot test.

Data Collection

The participants in the study, undergraduate interior design students, were randomly selected to either be in the control group or treatment group. All study participants completed a pre-test based on general ethics-based content and ethics content related to the profession of interior design. Then, all study participants received general lecture-based instruction on content related to professional ethics. Next, the control group received traditional pencil-and-paper case studies as a supplemental instructional strategy to review outside of normal class time and the treatment group received the same case studies but through a computer simulation as a supplementary instructional strategy to review outside of normal class time. Then a post-test was administered to the participants of the study after each group was exposed to their assigned condition. This finalized the data collection for the dependant variable of achievement. Lastly, to measure the additional dependent variable of engagement, each group completed a questionnaire.

The data were collected during the spring 2009 semester at a mid-western land grant university during an undergraduate interior design class covering ethics content. Institutional Review Board (IRB) Category 1 Exemption was granted by both university institutions involved in this study because this study created little to no risk to the student and was conducted within an identified educational setting. Confidentiality of each participant was attained by alpha-numerically coding each instrument, and participants

were also assured of their confidentiality during the initial consent and throughout the administration of all phases of the study.

Data Analysis

Descriptive statistics and inferential statistics were used to analyze the data for this research study. Data from the pre-test and post-test instruments and Likert-type questions of the questionnaires were compiled by the researcher, cross-checked for mathematical errors, and analyzed using SPSS (Statistical Package for the Social Sciences). Using the pre-test scores as a covariate, the mean differences from the post-test scores between the two instructional conditions (computer simulation case studies and traditional pencil-and-paper case studies) were compared to determine if there were effects on the dependant variable of achievement using a fixed-effect analysis of covariance (ANCOVA).

Perceived levels of engagement were analyzed by assessing the mean scores, standard deviations, and conducting *t*-tests for the five Likert-type questions on the engagement questionnaires for each group. The open-ended engagement questions were analyzed using qualitative inquiry methods reminiscent of grounded theory traditions including the development of categories of information (open coding) and extrapolating the categories into selective coded themes (Creswell, 1998). Responses for each of the four questions in their entirety were transcribed into a Microsoft Excel spreadsheet developed by the researcher. Segments of text from each response, and from each group, were tagged when related to a single idea or theme. Categories were created based on the themes, frequencies were recorded, and select textual responses were recorded into

summary table templates. Lastly, the three demographic questions within the engagement questionnaire were analyzed and documented using SPSS frequency tables.

Basic Assumptions

The assumptions of the study were as follows:

1. The experimental design of this study allowed the researcher to determine effects on achievement and perceived levels of engagement.
2. The computer simulation reinforced the basic principles and practices of professional ethics.
3. The participants understood the operations of the computer simulation.
4. The participants honestly and accurately answered the questionnaire.

Limitations of the Study

The limitations of the study included the following:

1. This study was limited to undergraduate interior design students with a smaller sample size, thus limiting the ability to generalize the findings.
2. The sample was purposive and not randomly selected due to the nature of the specific topic of professional ethics.
3. The pre-test and post-test questions were restricted in content validity.
4. The inability to change the physical, working structure of the computer simulation program's interactivity levels limited the effectiveness of the computer simulation case studies.

CHAPTER FOUR: FINDINGS, ANALYSIS, AND DISCUSSION

Introduction

The study was driven by two research questions. The first question was to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics. The second question was to determine the level of engagement of interior design students using traditional pencil-and paper instructional strategies compared to computer simulated instructional strategies to learn business ethics. The data offer both quantitative and qualitative evidence of preferred instructional strategies and what characteristics contributed towards level of engagement.

Effects on Achievement

Data were first checked for completeness and any surveys not filled out in their entirety were eliminated. The number of total study participants was $n = 21$ and all participants were between the ages of 18-24 years.

Mean scores from the pre-test and post-test instruments for both instructional strategy groups (traditional pencil-and-paper group and computer simulated group) were recorded. Overall raw mean scores were higher in the pre-test for the computer simulation group with a mean score of 7.80, compared to a mean score of 7.39 for the traditional pencil-and-paper group (see Table 3). Post-test scores were higher in the traditional pencil-and-paper group with a mean score of 8.55, compared to a computer simulation mean score of 8.20 as shown in Table 4: Post-test scores for both groups.

Table 3

Pre-test Raw Mean Scores and Standard Deviations of Both Groups

Descriptive Statistics			
Dependent Variable: Pre-test Score			
Group	Mean	Std. Deviation	N
Traditional Pencil-and-Paper	7.36	2.014	11
Computer Simulation	7.80	1.229	10
Total	7.57	1.660	21

Note. A total score of 15 points was possible.

Table 4

Post-test Raw Mean Scores and Standard Deviations of Both Groups

Descriptive Statistics			
Dependent Variable: Post-test Score			
Group	Mean	Std. Deviation	N
Traditional Pencil-and-Paper	8.55	2.296	11
Computer Simulation	8.20	2.098	10
Total	8.38	2.156	21

Note. A total score of 15 points was possible.

To determine effects on achievement and increase the internal validity of the study, pre-test scores were used as a covariate and the mean differences from the post-test scores between the two instructional conditions were compared to determine if there were effects on the dependant variable of achievement using a fixed-effect analysis of

covariance (ANCOVA). The integration of covariates in analysis of variance reduces within-group error variance to more accurately assess the effect of the experimental intervention and eliminates unmeasured confounding variables (Field, 2008). The ANCOVA test for parallel within-group regression lines was not significant using an alpha level of .05, $F(1, 18) = .105$, $p = .750$ (see Table 5 for ANCOVA results). This indicates there was not a significant effect of achievement on post-test scores between groups after controlling for the pre-test scores. The null hypothesis $H_0 = \mu_{\text{traditional}} = \mu_{\text{simulation}}$ was rejected.

Table 5

ANCOVA (Analysis of Covariance) Between Groups

Tests of Between-Subjects Effects						
Dependent Variable: Post-test Score						
Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	.768	2	.384	.075	.928	.008
Intercept	69.207	1	69.207	13.513	.002	.429
Pre-test	.143	1	.143	.028	.869	.002
Group	.537	1	.537	.105	.750	.006
Error	92.184	18	5.121			
Total	1568.000	21				
Corrected Total	92.952	20				

Note. R Squared = .008 (Adjusted R Squared = -.102)

Levels of Engagement

The second question of the study was to determine the level of engagement of interior design students between two groups: those using traditional pencil-and paper

ethics case studies (control group) compared to those using computer simulated ethics case studies (treatment group). After the post-test was completed, both groups completed an engagement questionnaire. Two separate questionnaires were developed for this study and both were identical in format, overall content, and wording, with the exception of “pencil-and-paper case studies” in lieu of “computer simulated case studies” (see Appendices F and G).

Both questionnaires consisted of three parts. The first part utilized a Likert-type rating scale of 1-5 with *1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = strongly agree, and 5 = strongly agree* for five close-ended questions. Part two consisted of four open-ended questions to have student’s write down what they believed contributed most and least to their learning experiences and what they believed contributed most and least to their engagement levels for each of the strategies. Part three consisted of three demographic-type questions including age, identifying approximately how much time the student spent on the computer (not for school-related work) as a child/teenager (ages 10-17), and approximately how much time the student currently spends on the computer for non-school-related work. Results for each part follow in the next three sections.

Part One – Engagement Questionnaire Results

Part one of each questionnaire utilized a Likert-type rating scale for five close-ended questions (see Table 6 for Likert questions).

Table 6

Part One Questions for Engagement Questionnaires

Traditional pencil-and-paper case studies (or) computer simulated case studies improved
Q1 my problem-solving skills regarding professional ethics.

Traditional pencil-and-paper case studies (or) computer simulated case studies were an
Q2 engaging format for learning.

Traditional pencil-and-paper case studies (or) computer simulated case studies increased
Q3 my motivation to learn.

Traditional pencil-and-paper case studies (or) computer simulated case studies provided
Q4 me with a real-world learning experience that was meaningful.

Traditional pencil-and-paper case studies (or) computer simulated case studies were
Q5 enjoyable.

Mean scores between the two groups were recorded (see Table 7 for mean score differences between groups).

Table 7

Part One Engagement Questionnaire Mean Scores Between Groups

Mean Score Summary Report						
Group		Engagement	Engagement	Engagement	Engagement	Engagement
		Question 1	Question 2	Question 3	Question 4	Question 5
Traditional	Mean	3.73	3.82	3.27	3.09	3.36
Pencil-and-Paper	N	11	11	11	11	11
	Std.					
	Dev.	.905	1.168	1.348	1.300	1.027
Computer	Mean	4.00	4.20	3.40	4.00	3.90
Simulation	N	10	10	10	10	10
	Std.					
	Dev.	.943	.789	.966	.816	.876

T-tests were conducted between groups for all five questions. Based on an alpha of .05, there were no significant differences found between the two groups for any of the five Likert-type questions. Table 8 summarizes the *t*-tests between groups for each of the first five questions on the engagement questionnaires.

Table 8

Part One Engagement Questionnaire T-test Summary Results Between Groups

		Independent Samples Test								
		Levene's Test for Equality of Variances			<i>t</i> -test for Equality of Means					
		<i>F</i>	Sig.	<i>t</i>	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Engagement Question 1	Equal variances assumed	.188	.670	-.676	19	.507	-.273	.403	-1.117	.571
Engagement Question 2	Equal variances assumed	.363	.554	-.868	19	.396	-.382	.440	-1.302	.538
Engagement Question 3	Equal variances assumed	2.325	.144	-.246	19	.808	-.127	.517	-1.209	.954
Engagement Question 4	Equal variances assumed	2.315	.145	-1.895	19	.073	-.909	.480	-1.913	.095
Engagement Question 5	Equal variances assumed	.634	.436	-1.281	19	.216	-.536	.419	-1.413	.340

Part Two – Engagement Questionnaire Results

Part two of the engagement questionnaires allowed the students from each group to respond to four open-ended questions inquiring about factors contributing most and least to their overall learning experience and overall engagement within their randomly selected instructional strategy (see Table 9 for open-ended questions). It was the intention of the researcher to garner richness of qualitative data with this method of inquiry.

Table 9

Part Two Open-ended Engagement Questionnaire Questions

Based on the pencil-and-paper case studies (or) computer simulated case studies utilized
Q6 during the unit of study on professional ethics, what factors do you think contributed MOST to your overall learning experience?

Based on the pencil-and-paper case studies (or) computer simulated case studies utilized
Q7 during the unit of study on professional ethics, what factors do you think contributed LEAST to your overall learning experience?

Based on the pencil-and-paper case studies (or) computer simulated case studies utilized
Q8 during the unit of study on professional ethics, what factors do you think contributed MOST to your overall engagement?

Based on the pencil-and-paper case studies (or) computer simulated case studies utilized
Q9 during the unit of study on professional ethics, what factors do you think contributed LEAST to your overall engagement?

Responses for each of the four questions, in their entirety, were transcribed into a Microsoft Excel spreadsheet developed by the researcher. Segments of text from each response, and from each group, were tagged when related to a single idea or theme. The themes were graphically depicted with bold and underlined text. Categories were created based on the themes, frequencies were recorded, and select responses and/or excerpts were recorded into summary table templates.

The pencil-and-paper control group ($n = 11$) had the following responses for question six of the part two engagement questionnaire *based on the pencil-and-paper case studies utilized during the unit of study on professional ethics, what factors do you think contributed MOST to your overall learning experience:*

- “I thought the **format** of the case studies was good and the **pictures** helped too. The stories seemed to be **realistic**, like the situations would come up in the field.”
- “The pencil-and-paper case studies allowed me to make **notes and highlight** directly on the reading material. I find that I always need to **write** something down in pencil whether I am studying from paper or a computer, and studying from paper is definitely more **time efficient**.”
- “**Paper** was easy to just **jot down** answers as they came to my head.”
- “**Reading** the case studies and then looking at the code because I was able to repeatedly go through it and learn.”
- “Just **reading** the packet and being asked **questions** to retain the information, contributed most to my overall learning experience.”

- “The ability to **read slower** and follow the lines easier.”
- “When in **writing** rather than using computer **I don't feel rushed**. Each case study was **realistic** and easy for me to put myself in the situation and think about what the best ethical solution would be.”
- “Being able to go through a **pre-test** to learn the different things that we were going to be covering.”
- “My overall learning experience did not come from the handout. The short **discussion in class** helped me and while reading the situations given on paper I felt the urge to look up the codes online.”
- “Having a **lecture** about the topics.”
- “I think the most beneficial thing about pencil and paper is the free movement of your **hand & pen** to follow along with your eyes.”

As summarized in Table 10, the most frequently mentioned theme was the actual pencil-and-paper format. The remaining themes, quantities, and excerpts of text were summarized further in Table 10: Engagement questionnaire question six.

Table 10

Part Two Engagement Questionnaire Question Six Themes – Pencil-and-Paper Group

Theme	Total number of comments	Select examples/excerpts
Format	6	<ul style="list-style-type: none"> • I thought the format of the case studies was good... • Just reading...contributed to my learning • ...easy format to understand • When writing rather than using computer I don't feel rushed
Realistic storyline	2	<ul style="list-style-type: none"> • The stories seemed to be realistic, like the situations would come up in the field • Ease case study was realistic and easy for me to put myself in the situation...
Write/take notes	2	<ul style="list-style-type: none"> • I find that I need to write something down in pencil... • Paper was easy to just jot down answers...
Self-paced/ efficient	2	<ul style="list-style-type: none"> • Reading...then looking..I was able to repeatedly go through it and learn
Prior lecture	2	<ul style="list-style-type: none"> • The short discussion in class helped me... • Having a lecture about the topics
Graphics	1	<ul style="list-style-type: none"> • ...the pictures helped too
Pre-test	1	<ul style="list-style-type: none"> • Being able to go through a pre-test...
Hand/eye movement	1	<ul style="list-style-type: none"> • ...the most beneficial thing about pencil & paper is the free movement of your hand and pen to follow along with your eyes

Question six of the part two engagement questionnaire had the following responses for the computer simulated treatment group ($n = 10$), with the question: *based on the computer simulated case studies utilized during the unit of study on professional ethics, what factors do you think contributed MOST to your overall learning experience:*

- “The studies themselves, where I was given a **real example** of the issue.”
- “I feel that it **got me thinking** of what I would do or how I would solve these problems. I thought more with the case studies than I thought I would and found them helpful.”
- “The way the **questions were set up** were very easy to understand and I learned a lot just from that.”
- “Most of my homework and studying is **done on the computer**. I'm more **used to this way** of learning.”
- “I really enjoyed the **interaction** with the person battling their ethics. It was helpful to have a **variety of situations** such as personal gain getting in the way, and religious beliefs. I could feel myself progressing and **getting it more** from the first to the last case study.”
- “**Reading all the pro's and con's**...some I wouldn't have thought of.”
- “I think the case studies were quite helpful, in the fact that they were **all different story lines** and **different situations**. Another helpful thing I thought was the **questionnaire** and seeing what their responses would be.”
- “I think the **interactive questions and responses** contributed to my overall learning experience.”

- “The **activities** that you had to do.”
- “I believe when you could **interact** with the person having the ethical situation and be the questioner/mentor.”

Table 11 details the various themes extracted from question six for the computer simulation group.

Table 11

Part Two Engagement Questionnaire Question Six Themes – Computer Simulation Group

Theme	Total number of comments	Select examples/excerpts
Interaction	5	<ul style="list-style-type: none"> • I really enjoyed the “interaction” with the person battling their ethics • ...the interactive questions and responses contributed to my overall learning experience • The activities that you had to do
Format	4	<ul style="list-style-type: none"> • The way the questions were set up were very easy to understand... • ...the questionnaire and seeing what their responses would be • ...and to be the questioner/mentor
Critical thinking	2	<ul style="list-style-type: none"> • I feel that it got me thinking of what I would do... • I could really feel myself progressing and getting it more from the first to the last case study
Realistic content	2	<ul style="list-style-type: none"> • The studies themselves, where I was given a real example of the issue • ...what I would do or how I would solve these problems
Convenience of computer	1	<ul style="list-style-type: none"> • Most of my homework and studying is done on the computer. I am more used to this way of learning.
Feeling of learning	1	<ul style="list-style-type: none"> • I could feel myself progressing and getting it more...

The pencil-and-paper control group ($n = 11$) had 11 unique responses to question seven: *based on the pencil-and-paper case studies utilized during the unit of study on professional ethics, what factors do you think contributed LEAST to your overall learning experience including:*

- “All of the studies were interesting but I think it would have been nice to know if we were to write out the answers to the questions. Because I took a lot of time to write each answer to each question out. (But then **not turn it in?**) But nothing other than that was ineffective.”
- “The pencil-and-paper case studies are **always the most beneficial to me rather than reading documents on a computer** but I always feel **guilty using a lot of paper**, especially since we are learning about the carbon footprint and sustainable design.”
- “**Layout of paper** was kind of complicated in a column form. Would rather have more of a paragraph form. There was a lot of **jumping back and forth between pages** that could have been avoided by putting it into a different layout.”
- “Having some of the **questions be almost the same** on the case study.”
- “I don't know if there was. For the most part I am a better learner with pencil-and-paper activities because I can write down notes and facts to look back and read at a later time.”

- “The fact that it was **paper**. I always have my **computer with me** and I feel it is **easier to just download** it and read it in my free time. Plus the paper also got wet and rumped in my bag making it difficult in some areas to read.”
- “There were **a lot of broad questions** in the directions that I felt would be better placed at the end of each case study, although I did like having there be things to take into consideration before hand.”
- “Not having **more** in case study packets.”
- “The least contribution to learning was that the **answers were not listed** on the study guide/review sheet. Or at least the ethics should have been listed in a handout.”
- “Would have liked to have the **slide show to reflect upon;** would have liked **more time** to go further into detail.”
- “One thing I was slightly confused about on the previous page was whether or not I was comparing my learning abilities with pencil & paper to learning on the computer or comparing it to other types of learning. I think learning by **interaction and experience** is more beneficial than paper and pencil but when compared to computer simulation I prefer pencil and paper.”

Table 12 summarized the themes comments in response to question seven for the pencil-and-paper group.

Table 12

Part Two Engagement Questionnaire Question Seven Themes – Pencil-and-Paper Group

Theme	Total number of comments	Select examples/excerpts
Format	4	<ul style="list-style-type: none"> • ...there were a lot of broad questions • ...jumping back and forth between pages...could have been avoided with a different layout • Layout of paper was kind of complicated in a column format...
Guilt of paper waste	2	<ul style="list-style-type: none"> • ...I always feel guilty using a lot of paper, especially since we are learning about the carbon footprint and sustainable design • The fact it was paper
Lack of convenience	2	<ul style="list-style-type: none"> • I always have my computer with me and I feel it is easier to just download it and read it in my free time
Lack of interaction	1	<ul style="list-style-type: none"> • I think learning by interaction and experience is more beneficial...
Lack of information	1	<ul style="list-style-type: none"> • Not having more in the case study packets
Not turning in	1	<ul style="list-style-type: none"> • ...I took a lot of time to write each answer to each question out. (But then to not turn in?)
Lack of time	1	<ul style="list-style-type: none"> • ...would have liked more time to go further into detail
Nothing	1	<ul style="list-style-type: none"> • I don't know it there was. For the most part I am a better learner with pencil-and-paper activities because I can write down notes and facts to look back and read at a later time.

Compared to the pencil-and-paper group, the computer simulation group ($n = 10$) had closely related comments on *format* for question seven: *based on the computer simulated case studies utilized during the unit of study on professional ethics, what factors do you think contributed LEAST to your overall learning experience* including:

- “At first the simulations were a **little difficult to follow** what they wanted me to click on.”
- “My least would be the fact that I was **confused** as to what I was supposed to be doing at times. I wasn't always sure I was doing it correctly.”
- “I'm not sure, overall I thought the case studies were a good overall learning experience.”
- *Nothing written down.*
- “I would have liked to have more of the **terminology** we discussed in class incorporated into the different scenarios.”
- “The whole process - I **would rather talk this through** in class, **reading is repetitive** and **doesn't hold my interest.**”
- “I don't think **anything was unhelpful** during the case studies. Every item had a learning factor.”
- “I think that the **Q and A questions** would have been more helpful **as a discussion** rather than a personal activity.”
- “The **interviewing** part of the case studies.”
- “Parts of it seemed **redundant** - each case study was 12 pages long and I could guess the whole situation before I got through the first few slides.”

The computer simulation group had seven unique responses for question seven, and the following themes were developed and summarized in Table 13.

Table 13

Part Two Engagement Questionnaire Question Seven Themes – Computer Simulation Group

Theme	Total number of comments	Select examples/excerpts
Format	5	<ul style="list-style-type: none"> • At first the simulation was difficult to follow...what they wanted me to click on • ...Q & A questions would have been more helpful as a discussion than a personal activity
Nothing contributed least	3	<ul style="list-style-type: none"> • ...overall I thought the case studies were a good overall learning experience • I don't think anything was unhelpful...every item had a learning factor
Simulation composition	2	<ul style="list-style-type: none"> • The interviewing part of the case studies
Redundancy	1	<ul style="list-style-type: none"> • Parts of it seemed redundant...each case study was 12 pages long
Lack of terminology	1	<ul style="list-style-type: none"> • I would have like to have more of the terminology we discussed in class incorporated into the different scenarios.
Redundant information	1	<ul style="list-style-type: none"> • Parts of it seemed redundant; each case study was 12 pages long and I could guess the whole situation before I got through the first few slides.

Question eight from part two of the engagement questionnaire for the pencil-and-paper group produced a wide array of answers. The question: *based on the pencil-and-paper case studies utilized during the unit of study on professional ethics, what factors do you think contributed MOST to your overall engagement*, produced the following citations:

- “One thing about pencil and paper that helps keep me engaged is that I am able to **take the paper and transport it** to wherever I want to be to take the test or read the article. I am much, much more engaged if I can **hold something** I can read instead of reading it on the computer. **Pictures** helped.”
- “The **stories/scenarios** were very engaging. They **made me really think** about what I would do in those situations.”
- “The pencil-and-paper case studies were overall better in engagement because I could **look at the pictures, read the questions, and answer the questions directly on the same document.**”
- “**Discussion in class** helped prepare for the paper & pencil activity.”
- “Being able **to do studying on my own time** because I am fully alert to pick up on what I should learn, as well as being able to pick out things learned from class.”
- “My first ‘**quiz**’ we were given because I had no idea what was going to be asked so it was somewhat of a challenge/surprise.”
- “**Learning what ways** people can act unethically.”

- “**Easy to read** and a quick read with **nice font; colorful pictures** were engaging and easily brought me visually to the situation; broad and very **different situations kept them interesting.**”
- “Being able to go through the different case studies and **trying to figure out what I would do.**”
- “Having **material printed and right in front of me** while reading, less distractions if I were to read a document online.”
- “Using **easily understandable** examples and situations.”

Question eight yielded the following thematic results in regard to factors contributing most to overall engagement for the pencil-and-paper instructional strategy group, as illustrated in Table 14: Engagement questionnaire question eight.

Table 14

Part Two Engagement Questionnaire Question Eight Themes – Pencil-and-Paper Group

Theme	Total number of comments	Select examples/excerpts
Concise and convenient format	5	<ul style="list-style-type: none"> • Being able to do studying on my own time... • ...could answer the questions directly on the same document • Easy to read and a quick read...
Realistic scenarios	4	<ul style="list-style-type: none"> • They (case studies) made me really think about what I would do in those situations • ...figuring out what I would do
Graphics (pictures) and font	4	<ul style="list-style-type: none"> • ... I could look at the pictures... • ...nice font
Breadth of scenarios	3	<ul style="list-style-type: none"> • ...broad and very different situations kept them interesting • Learning what ways people can act unethically
Paper (physical properties)	3	<ul style="list-style-type: none"> • I am much more engaged if I can hold something... • I like having printed material right in front of me
Prior discussion	1	<ul style="list-style-type: none"> • Discussion in class helped me prepare for the paper & pencil activity
Critical thinking	1	<ul style="list-style-type: none"> • They made me really think about what I would do in those situations
Pre-test	1	<ul style="list-style-type: none"> • My first “quiz” ...because I had no idea what was going to be asked so it was somewhat of a challenge/surprise

The computer simulated group ($n = 10$) had seven unique comments for question eight: *based on the computer simulated case studies utilized during the unit of study on professional ethics, what factors do you think contributed MOST to your overall engagement*, as shown below:

- “The **graphics** it was more appealing to look at than a plain piece of paper with just words.”
- “think that the **stories** were helpful and that felt that you could **always go back if you needed to.** That is what helped me.”
- “The fact that **I had all the time I needed** to think about the questions helped out a lot.”
- “It helped when the **case studies were broken up** so I didn't feel overwhelmed seeing a huge story or ton of writing.”
- “It felt like you were **actually talking to this person** and trying to help them figure out their dilemma. The **pictures** of the different people helped to put a name to the face.”
- “That you **must keep clicking**, this makes you not skim as much, you read everything.”
- “The **questions** we chose to ask during the middle of each process and the questions we chose at the end to see if we chose the right thing to say/ask.”
- “I think the **real world scenarios** contributed most to my engagement.”
- “What the person's **answers** were for each question.”

- “It was online, so easy to access, and there were pictures of the people to help make it more realistic. It was relatively easy to go through.”

The simulation group had seven unique responses for question eight, as summarized in Table 15: Engagement questionnaire question eight for simulation group.

Table 15

Part Two Engagement Questionnaire Question Eight Themes – Computer Simulation Group

Theme	Total number of comments	Select examples/excerpts
Format	6	<ul style="list-style-type: none"> • ...that you could always go back if you needed to • It helped when the case studies were broken up so I didn't feel overwhelmed ... • That you must keep clicking, this makes you not skim as much, you read everything
Realistic content	4	<ul style="list-style-type: none"> • I think that the stories were helpful... • I think the real world scenarios contributed most...
Graphics (pictures)	3	<ul style="list-style-type: none"> • The graphics. It was more appealing to look at then a plain piece of paper with just words • The pictures of the different people helped to put a name on the face
Interaction	2	<ul style="list-style-type: none"> • It felt like you were actually talking to the person and trying to help them figure out their dilemma
Convenience of computer	2	<ul style="list-style-type: none"> • ...you could always go back if you needed to • It was online, so easy to access...
Question and answer format	2	<ul style="list-style-type: none"> • The questions we chose to ask during the middle of each process and the questions we chose at the end to see if we chose the right thing to say/ask • What the person's answers were for each question
Self-paced	1	<ul style="list-style-type: none"> • The fact that I had all the time I needed to think about the questions helped out a lot

The final open-ended question was question nine: *based on the pencil-and-paper case studies utilized during the unit of study on professional ethics, what factors do you think contributed LEAST to your engagement.* It had eight unique responses for the pencil-and-paper group ($n = 11$) including the following:

- “When my **hand starts to hurt** I loose engagement. “
- “I don't think factors. It was all very engaging!”
- “The pencil-and-paper case studies were engaging to read and study.”
- “The **overall layout** of the paper. **Pictures were corny** showing ethically challenged people. I feel I could understand what was going on in the questions without the use of the pictures. Overall change layout and get rid of pictures.”
- “Having my **computer** when it wasn't needed, it's a **distraction.**”
- “Probably **just reading the packet** to make sure I understand.”
- “The fact of it **being paper** and the ability for it to be **easily destroyed** as well as having to **write the question/answer by hand.**”
- “**Spacing questions out** before and after the case studies.”
- “Not having **more types** of case study situations.”
- “I was least engaged because the **questions** to the situations didn't feel like they had one **straight forward answer.**”
- “Some **questions** I felt could have **gone either way.**”

Many themes were developed for the pencil-and-paper group for question nine, as illustrated below in Table 16: Engagement questionnaire question nine for control group.

Table 16

Part Two Engagement Questionnaire Question Nine Themes – Pencil-and-Paper Group

Theme	Total number of comments	Select examples/excerpts
Preferred computer	3	<ul style="list-style-type: none"> • Having my computer when it wasn't needed...that was a distraction • ...the ability for paper to be easily destroyed
Layout and composition	2	<ul style="list-style-type: none"> • Overall change layout and get rid of pictures • Spacing questions out before and after the case studies
Intense writing	2	<ul style="list-style-type: none"> • When my hand starts to hurt I loose engagement • ...having to write the question/answer by hand
Indirectness of answers	2	<ul style="list-style-type: none"> • I was least engaged because the questions to the situations didn't feel like they had one straight forward answer • Some questions could have gone either way
Nothing	2	<ul style="list-style-type: none"> • I don't think factors. It was all engaging • ...they were engaging to read and study
Ineffective graphics	1	<ul style="list-style-type: none"> • Pictures were corny...
Just being paper	1	<ul style="list-style-type: none"> • The fact of it being paper and the ability for it to be easily destroyed...
Limited amount of scenarios	1	<ul style="list-style-type: none"> • Not having more types of case study situations.

Question nine: *based on computer simulated case studies utilized during the unit of study on professional ethics, what factors do you think contributed LEAST to your engagement* had six unique responses for the computer simulation group ($n = 10$). All respondent's comments are noted below:

- “The simulations were a **little long** and **difficult to follow** what you were supposed to do. “
- “I think **it could be clearer** cause that's the only thing that bugged me and made the whole thing upsetting for me if I understood what I was suppose to be doing more I wouldn't have had a problem.”
- “It's sometimes **easier to do it on paper than on the computer** I feel. I like to have it right in front of me and not just on the screen.”
- “Although the study being broken up helped it also had a downfall. When I wanted to look back at a part of the study **I had to click back on the arrow** instead of simply look it up.”
- “The **question and answer could be more interactive**. It had good information, but one couldn't answer as opposed to multi-choice.”
- “It was **long** and some parts more **repetitive**.”
- “Again, I think everything engaged us equally, it wasn't all one big slide. You actually have to get involved and that helped us learn.”
- “I think the **series of questions** toward the end that were meant to make us think contributed least to my overall engagement.”
- “The **question and answer** slides.”

- “I can't think of any.”

The computer simulation participant's themed comments for question nine are summarized below in Table 17: Engagement questionnaire question nine - simulation group.

Table 17

Part Two Engagement Questionnaire Question Nine Themes – Computer Simulation Group

Theme	Total number of comments	Select examples/excerpts
Format issues	4	<ul style="list-style-type: none"> • The simulations were...difficult to follow • It's sometimes easier to do it on paper...I like to have it right in front of me and not on a the screen • When I wanted to look back at a part of the study I had to click back on the arrow instead...
Q/A slides	3	<ul style="list-style-type: none"> • The Q/A slides could be more interactive... • ...the series of questions toward the end that were meant to make us think contributed least to my overall engagement
Length	2	<ul style="list-style-type: none"> • Parts of it seemed redundant...each case study was 12 pages long
Nothing	2	<ul style="list-style-type: none"> • ...I think everything engaged us equally, it wasn't all one big slide. You actually have to get involved and that helped us learn
Preferred paper	1	<ul style="list-style-type: none"> • ...easier to do it on paper than on computer...
Repetitive	1	<ul style="list-style-type: none"> • ...some parts were repetitive

Results were also cross-tabulated to compare both groups and look for common factors attributing most to their learning experiences and engagement levels. Results are shown as follows in Tables 18: Common learning experience factors and Table 19: Common engagement factors.

Table 18

Common Themes for Factors Contributing Most to Learning Experience Between Both Groups

Theme	Number of Comments: Pencil-and- Paper Group	Number of Comments: Computer Simulation Group	Total Number of Similar Themed Comments
Format	6	4	10
Realistic storyline/content	2	2	4
Efficiency or convenience of medium	2	1	3

Table 19

Common Themes for Factors Contributing Most to Engagement Between Both Groups

Theme	Number of Comments: Pencil-and- Paper Group	Number of Comments: Computer Simulation Group	Total Number of Similar Themed Comments
Concise & convenient format	5	6	11
Realistic scenarios	4	4	8
Graphics	4	3	7

Part Three – Engagement Questionnaire Results

Part three of the engagement questionnaires asked the participants the following questions: 1) indicate approximately how much time you spent on the computer (not for school-related work) as a child/teenager (ages 10-17), and 2) indicate approximately how much time you currently spend on the computer for non-school-related work. Study participants were to choose one of the following selections: zero (0) hours/week, 1-5 hours/week, 6-10 hours/week, 11-15 hours/week, 16-20 hours/week, or 20+ hours/week.

Results indicated that the predominant number of pencil-and-paper group participants as children/teenagers utilized the computer between 1-5 hours/week ($n = 5$) and 6-10 hours/week ($n = 5$) for non-school-related work. Compared to the computer

simulation group, results were similar with the majority of the participants having spent either 1-5 hours per week ($n = 5$) or 6-10 hours per week ($n = 4$) on the computer as a child/teenager for non-school-related work.

Regarding the final engagement questionnaire question of indicating approximately how much time is currently spent on the computer for non-school-related work, the findings were different. For the pencil-and-paper group, six of the eleven total participants indicated that they either spend 20+ hours/week or 16-20 hours/week currently on the computer. The frequencies were distributed evenly with the computer simulation participants in that six of the ten total participants either spend 20+ hours/week or 16-20 hours/week currently on the computer.

Discussion

Effects on Achievement

The research questions and related findings, both quantitative and qualitative, will be further discussed within this section. The first research question was to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics. The second question, which will be elaborated on further into this section, was to determine the level of engagement of interior design students using traditional pencil-and-paper instructional strategies compared to computer simulated instructional strategies to learn business ethics.

Starting with the effects on achievement, the results showed raw mean scores that were different between the pre-test and post-test scores for both groups (pencil-and-paper

and computer simulation). Both groups had higher reported mean scores for the post-test, as compared to the pre-test scores. For example, the recorded mean pre-test score for the pencil-and-paper group ($n = 11$) was 7.36 out of a possible 15 points and the recorded mean post-test score for the same group was 8.55. In addition, the recorded mean pre-test score for the computer simulation group ($n = 10$) was 7.80 out of a possible 15 points and the mean post-test score for the same group was 8.20. This indicates that, based on the pre-test/post-test scores, students did perform better on the post-test and after both instructional strategies had been implemented. The pencil-and-paper group had a larger range of growth between pre-test and post-test scores, but their mean pre-test scored started lower, as compared to the computer simulation group.

It was anticipated that post-test mean scores would be higher than pre-test mean scores between groups, but there were no statistically significant differences found. This could be attributed to the small number of study participants ($n = 21$). Due to the low number, and only approximately ten students per group, the central limit theorem could not be applied. If it had been able to be applied, with approximately 30 participants in each group, the sampling distributions of the mean would have approached a normal distribution, regardless of the original distribution (Zieffler, 2008). In addition, the validity of the content within both the pre-test and post-test could have been higher and this may have negatively affected the mean scores and the results of the ANCOVA, as explained below.

It was also anticipated that the computer simulation group would have higher mean post-test scores than the pencil-and-paper group, but this was not supported by the

results. Through the results of ANCOVA, it was shown that students in the computer simulation group did not have significantly different post-test scores compared to the pencil-and-paper group of students. The pre-test scores from each group were used as a covariate variable to exert stricter experimental control by taking into account potential confounding variables (i.e., pre-test scores). Even though the raw mean scores did show an improvement in pre-test and post-test scores, with the controlling of the pre-test scores as the covariate, the results were not statistically significant.

The ANCOVA results could be attributed, again, to the low number of study participants ($n = 21$) with only 11 participants in the pencil-and-paper group and 10 participants in the computer simulation group. A similar study conducted by Klassen and Wiloughby (2003) utilized in-class simulation games to assess student learning within the topic of operations management and information systems. This study had a smaller number of participants ($n = 27$) and although qualitative data came back as favorable by the students for this format of instruction, there were no statistically significant results.

The experimental design could also explain the results. A study by Druckman and Ebner (2008) utilized a randomized post-test-only design where equivalence was assumed through randomization, instead of by pre-testing. A lecture-only control group condition was used to provide the baseline data for the study. They noted the randomized post-test-only design had the advantage of avoiding validity threats referred to as *testing* because the same questions are typically used on both the pre-test and post-test. This limitation will be further addressed in the next chapter. Future modifications could be

made to the research design of this study such that two post-tests could be utilized so the case studies could be further isolated as the only instructional strategy being tested.

Another assumption of non-significant findings for this study could be within the demographics of the participants. As noted earlier, all of the study participants were female (100%) and between the ages of 18-24 years of age. Gender and gaming effectiveness have been measured in the literature. A meta-analysis by Vogel et al. (2006) identified that females showed significant cognitive gains favoring the interactive simulation and game method. However, a study conducted by Dempsey et al. (2002) reported different findings. Forty participants (20 male and 20 female) were exposed to different types of computer games. The study found that the “most diverse patterns between men and women occurred in simulations” (p. 163) and women were less motivated to engage in simulations because the simulations did not effectively attract their interest or attention.

Jones (2003) also conducted a study on gaming that inquired about the frequency of technology gaming with 1,162 college students. The researcher found that college-age men may be the most avid video game players and reported playing games more than 15 hours a week. Females have also traditionally been associated with not being as motivated to play computer games. However, the study did report that women (60%) played more computer and online games than men (40%). The researcher attributed this to the lower degree of action (usually violent in nature) and adventure within the platforms of computer and online games, compared to video games. In addition, both

genders were equally distributed for preference of playing video games. In summary, college-age men preferred to play more video games than online or computer games.

The fact that this study did not have any male participants, and that research has found simulations not as interesting to females could be an attributed factor to the lack of statistically significant effects of achievement between the two groups. This assumption will be addressed in the next chapter within the future research and implications section.

Levels of Engagement

Part One – Likert Questions on Engagement Questionnaire

The second research question was to determine the level of engagement of interior design students using traditional pencil-and-paper instructional strategies compared to computer simulated instructional strategies to learn business ethics. Reported mean scores between groups (pencil-and-paper and computer simulation) indicated that overall higher levels of engagement were found within the computer simulation group even though none of the results were found to be statistically significant. Regardless of the lack of identified significant results, the overall higher mean scores in the computer simulation group leads to an assumption that the net-generation learner thrives on technology-related learning that is engaging, interesting, and leads to a positive learning experience.

This assumption is supported by a study conducted by Anderson and Lawton (2009) where business simulated exercises were integrated within an undergraduate business-related course. The results did not find a significant relationship between performance on the simulation and overall enthusiasm for the learning medium.

However, they reported the students exhibited very positive attitudes toward the simulated business exercises.

To quantify overall engagement of each instructional strategy for learning business ethics, five Likert-type questions were developed for the study based on the constructs of engagement, as identified in the review of literature. Participants could select a 1 (strongly disagree) up to a 5 (strongly agree). The two questions that reported the highest mean scores for each group were questions one and two. Question one was *traditional pencil-and-paper case studies (or) computer simulated case studies improved my problem-solving skills regarding professional ethics* and question two was *traditional pencil-and-paper case studies (or) computer simulated case studies were an engaging format for learning*.

This study integrated the theories of problem-based and experience-based learning to develop the case studies. Research has shown that experiential exercises, such as role-playing, scenarios, and case studies have been successful instructional strategies in higher education. Druckman and Ebner (2008) recently completed a study that explored learning advantages of role-playing and scenarios compared with a lecture-only control group. The results indicated that the lecture-only group reported the fewest positive responses to their overall learning and were less motivated, compared to the hands-on role-playing and scenario study participants.

It should also be noted that for the computer simulation group, question four had an identical mean score of 4.00 with that of question one. Question four was *computer simulated case studies provided me with a real-world learning experience that was*

meaningful. Again, this score supports the literature that net-generation students want learning environments and related learning materials that are meaningful, engaging, and enhance their problem-solving skills to better prepare them for “real-world” experiences. This finding is supported by a research study conducted by Kiili (2007) where a problem-based learning business simulation game was integrated into an economics classroom. It identified that simulation participants/learners saw that authenticity, or real-world experience, was a very important element in educational games and that learning-by-doing was preferable over passive learning, such as listening to a lecture.

Part Two – Open-ended Questions on Engagement Questionnaire

Still addressing the second research question of assessing levels of engagement between both instructional strategy groups, four open-ended questions were posed to the participants to indicate factors that *most* and *least* attributed to their overall learning experiences and engagement levels. A variety of comments were documented for each of the four questions, as noted earlier in this chapter.

However, in summary for the pencil-and-paper case study group, consistent themes of *format*, *realistic storylines*, the *ability to write and take physical notes*, and the medium being *self-paced* and *efficient*, were factors this group found to contribute *most* to their overall learning experience. Similar-themed comments were found for the computer simulation group. These themes included *format* (cited four times) and *realistic content/storylines* (cited twice). In addition, this group found that the *level of interaction* within the simulated case studies contributed *most* to their overall learning, as this was cited by five different participants (50% of the computer-simulation group).

With *format* most frequently cited by both groups as one of the highest contributing factors to learning experience, this supports an assumption that interior design students may prefer more than one type of learning method. Research has been conducted on dual-preferred learning styles of undergraduate students in design-related disciplines (Martinson & Zollinger, 2006). This longitudinal study found that of 523 incoming undergraduate students majoring in interior design, graphic design, clothing design, housing studies, retail merchandising, family social science, and nutrition, a majority (53%) exhibited bi-modal learning style preferences (having two predominant learning styles). If these disciplines have a tendency toward bi-modality in learning style preferences, this assumption fits the findings of this research study in that participants from both the pencil-and-paper and computer simulation groups had positive comments for both learning formats.

Regarding the factors contributing *least* to their overall learning experience, the pencil-and-paper group noted the *column format* of the case studies worked against their learning. For the computer simulation group, the comments were from a similar vein. They indicated that the *format* was the factor that least contributed to their learning experience. A majority of format comments revolved around just understanding the platform and navigational aspects of the simulation, as well as having more interaction in the question and answer session of the simulation. These comments marry those from a study conducted by Wideman et al. (2007) where a computerized educational game was utilized in a course. The researchers noted that although the students reported their game-

playing experience as interesting and enjoyable, many felt confused and/or frustrated at different points in the simulation game.

Factors contributing *most* to engagement levels resulted in some similar-themed comments. The pencil-and-paper group really liked the *convenience* and *concise format* of the case studies, including the *realistic scenarios* and *integrated graphics*. Compared to the computer simulation group, the *format* of the simulation program, its *realistic content* with *graphics*, and the *interaction* all attributed positively to their overall engagement levels. Kumar and Lightner's (2007) study on interactive simulation games resulted in students experiencing high enjoyment levels while utilizing the simulation, which contributed to their learning and engagement. In addition, a study by Connolly, Stansfield, and McLellan (2006) provided extremely positive perceptions of simulation and game-based learning to teach database design concepts. It can be assumed that the students participating in the computer simulated case studies experience a flow state, which has been correlated to a high level of engagement (Salen & Zimmerman, 2004).

Factors contributing *least* to overall engagement levels were summarized into themes for both groups for this study. The pencil-and-paper group commented most often that they would have preferred to *review the case studies on the computer* and that this contributed *least* to their overall engagement levels. This could indicate that these participants had a preference towards integrated information technology learning in lieu of the traditional format of learning.

Other comments that received equal distribution for factors contributing *least* to overall engagement levels for the pencil-and-paper group included *layout* and

composition, the *intense writing* aspect of the pencil-and-paper case studies, as well as two participants did not think *anything was not engaging*.

The computer simulation case study participants reported most often that two factors, including specific *navigation* of the question-and-answer section, and the overall *length*, contributed *least* to overall engagement levels. Similarly, Whitton and Hynes (2007) found that students had greater motivation to learn from simulations due to the novelty factor and this motivation could wane if simulations were integrated into many units of study.

In general, many of the identified themes that contributed positively to the overall learning experiences and engagement levels of the participants directly related to constructs of problem-based and experience-based learning. These were theoretical frameworks used to drive the study. Overall, findings support the inclusion of simulations as an effective learning tool in higher education. The enhanced interactivity and engagement of such simulations are their hallmark and they are also known to lead to deeper learning (Oblinger, 2004).

Part Three – Demographic Questions on Engagement Questionnaire

Part three of the engagement questionnaires asked the participants three questions: 1) indicate your age, 2) indicate approximately how much time you spent on the computer (not for school-related work) as a child/teenager (ages 10-17) and 3) indicate approximately how much time you *currently* spend on the computer for non-school-related work. Participants chose one of five scaled choices ranging from zero (0) hours/week to 20+ hours/week.

All of the participants were between the ages of 18-24 years old, which fit the characteristics of net-generation learners. Question two indicated that overall, the majority of study participants, regardless of which group they were in, indicated that as a child/teenager they either spent between 1-5 hours/week or 6-10 hours/week on the computer for non-school-related work. Compared to how much time they currently spend on the computer for non-school-related work, the frequency of usage increased substantially. For the pencil-and-paper group, 55% of the participants indicated that they either currently spend 20+ hours/week or 16-20 hours/week on the computer. For the computer simulation participants, 60% of the participants either spend 20+ hours/week or 16-20 hours/week currently on the computer. These results support the net-generation learner characteristics of a high reliance and integration of technology-related interaction into their day-to-day activities (Oblinger, 2004).

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The first purpose of this exploratory study was to determine if there were effects on achievement between traditional pencil-and-paper instructional strategies and computer simulated instructional strategies used to teach interior design business ethics. The secondary purpose was to determine the level of engagement of interior design students using traditional pencil-and paper instructional strategies compared to computer simulated instructional strategies to learn business ethics.

In Chapter Two, the review of literature focused on the profile of the net-generation learner, including characteristics, demographics, and expectations they have in higher education and the workplace. The terms “digital natives” and “digital immigrants” were also defined. Games, their taxonomies and genres, were reviewed, including how games have been integrated into higher education. Theoretical models of gaming and learning in education were presented, with a focus on problem-based learning and experience-based learning in gaming. The chapter ended with sections related to current trends in electronic simulation/game-based research, how they can relate to effectiveness, motivation, engagement and a state of flow, and how current practices for interior design education are formatted.

Participants for this study included 21 undergraduate interior design students studying business ethics at a mid-western land-grant university in the United States. Participants were purposefully selected due to their academic emphasis of interior design,

and because this course was identified as to where the interior design students were introduced to professional practice issues , including the topic of ethics.

After voluntary consent was obtained, study participants were randomly selected to either be in the control group (pencil-and-paper instructional strategy) or treatment group (computer simulation instructional strategy). The data collection and intervention measures evolved over a one week time frame (Friday to Friday).

Various instruments were developed for this study. Prior to the pre-test instrument being administered to the study participants, the instructor / researcher gave a two-hour lecture and discussion on ethics including content of defining ethics, the history and philosophical / theoretical tenets of ethics, and how to analyze potential ethical situations by assessing values and virtues, consequences and contingencies, and rights and responsibilities of each situation. The lecture also reviewed ethics and professional responsibilities for design professionals, as noted in Chapter Four. At the end of the lecture, a reading from the course textbook was assigned to the study participants that also reviewed ethics and professional practice issues.

To measure effects of achievement, a pre-test and post-test related to ethics content were developed. In addition, three pencil-and-paper ethics case studies were developed for out-of-class learning activities and these were distributed to the control group. The treatment group was exposed to the same ethics case studies as the out-of-class learning activity, but the learning medium was different. The learning medium for the treatment group was a computer simulation presenting the same three ethics case studies. Interactive Scenario Builder (ISB) was the computer program utilized for the

development of the computer simulated case studies. ISB and was originally developed by the Center for Spirituality and Healing at the University of Minnesota (2007) and was modified for this study to fit the topic of ethics.

Because the purpose of this study was twofold, including the measurement of achievement effects, and the measurement of overall engagement levels, engagement questionnaires were developed and implemented to address the secondary purpose of the study. The questionnaires consisted of five Likert-type questions, four open-ended questions, and three demographic/characteristic scaled questions. The questionnaires were identical in format, intent, and wording for both instructional strategy groups. However, the only wording that varied between the two engagement questionnaires was “pencil-and-paper” case studies being used in lieu of “computer simulated” case studies.

Conclusions

The profession of interior design is ever-changing due to the integration of information technology. Because a number of interior designers either work within a design firm or start their own business, the amount of carryover from classroom to practical application is limited. This study addressed the identified lapse in research, both in regard to interior design education integrating computer simulations as a form of information technology learning for the net-generation student, and the lack of research focusing on the topic of ethics.

If we, as educators of the net-generation, strive to strengthen ethics-related knowledge in our students so they become ethically responsible professionals, the instructional method of computer simulated case studies seems to have offered a well-

received and effective learning tool. Even though statistically significant results on achievement between the two instructional strategies were not found in this study and the results were inconclusive, the overall qualitative results related to engagement and overall learning results were very positive.

As stated earlier in the study, the broad and holistic domain of business practice, specifically the content of professional ethics, is a topic that is challenging to teach to undergraduate interior design students. Most educators have relied on creating real-world scenarios solely from textbooks and/or pencil-and-paper case studies. This study introduced a more interactive, engaging, and realistic learning format for the net-generation learner. Even though statistically significant results were not identified in this study, the overall perception of the computer simulated case studies was positive. Similarly, a study conducted by Klassen and Willoughby (2003) found that students were more likely to remember the educational material and be more engaged from simulated games than from a typical lecture. Also, a recent study by Druckman and Ebner (2008) found that integrating simulated role-play and scenario lead to a higher level of motivation and overall interest in learning, compared to a lecture-only instructional strategy.

An additional benefit of the computer simulated case studies was the relatively high amount of interactivity the students experienced with the “ethically-challenged-professional.” It can be assumed that the computer simulation study participants experienced a *state of flow*, defined as a person is in a psychological state where he or she is so involved with the experience that nothing else matters (Csikszentmihalyi, 1975). It

is within this state of flow when complete engagement occurs. Feeling in control of your own actions, being highly involved in the production of a piece of equipment, or being immersed in a problem-solving activity, are also examples of the flow state. Salen and Zimmerman (2004) integrated *game flow*, taking cues from Csikszentmihalyi's flow state, into their framework for designing computer simulations and games.

It can also be assumed that with higher levels of engagement, some knowledge construction will occur. Lainema and Lainema (2007) found that by integrating a business simulation game within a learning environment, even though the problems were complex, the experience was very motivating and enjoyable. They also identified characteristics of learning specific for business practice, including empowerment of the learners, learning by doing, authenticity of the task, intensity of the learning setting, and complexity of the learning context, to name a few.

This study had similar results in that the computer simulated case studies were overall positively received and advanced the participant's acquisition of ethics-based knowledge. By integrating computer simulated ethics case studies into the repertoire of interior design educator's teaching arsenal, results from this study indicate that positive effects of engagement and overall learning experiences will more than likely be found.

More specifically related to this study, utilizing business/ethics-related simulations is starting to gain some momentum in higher education. A study by Bos, Sadat, and Naab (2006) integrated a globalized computer simulation to teach corporate social responsibility to undergraduate students. The students used role-playing and perspective-taking to work through problems related to both ethics and corporate social

responsibility. Even though this study did not employ quantitative measures, qualitatively speaking, students demonstrated success in both ethical problem-solving and corporate considerations of perspective taking.

Other concluding results of this study include the identified factors contributing least to overall learning experiences and engagement levels. The first concluding result was the physical format of the learning media (paper and computer). If students have to constantly flip back-and-forth between pages or click on various computer screens to review details of a case study, their learning experiences and engagement levels might be negatively impacted. This research utilized a dual-column format for the pencil-and-paper case studies which was not well-received, nor was the integration of review questions at the beginning of the document and interspersed throughout the three case studies. Each of the computer simulated case studies were formatted to fit onto three to four introductory screens with the intention of integrating corresponding visual graphics. When students got to the interactive question and answer session, they had a tendency to click back to the introductory screens and review specifics of each case. They found this action inefficient. Another result identified from the computer simulation study for participants was their lack of familiarity with the computer program (i.e. how to navigate between screens). This, too, was cited as a factor that lowered their overall learning experiences and engagement levels.

Looking at the broader context of learning, this study also identified positive learning experiences for *both* the pencil-and-paper and computer simulated case study participants. This can be attributed to the problem-based and experience-based learning

formats the pencil-and-paper case studies and computer simulated case studies were grounded. Both instructional strategy formats provided the learner the possibility to face three real-life ethical situations, analyze the situations within an ethical framework, and develop potential ethical resolutions. By integrating a variety of instructional strategies into the classroom, the *whole brain* of the student is utilized, compared to only lecturing or only reading case studies. In summary, it was both the constructs of active experimentation and learning-by-doing that supported the theory of experiential learning and overall positive outcomes of this study.

Implications

Implications for Higher Education

Higher education institutions have begun implementing more information technology into classrooms. This study focused on the educational needs of the net-generation interior design student. More specifically, it addressed the effects of achievement by integrating traditional supplementary instructional strategies of pencil-and-paper scenarios compared to computer simulated scenarios as a supplementary instructional strategy for an undergraduate interior design class studying business ethics content. This study also examined learner engagement levels of each supplementary learning strategy. The findings of this study showed that although interior design students found computer simulated ethics case studies a positive learning experience with relatively high levels of engagement, this did not necessarily equate to higher levels of achievement when compared to other instructional strategies.

However, from this study, interior design educators, and more broadly, educators within higher education, can expand their teaching repertoire to include computer simulations as a supplementary teaching strategy to address the educational needs of net-generation students. Results from this study can also be used to substantiate the positive effects that computer simulated ethics case studies have for students, both in regard to overall learning experience and engagement. By integrating more information technology into the classroom, the generation gap between “digital immigrants” and “digital natives” would decrease, which served as a supporting argument for the implementation of this study.

More specifically, this study could also positively serve the needs of the growing number and popularity of online courses being developed and implemented in higher education. Instructors of online courses are always looking for different ways to enhance learning through the medium of the computer. Discussion platforms, viewing and producing multi-media assignments, and other on-line activities can only be utilized so much before interest and/or engagement wanes by the online students. A viable option for these online courses, specifically those dealing with problem-based and experience-based learning, could be to integrate computer simulated scenarios as a format of online teaching and learning. Regardless of the topic, computer simulated scenarios could be developed and integrated into many online courses.

This study integrated a research model for developing the computer simulated case studies based on problem-based and experienced-based learning theories, with engagement being achieved by a positive state of flow. As noted in the review of

literature, educational gaming models lack a consistent theoretical framework upon which to develop simulation games. Based on the overall positive learning and engagement results of this study, this research model could be integrated into other areas of study and act as a unifying framework from which other simulation games could be developed.

Implications for Future Research

From this study it is possible to propose a number of implications for future iterations. Because this study had a low number of participants, this study could be considered a pilot study for a larger longitudinal study. The accessible population could be increased to include undergraduate interior design students from other universities in the mid-west and/or data collected over a period of two to five years from the same university. By increasing the sample size, the potential for more statistically significant results might be achieved.

Also, if this study were to be expanded to include other area universities, the experimental design could be modified so it would be modeled after the study by Druckman and Ebner (2008) who utilized the randomized post-test-only design and integrated a lecture-only control condition to provide baseline data, instead of the pre-test. The lecture-only component would be scripted by the researcher and the instructors at the participating universities would disseminate this lecture component as scripted. This type of experimental design could help control the threat to validity otherwise found in the pre-test/post-test design (Druckman & Ebner, 2008).

Another interesting implication for future consideration is this study only had participants who fit the “traditional” demographic of ages 18-24 years. However, there are many “non-traditional” aged students who return to college to pursue second or third degrees, or to carry out previously unfulfilled professional goals. Non-traditional students do pursue careers in interior design. Future research studies could be developed to target this non-traditional demographic and compare results with traditional student demographics, in regard to integrating computer simulations as a specific instructional strategy.

Results from this study indicated some participants preferred the *physical nature* of paper-and-pencil case studies, thus giving them the ability to *write down* answers and have a *format* that was *concise*, while others preferred the *interactive* and *efficient* nature of the computer. Previous research has been conducted on undergraduate design students’ learning styles being predominantly bi-modal (Martinson & Zollinger, 2006). Another study used various forms of information technology to engage students with multiple learning styles (Solvie & Kloek, 2007). Future research could be conducted to evaluate if student’s identified learning styles could be used as a predictor of preferred instructional strategies, achievement, and perceived level of engagement.

Research on integrating simulations into higher education and the lack of progress made in objectively being able to assess cognitive learning that occurs within this medium has gained the attention of researchers (Anderson & Lawton, 2009). These researchers noted that most studies conducted on integrating computer simulations as instructional and learning strategies, resulted in assessments often measured using the

affective (feeling) domain, and not the cognitive (learning) domain. To address this perceived lapse in cognitive assessment, future research could be conducted to improve this specific assessment of the educational impact of simulations. For example, usability software that measures a person's movements and frequencies during actual simulations could be used as a quantifiable method of measurement, and would go beyond the reliance of self-report measures such as pre-test, post-test, and questionnaires. This type of research could possibly provide a higher validated and reliable form of measuring learning within computer simulations. However, learning does not always have to occur within the confines of higher education.

Looking beyond the walls of higher education, results from this study could be used to aid in the development of continuing professional education programs related to professional practice and business ethics. Interior design practitioners, if registered professionals in their state (or states) of practice, are required to complete a specific number of continuing education hours/units to retain their professional registration. Previous research conducted by Peterson & Zollinger (2006) identified that interior design practitioners ($n = 161$) had two equally distributed and predominant learning styles. Both of the predominant learning styles preferred learning activities including computer-assisted instruction, role-playing, guided fantasy and reflection, and various forms of other multi-media. Computer simulated ethics case studies could be one of the instructional strategies implemented within such continuing professional education programs to create effective and engaging learning experiences.

In addition to continuing professional education, this research could be expanded into professional practice and ethics-based training for design companies. Due to the current state of the economy, many companies have decreased, or eliminated, sending employees to expensive off-site training and education programs. Design employees could work through various computer simulated ethics case studies at their leisure, and then debriefing, or reflection time, could occur with the employees/participants during a lunch hour within their place of business. This type of supplementary training for design business professionals, or any business professional, could be a benefit to the company and lower the potential for future liability claims where ethical resolutions were not thoroughly examined and reflected upon before action was taken.

Regardless of the format of instructional strategies, it should be the intent of the educator to exude elements of engagement, learning by doing, authenticity, and intensity to the learner. The use of computer-simulated case studies can serve as a consistent, effective tool in teaching interior design business ethics to learners. This research bolsters the argument for integrating computer simulations situated within problem-based and experience-based theoretical frameworks. A lot is yet to be uncovered as far as being able to effectively and accurately measure cognitive gain within computer simulations. However, these findings support the value of adding and integrating information technology as an effective and engaging learning and teaching tool for students in higher educations, especially within interior design education.

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APPENDIX A: Letter of Consent for Participants

CONSENT FORM

The Net-Generation Interior Design Student: Assessing Learning and Engagement Within a Computer Simulation Environment

Dear DES-314 Student:

You are invited to be in a research study that will be assessing learning and engagement using different educational methods within an interior design undergraduate class dealing with professional ethics content. The two educational methods employed will be traditional pencil-and-paper case studies and computer simulated case studies, both dealing with ethics content. You were selected as a possible participant because you are currently in an accredited undergraduate smaller mid-western university interior design program and enrolled in a course that covers topics of business and professional practice issues within the field of interior design. Please read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Julie E. Peterson, graduate student and Ph.D. candidate within the College of Design's Department of Design, Housing, and Apparel at the University of Minnesota – Twin Cities. Ms. Peterson is also full-time faculty at the University of Wisconsin – Stout within the Department of Art and Design.

Background Information:

The purpose of this study is to assess potential effects on learning via achievement between traditional instructional strategies and computer simulation instructional strategies and levels of engagement. Net-generation learners, born in or after 1982, have been exposed to technology their whole lives and have come to expect the integration of various forms of multi-media instructional strategies within the classroom. Many studies have been conducted that integrate computer simulation gaming with higher education but research is very limited within the field of interior design. This study addresses the need for more research in this area and also the need to greater meet the educational needs of the net-generation learner.

Procedures:

If you agree to be in this study, I would ask you to do the following things: Take both a pre-test and post-test to assess level of achievement/learning; review and complete either pencil-and-paper case studies or computer simulated case studies, both dealing with ethics content, and complete a short survey on the level of engagement for the selected educational method described above.

Risks and Benefits of being in the Study:

The study has no risks. It should be noted that participation or non-participation in this research such will not influence class standing, grades, or other benefits under the control of the researcher.

The benefits to participation are enhancing your learning within the field of interior design, specifically in regards to professional ethics and being exposed to ethics content in a non-risk environment before entering the profession. Another benefit of participating is being part of a formal research study within your field of study.

Compensation:

Not all participants will be compensated for participating. However, two participants will be randomly selected to receive a \$20 gift card to a local retailer.

Confidentiality:

The records of this study will be kept private and subjects will be identified by an anonymous code. In any sort of report published, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota of the University of Wisconsin – Stout. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

IRB Approval:

This study has been reviewed and approved by the University of Wisconsin – Stout's Institutional Review Board (IRB) and the University of Minnesota's Institutional Review Board (IRB) as required by the Code of Federal regulations Title 45 Part 46. The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Contacts and Questions:

The researcher conducting this study is Julie Peterson. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at

jepeters@umn.edu or peteronj@uwstout.edu or call her at 715-232-3490. You may also contact her advisor to answer further questions, Dr. Stephanie Zollinger at the University of Minnesota, 612-624-3205 or via e-mail at szolling@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650 OR the UW-Stout, **IRB Administrator**, Sue Foxwell, Director, Research Services, 152 Vocational Rehabilitation Bldg., UW-Stout, Menomonie, WI 54751, 715-232-2477 or via e-mail at foxwells@uwstout.edu.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

IRB Code # 0903E61161

Version Date: 03.25.09

APPENDIX B: Pre-test

This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46

PRE-TEST

Code _____

Professional Ethics in Interior Design

The code should consist of the first letter of your LAST name, a four (4) digit number you can easily recall, and your middle initial. For example: P0117E.

Directions:

Answer all 15 questions based on the topic of professional ethics.

Part I – Multiple Choice. (Read the question and circle the correct response).

1. Making ethical decisions within the professional business environment comes down to making decisions and choices that often involve which of the following areas?
 - a. Conflict of interest
 - b. Competition
 - c. Misuse of proprietary information
 - d. Employee theft
 - e. All of the above

2. Most people typically behave unethically because they:
 - a. are careless, motivated by self-interest, and see no harm in their behavior.
 - b. do not think clearly on how their actions will affect others.
 - c. only want what is best for themselves.
 - d. are pressured by others.

3. A *conflict of interest* is defined as a real or seemingly incompatibility between one's private interests and one's public duties, putting personal gain above the good of the person or the organization another person is supposed to represent. Which of the following examples is a *conflict of interest*?
 - a. Using information from another design firm without their permission.
 - b. Prior to leaving a firm, copying a written specification section onto a memory stick so it can be used with one's new firm they are starting.
 - c. Submitting a request for proposal for a design project when the designer is related to one of the proposal reviewers.

4. Which of the following is NOT an example of *proprietary information* within the design profession?
 - a. A custom design detail for a reception desk.
 - b. A company's mission statement.
 - c. Bidding strategies for obtaining projects.
 - d. Financial records of clients.

5. When in the process of developing an ethical resolution and understanding each of the participants involved is called:
 - a. stockholder analysis.
 - b. stakeholder analysis.
 - c. knowing your rights.
 - d. full disclosure.

6. Acting ethically within the profession of design is one's _____ responsibility.
 - a. private
 - b. personal
 - c. societal
 - d. sole

7. Balancing the relative merits, benefits, and costs associated with how well a design project serves community purposes derive from what theory?
 - a. Deontics
 - b. Social-Contract
 - c. Virtue
 - d. Utility

8. You have learned that a colleague in another design firm always orders extra yardage of carpet, billing the product to the client whose project needed the carpet. Instead of giving the extra material to the client, this designer donates it to charities, taking a tax deduction on her income taxes. Select your most ethically appropriate course of action.
 - a. After considering the circumstances you decide to do nothing.
 - b. Inform the client of this designer's actions.
 - c. Discuss the situation with other designers at a local design event to help analyze this ethical dilemma.
 - d. Confront this designer yourself and review ethical behavior within the design profession.

9. Bill has been running radio ads in his community, which give the impression that he and his staff are professional-level members of one of the major interior design associations. Bill and his staff are not professional members of this association mentioned in the ads. Is this ethically acceptable?
- a. Yes. Because they really are members of the organization mentioned in the ads, it doesn't matter the level of membership status.
 - b. Yes. There are no direct negative implications to the client as a result of the short radios ads.
 - c. No. This professional conduct falls under the designer's responsibility to not engage in any form of false or misleading advertising or promotional activities.
 - d. No. This professional conduct solely falls under the designer's responsibility to the client.
10. You go to the home of a new client for a residential remodel. The client shows you boards and plans that obviously were not prepared by the client. You would really like to complete this project because this client is well-known and a local celebrity. What would you do?
- a. Take the job regardless of the other boards and plans. You will only use a little bit of the information from them and no one will ever know.
 - b. Ask the client to explain where the boards came from and proceed to tell the client that even though they look really nice, you cannot use them because they are proprietary information.
 - c. Acknowledge the boards and plans by someone else to the client, use the boards as design concept inspiration to create a variation of complementary ideas.
 - d. Ask the client who developed the boards and plans. Take the job/project and use the same boards and plans, but acknowledge who developed them.

Part II – True/False. (Circle the correct response).

11. Ethical standards are standards of the law.
- a. True
 - b. False
12. Ethical behavior only affects interior designers who are members of professional organizations with written and adopted ethical standards.
- a. True
 - b. False

Part III – Matching. (Select the best response from the terms given and write the letter in the space provided. Terms can be used more than once or not at all).

TERMS

- a. Values and Virtues
- b. Rights and Responsibilities
- c. Consequences and Contingencies

13. Having thought about the outcome of an ethical decision or resolution. _____

14. Being accountable. _____

15. Fully disclosing all types of compensation to a client. _____

APPENDIX C: Pencil-and-Paper Case Studies

CASE STUDIES – Pencil-and-Paper **Professional Ethics in Interior Design**

These case studies are meant to be used as supplementary problem-solving situation exercises within the unit of study on professional ethics, specifically within the field of interior design practice.

Directions:

Read each case study in its entirety. Assess all facts, both known and unknown. Also analyze the ethical theories the case study addresses. At the end of each case study there will be specific questions pertaining to that particular case study. In addition, consider the following questions for all case studies. These questions will guide you in evaluating all possible outcomes and developing potential resolutions. Write down your thoughts and responses. The questions are:

- 1) Does this case study present an ethical situation? If so, why? If not, why not?
- 2) What would you do in this situation if you were the designer?
- 3) What would you do if you were aware of a design coworker engaging in such activity?
- 4) What would you do if you were aware of a design colleague engaging in such activity at a different company?
- 5) Does this situation fall under specific IIDA (International Interior Design Association) or ASID (American Society of Interior Designers) codes of ethics? If so, which specific items?



Case Study #1 – Professionalism

John has been working for the same interior design firm for the past five years, ever since completing college. He has been responsible for a variety of project types since starting the company, but has become the primary lead-person for designing various types of retail stores.



This has started to become quite mundane to him and does not seem to be challenging him anymore because much of the space planning and lighting design are the same and the only

variety seems to be with the material and finish selections.

Overall, he has gained much experience within the field of retail design and has exhibited professional growth. However, during his last performance review he became quite disgruntled because he did not receive either a raise or a promotion to junior-level designer.



Within the past few months, John has been approached by other interior design firms in the city. Since his recent performance review, he decides to pursue looking for a different design firm to work for and does so without asking permission from his current employer. John also takes plans and photos of projects he has been involved in and includes them in his portfolio for upcoming job interviews, which he goes to during regular business hours.



Questions for Case Study #1

1. What are John's responsibilities to his current employer?
2. Should he be using these projects in his portfolio without having asked permission?
3. What are the consequences if he asks permission to use the projects in his portfolio?
4. What are the consequences if he does not ask permission to use the projects in his portfolio?
5. Is he acting out of his best interest?
6. Also address the questions from the "Directions."

Case Study #2 –Rights and Responsibilities

Beth is the principal designer and owner of Beth Design Firm. She currently finds the company with a surplus of projects to work on, which she believes is a short-term situation. A decision is made that additional help at the junior design level is needed, but Beth and other members of management do not currently feel comfortable in making a long-term commitment to hire more full-time staff.



However, at the same time, DEF Design Firm, a firm on the other side of town, is experiencing a decrease in projects due

to the limited number of new residential homes being designed and built, given the state of the economy. The partners of DEF Design Firm are convinced that home construction will eventually increase and they are reluctant to lay off any of their key staff members who will be needed when the residential home scene starts thriving again.

One of the partners from DEF Design Firm contacts a friend, who happens to be Beth, the principal designer and owner of Beth Design Firm. They have a conversation about the possibility of “loaning” an employee (on a short-term basis) for approximately six months.



The qualifications of the DEF Design Firm employee and the duration of his availability fit perfectly into the projected needs and project deadlines for Beth Design Firm. This employee agrees to the concept of a “loan” to Beth Design Firm for six months. All members of management from both firms are in agreement that the change is strictly temporary and the employee will return to DEF Design Firm at the end of the loan period. The “loaned” employee starts work at Beth Design Firm.



Before the end of the six months, the temporary employee approaches Beth and informs her that he would like to stay with Beth Design Firm, rather than return to DEF Design Firm when the loan period has ended. The employee goes on to tell Beth that he finds work and his job responsibilities at Beth Design Firm much more challenging and feels there is more opportunity for growth and development because of the different project types.

During the time this “loaned” employee has been with Beth Design Firm, the company’s workload has continued to increase and it appears now that the addition of permanent/long-term staff is probably desirable. Also, Beth has been impressed by the employee’s ability, attitude, overall performance, and would like to have him as part of the permanent staff.



Beth calls her friend at DEF Design Firm and informs him of the situation. The friend indicates he is glad the temporary arrangement worked but that DEF Design Firm is now in a workload

position where he needs the employee back at his firm.



Beth is not sure how to handle this situation.

Questions for Case Study #2

1. Should a permanent position be offered to the employee by Beth Design Firm on the premise that the employee alone has a right to decide where he works?
2. Should Beth Design Firm advise the employee that they would like to have him join the firm, but indicate it feels a commitment to honoring its agreement with DEF Design Firm? If so, should Beth Design Firm advertise for new staff?
3. What responsibilities does the employee have to its original firm, DEF Design Firm?
4. Does DEF have any obligation to honor the employee's wishes?
5. If the employee returns to DES Design Firm and then ends up quitting shortly after his return and seeks to be hired by Beth Design Firm, what should be the position of Beth Design Firm?
6. Also address the questions from the "Directions."

Case Study #3 – Values and Virtues

Shannon is a senior-level designer and project manager for a medium-sized commercial interior design firm. Over the years the firm has worked on a large variety of projects including corporate offices, schools, churches, and libraries.



During the last year, the workload began to diminish due to the economic recession. Overall employment in the profession is down and competition between design firms is fierce.

At the current time, the projected work-under-contract is only out two months and if this doesn't increase, lay-offs will more than likely occur.



In the meantime, one of firm's principals hears of a Request for Proposal (RFP) for full interior design services for a new downtown corporate office. The principal makes a few calls, meets initially with

this client, submits the RFP, and receives a phone call that the project was awarded to their design firm.



The principal informs Shannon of the new project and that she, as the assigned project manager, will conduct all of the design meetings with the client, Planned Parenthood.



Shannon has always been a strong, pro-life supporter, but she has never shared these feelings with any of her co-workers. Now that she is going to be the project manager for the new corporate offices for Planned Parenthood, she feels conflicted.

3. Should Shannon's personal values and virtues alter her professional responsibilities?
 4. What are the consequences if Shannon makes her personal beliefs of abortion know to her employer and/or the client?
 5. Also address the questions from the "Directions."
-

Adapted from:

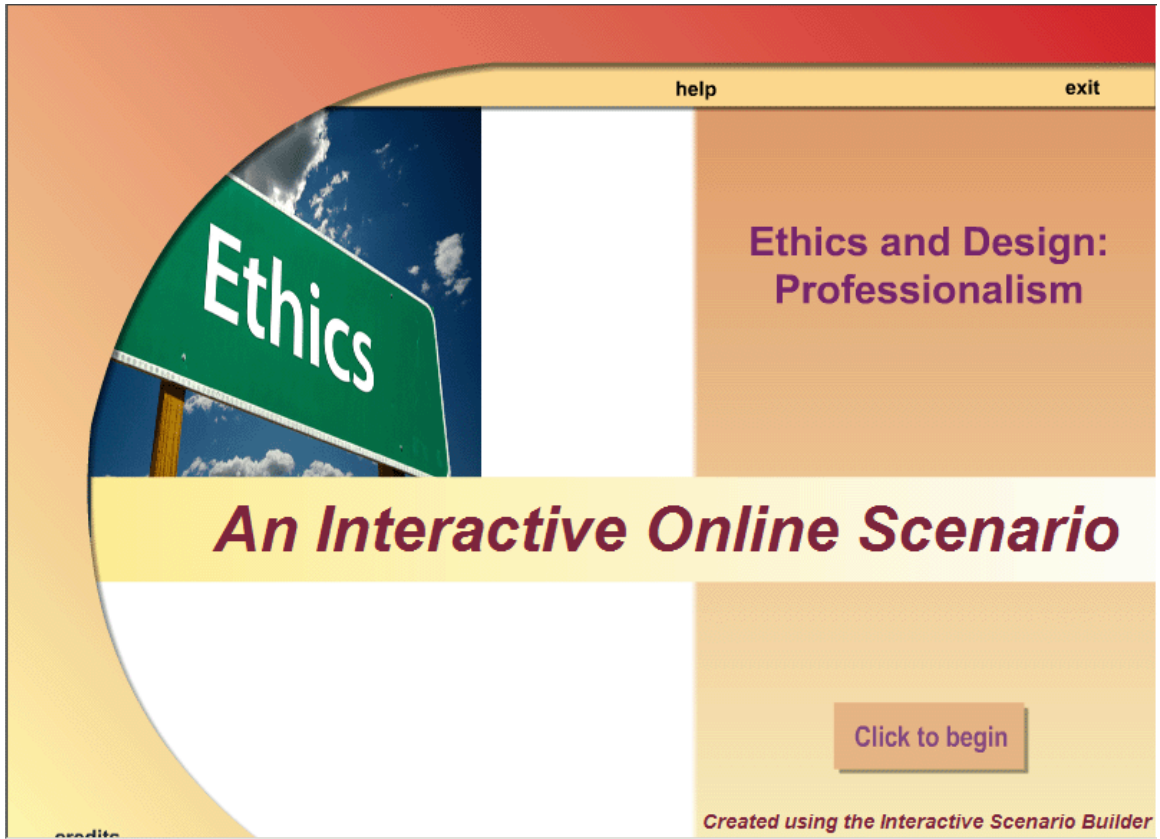
Piotrowski, C.M. (2008). *Professional practice for interior designers*. (4th ed.) New Jersey: John Wiley & Sons, Inc.

Wasserman, B., Sullivan, P., & Palermo, G. (2000). *Ethics and the practice of architecture*. New York: John Wiley & Sons, Inc.

Questions for Case Study #3

1. What are Shannon's responsibilities to her employer?
2. What are the firm's responsibilities to the new client to carry out the project?

APPENDIX D: Computer Simulation Case Studies



<http://art.uwstout.edu/~petersonj/>

APPENDIX E: Post-test

This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46

POST-TEST

Code _____

Professional Ethics in Interior Design

The code should consist of the first letter of your LAST name, a four (4) digit number you can easily recall, and your middle initial. For example: P0117E.

Directions:

Answer all 15 questions based on the topic of professional ethics.

Part I – Multiple Choice. (Read the question and circle the correct response).

1. Most people typically behave unethically because they:
 - a. are careless, motivated by self-interest, and see no harm in their behavior.
 - b. do not think clearly on how their actions will affect others.
 - c. only want what is best for themselves.

2. Making ethical decisions within the professional business environment comes down to making decisions and choices that often involve which of the following areas?
 - a. Misuse of proprietary information
 - b. Conflict of interest
 - c. Employee theft
 - d. Competition
 - e. All of the above

3. Which of the following is NOT an example of *proprietary information* within the design profession?
 - a. Financial records of clients.
 - b. A custom design detail for a reception desk.
 - c. Bidding strategies for obtaining projects.
 - d. A company's mission statement.

4. Acting ethically within the profession of design is one's _____ responsibility.

- a. Sole
 - b. Personal
 - c. Private
 - d. Societal
5. When in the process of developing an ethical resolution and understanding each of the participants involved is called:
- a. stockholder analysis.
 - b. stakeholder analysis.
 - c. knowing your rights.
 - d. full disclosure.
6. You go to the home of a new client for a residential remodel. The client shows you boards and plans that obviously were not prepared by the client. You would really like to complete this project because this client is well-known and a local celebrity. What would you do?
- a. Ask the client who developed the boards and plans. Take the job/project and use the same boards and plans, but acknowledge who developed them.
 - b. Take the job regardless of the other boards and plans. You will only use a little bit of the information from them and no one will ever know.
 - c. Ask the client to explain where the boards came from and proceed to tell the client that even though they look really nice, you cannot use them because they are proprietary information.
 - d. Acknowledge the boards and plans by someone else to the client, use the boards as design concept inspiration to create a variation of complementary ideas.
7. Balancing the relative merits, benefits, and costs associated with how well a design project serves community purposes derive from what theory?
- a. Social-Contract
 - b. Utility
 - c. Deontics
 - d. Virtue
8. Bill has been running radio ads in his community, which give the impression that he and his staff are professional-level members of one of the major interior design associations. Bill and his staff are not professional members of this association mentioned in the ads. Is this ethically acceptable?
- a. No. This professional conduct falls under the designer's responsibility to not engage in any form of false or misleading advertising or promotional activities.

- b. Yes. Because they really are members of the organization mentioned in the ads, it doesn't matter the level of membership status.
 - c. No. This professional conduct solely falls under the designer's responsibility to the client.
 - d. Yes. There are no direct negative implications to the client as a result of the short radios ads.
9. You have learned that a colleague in another design firm always orders extra yardage of carpet, billing the product to the client whose project needed the carpet. Instead of giving the extra material to the client, this designer donates it to charities, taking a tax deduction on her income taxes. Select your most ethically appropriate course of action.
- a. Confront this designer yourself and review ethical behavior within the design profession.
 - b. After considering the circumstances you decide to do nothing.
 - c. Discuss the situation with other designers at a local design event to help analyze this ethical dilemma.
 - d. Inform the client of this designer's actions.
10. A *conflict of interest* is defined as a real or seemingly incompatibility between one's private interests and one's public duties, putting personal gain above the good of the person or the organization another person is supposed to represent. Which of the following examples is a *conflict of interest*?
- a. Prior to leaving a firm, copying a written specification section onto a memory stick so it can be used with one's new firm they are starting.
 - b. Using information from another design firm without their permission.
 - c. Submitting a request for proposal for a design project when the designer is related to one of the proposal reviewers.

Part II – True/False. (Circle the correct response).

11. Ethical behavior only affects interior designers who are members of professional organizations with written and adopted ethical standards.
- a. True
 - b. False
12. Ethical standards are standards of the law.
- a. True
 - b. False

Part III – Matching. (Select the best response from the terms given and write the letter in the space provided. Terms can be used more than once or not at all).

TERMS

- a. Values and Virtues
- b. Consequences and Contingencies
- c. Rights and Responsibilities

13. Having thought about the outcome of an ethical decision or resolution.

14. Fully disclosing all types of compensation to a client _____

15. Being accountable. _____

APPENDIX F: Engagement Questionnaire – Pencil-and-Paper - Control Group

ENGAGEMENT QUESTIONNAIRE

Code _____

The code should consist of the first letter of your LAST name, a four (4) digit number you can easily recall, and your middle initial and be in this order. For example: P0117E.

The questionnaire has been developed to assess your perceived levels of engagement for the traditional pencil-and-paper ethics case studies used during the unit of study on professional ethics. The questionnaire can be completed in approximately 15 minutes. Thank you in advance for taking time to participate in this research study.

Directions: This questionnaire consists of three (3) parts. Part I consists of five questions with a Likert-type rating scale of 1 - 5 with 1 = *strongly disagree*, 3 = *neutral*, and 5 = *strongly agree*. Place an “X” in the box that you feel most appropriately responds to each question. Part II consists of four (4) open-ended questions where you can add your own personal reflection and thoughts. Part III consists of demographic and computer frequency questions. Please take the time to fill out all questions.

Part I – Place an “X” in the box of your most appropriate response.

	1 = Strongly Disagree	2 = Somewhat Disagree	3 = Neutral	4 = Somewhat Agree	5 = Strongly Agree
1. Traditional pencil-and-paper case studies improved my problem-solving skills regarding professional ethics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Traditional pencil-and-paper case studies were an engaging format for learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Traditional pencil-and-paper case studies increased my motivation to learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Traditional pencil-and-paper case studies provided me with a real-world learning experience that was meaningful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Traditional pencil-and-paper case studies were enjoyable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part III - Place an "X" in the box of your most appropriate response.

10. Your age:

- 18-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40+ years

11. Indicate approximately how much time you spent on the computer (not for school-related work) as a child/teenager (ages 10-17):

- zero (0) hours/week
- 1-5 hours/week
- 6-10 hours/week
- 11-15 hours/week
- 16-20 hours/week
- 20+ hours/week

12. Indicate approximately how much time you currently spend on the computer for non-school-related work:

- zero (0) hours/week
- 1-5 hours/week
- 6-10 hours/week
- 11-15 hours/week
- 15+ hours/week
- 20+ hours/week

APPENDIX G: Engagement Questionnaire – Computer Simulation - Treatment Group

This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46

ENGAGEMENT QUESTIONNAIRE

Code _____

The code should consist of the first letter of your LAST name, a four (4) digit number you can easily recall, and your middle initial and be in this order. For example: P0117E.

The questionnaire has been developed to assess your perceived levels of engagement for the computer simulated ethics case studies used during the unit of study on professional ethics. The questionnaire can be completed in approximately 10 minutes. Thank you in advance for taking time to participate in this research study.

Directions:

This questionnaire consists of three (3) parts. Part I consists of five questions with a Likert-type rating scale of 1 - 5 with 1 = *strongly disagree*, 3 = *neutral*, and 5 = *strongly agree*. Place an “X” in the box that you feel most appropriately responds to each question. Part II consists of four (4) open-ended questions where you can add your own personal reflection and thoughts. Part III consists of demographic and computer frequency questions. Please take the time to fill out all questions.

Part I – Place an “X” in the box of your most appropriate response.

	1 = Strongly Disagree	2 = Somewhat Disagree	3 = Neutral	4 = Somewhat Agree	5 = Strongly Agree
1. Computer simulated case studies improved my problem-solving skills regarding professional ethics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Computer simulated case studies were an engaging format for learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Computer simulated case studies increased my motivation to learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Computer simulated case studies provided me with a real-world learning experience that was meaningful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Computer simulated case studies were enjoyable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part III- Place an "X" in the box of your most appropriate response.

10. Your age:

- 18-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40+ years

11. Indicate approximately how much time you spent on the computer (not for school-related work) as a child/teenager (ages 10-17):

- zero (0) hours/week
- 1-5 hours/week
- 6-10 hours/week
- 11-15 hours/week
- 16-20 hours/week
- 20+ hours/week

12. Indicate approximately how much time you currently spend on the computer for non-school-related work:

- zero (0) hours/week
- 1-5 hours/week
- 6-10 hours/week
- 11-15 hours/week
- 15+ hours/week
- 20+ hours/week

APPENDIX H: Computer Simulation Case Study One – Screen Shots

Professionalism ~ Background ~ Interview John

Select questions as if you were actually interacting with this person during a professional networking interview. The questions are not in order.

- Do you think you have a potentially ethical situation here?
- What are the important values affecting this situation?
- What are the important virtues affecting this situation?
- What would be some of the positive consequences surrounding your decision to look for a different job?
- What would be some of the negative consequences surrounding your decision to look for a new job and use the company's graphics? What about going on interviews during regular "office hours?"
- Should you be using your current company's graphics without their permission?
- Have you assessed all of the facts so far in this situation? Should you have told your employer about the interviews? Should you be using their graphics?
- What is your responsibility to your current firm?
- What is your responsibility to the profession?
- What are other consequences that you could encounter from your current colleagues if they were to find out about your actions and intentions?


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Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

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Professionalism ~ Background

Select questions as if you were actually interacting in a professional networking interview. The questions

- Do you think you have a potentially ethical situation here?
- What are the important values affecting this situation?
- What are the important virtues affecting this situation?
- What would be some of the positive consequences surrounding your decision to look for a different job?
- What would be some of the negative consequences surrounding your decision to look for a new job and use the company's graphics? What about going on interviews during regular "office hours?"
- Should you be using your current company's graphics without their permission?
- Have you assessed all of the facts so far in this situation? Should you have told your employer about the interviews? Should you be using their graphics?
- **What is your responsibility to your current firm?**
- What is your responsibility to the profession?
- What are other consequences that you could encounter from your current colleagues if they were to find out about your actions and intentions?



Well, I've worked for this company so many years there is a definite layer of loyalty I seem to feel, but then I have these doubts creep up into my mind. What does it mean?

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Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

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Reflect on the Interview

Q: What are John's responsibilities to his current employer?

A: This is where you really need to open up your thoughts to all potential contingencies and evaluate all of the stakeholders. What does his contract state as far as his job responsibilities? What are not only the responsibilities he has to his employer but also to his colleagues?



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Click the button for a discussion and then click the forward arrow at the top of the screen to continue.

Professionalism ~ Course of Action for the Designer

Select the most appropriate course of action options for this ethical situation. Click "Response" to gauge reactions of the designer to each option.

Available Options



- I don't think John has any over-arching responsibilities to his employer...hasn't he put his time in?
- I think John should only use those drawings if he has actually done the work on the projects and also clears it with his employer.
- If John does ask permission of the employer to use the projects in his portfolio then there could be a variety of things that happen.
- If John does not ask permission of his employer to use the graphics then the consequences would more than likely be negative.
- I don't think John should be going to interviews during business hours. It isn't in his or his client's best interests.
- I think John should be going to

Selected Options



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Response

To select an option, click it and then click the right arrow to move it to the Selected Options box. (To deselect, click it and click the left arrow to move it back.)

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APPENDIX I: Computer Simulation Case Study Two – Screen Shots

Introduction

PRIMARY LEARNING OBJECTIVE:
The instructional goal for the students is to increase their awareness of complex, ethical situations, and corresponding resolutions.

DIRECTIONS FOR STUDENT:
Students should read the entire scenario, navigate through each screen, and perform the tasks presented. At the end there will be time for reflection of the case.

The case study is centered around interactions with a virtually simulated interior designer. Each designer has been faced with an ethical dilemma in the workplace. The students should assume they are conducting a simulated professional mentoring interview with the interior designer.



Read the text and then click the forward arrow at the top of the screen to continue.

Rights & Responsibilities ~ Background

Before the end of the six months, the temporary employee approaches Beth and informs her that he would like to stay with Beth Design Firm, rather than return to DEF Design Firm when the loan period has ended. The employee goes on to tell Beth that he finds work and his job responsibilities at Beth Design Firm much more challenging and feels there is more opportunity for growth and development because of the different project types.

During the time this "loaned" employee has been with Beth Design Firm, the company's workload has continued to increase and it appears now that the addition of permanent or long-term staff is probably desirable. Also, Beth has been impressed by the employee's ability, attitude, overall performance, and would like to have him



Read the text and then click the forward arrow at the top of the screen to continue.

Rights & Responsibilities ~ Background ~ Interview Beth

Select questions as if you were actually interacting with this person during a professional networking interview. The questions are not in order.

- Do you think you have a potentially ethical situation here?
- What are the important values affecting this situation?
- What are the important virtues affecting this situation?
- What would be some of the positive consequences surrounding your decision on how to act?
- What would be some of the negative consequences surrounding your decision on how to act?
- Who is the "loaned employee" accountable to?
- Have you assessed all of the facts so far in this situation?
- What is your responsibility to DEF Design Firm?
- What is your responsibility to the "loaned employee?"
- What would the managers in your design firm say if you don't try to retain the "loaned employee?"



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Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

Rights & Responsibilities ~ Background

Select questions as if you were actually interacting in a professional networking interview. The questions

Oh, I haven't even thought of them. I am responsible for their best interests, too. I guess I also need to consider their point of view!

- Do you think you have a potentially ethical situation here?
- What are the important values affecting this situation?
- What are the important virtues affecting this situation?
- What would be some of the positive consequences surrounding your decision on how to act?
- What would be some of the negative consequences surrounding your decision on how to act?
- Who is the "loaned employee" accountable to?
- Have you assessed all of the facts so far in this situation?
- What is your responsibility to DEF Design Firm?
- What is your responsibility to the "loaned employee?"
- **What would the managers in your design firm say if you don't try to retain the "loaned employee?"**



Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

Reflect on the Interview

Q: Should Beth Design Firm advise the employee that they would like to have him join the firm, but indicate it feels a commitment to honoring its agreement



A: This is an example of ethical situations having more than one clear-cut answer. Have you prioritized the various ethical outcomes?



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Click the button for a discussion and then click the forward arrow at the top of the screen to continue

Rights & Responsibilities ~ Course of Action for the Designer

Select the most appropriate course of action options for this ethical situation. Click "Response" to gauge reactions of the designer to each option.



Available Options	Selected Options
Item	Response
I don't think Beth should offer a permanent position to the "loaned" employee.	Even though you might think that the employee has the right to work where he wants, there was still a formal contractual agreement (this could have been written or verbal) between my firm, DEF Design Firm, and the "loaned" employee.

•Beth should say "thank you" to the employee because he has fulfilled his contractual agreement and send him back to DEF Design Firm.

•Beth should advise the employee that they would like to have him join her firm, but indicate she feels a commitment to honoring its agreement with DES Design Firm.

•Beth should advise the employee that they would like to have him join her firm and to terminate future employment with his former, DEF Design Firm.

Continue



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Response

To select an option, click it and then click the right arrow to move it to the Selected Options box. (To deselect, click it and click the left arrow to move it back.)

APPENDIX J: Computer Simulation Case Study Three – Screen Shots

Values and Virtues ~ Background

Shannon is a senior-level designer and project manager for a medium-sized commercial interior design firm. Over the years the firm has worked on a large variety of projects including corporate offices, schools, churches, and libraries.



Read the text and then click the forward arrow at the top of the screen to continue.

Values and Virtues ~ Background

During the last year, the workload began to diminish due to the economic recession. Overall employment in the profession is down and competition between design firms is fierce. At the current time, the projected work-under-contract is only out two months and if this doesn't increase, lay-offs will more than likely occur.



Read the text and then click the forward arrow at the top of the screen to continue.

Values and Virtues ~ Background ~ Interview Shannon

Select questions as if you were actually interacting with this person during a professional networking interview. The questions are not in order.

- Do you think you have a potentially ethical situation here?
- What are the important values affecting this situation?
- What are the important virtues affecting this situation?
- What would be some of the positive consequences surrounding your decision on how to act?
- What would be some of the negative consequences surrounding your decision on how to act?
- Do you think your personal values and virtues should really alter your professional responsibilities?
- Have you assessed all of the facts so far in this situation?
- What are your responsibilities to your employer?
- What would others say in the firm if you declined to be project manager for this job?
- What else would be some other negative consequences surrounding your decision on how to act?



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Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

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Values and Virtues ~ Background

Select questions as if you were actually interacting professional networking interview. The questions

Let's see...values of myself, my client, my employer...where do I start?

- Do you think you have a potentially ethical situation here?
- **What are the important values affecting this situation?**
 - What are the important virtues affecting this situation?
 - What would be some of the positive consequences surrounding your decision on how to act?
 - What would be some of the negative consequences surrounding your decision on how to act?
- Do you think your personal values and virtues should really alter your professional responsibilities?
- Have you assessed all of the facts so far in this situation?
- What are your responsibilities to your employer?
- What would others say in the firm if you declined to be project manager for this job?
- What else would be some other negative consequences surrounding your decision on how to act?

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Click on an item to see the person's response. When you are done asking questions, click the forward arrow.

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Reflect on the Interview

Q: Should Shannon's personal values and virtues alter her professional responsibilities?

A: This type of ethical situation is common; when a person's moral fabric is stretched so far that it might impact responsibilities one has to a job, a colleague, or an employer.



Reflect on the Interview

Q: Does this type ethical situation fall under specific IIDA (International Interior Design Association) or ASID (American Society of Interior Designers) codes of

A: Both of these professional Codes of Ethics would be good to review when gathering all facts of the situation and responsibilities of all stakeholders. Even if you don't find an exact clause that states something directly, it can at least point you in the right direction and make you feel good because you have been thorough in your analysis thus far.



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Click the button for a discussion and then click the forward arrow at the top of the screen to continue.

Values & Virtues ~ Course of Action for the Designer

Select the most appropriate course of action options for this ethical situation. Click "Response" to gauge reactions of the designer to each option.



Available Options	Selected Options
Item	Response
<p>I think Shannon should not push away her personal morals and values.</p> <p>abilities to do a good job for Planned Parenthood.</p> <ul style="list-style-type: none"> •I think Shannon should not push away her personal morals and values. •I think Shannon should decide to talk to the principal in her firm but he gets very upset at her when she shares her pro-life values with him. •I think Shannon should decide to talk to the principal in her firm and be very up front with him about pro-life values with him. She should be prepared with rational responses to potential questions he might ask her. •Shannon should move ahead with the 	<p>I would be very nervous about bringing this up to the principal of the firm (my boss) in a private meeting but if would do it prior to any design meetings occurring with the client, that would be even better.</p>

Continue



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Response

To select an option, click it and then click the right arrow to move it to the Selected Options box. (To deselect, click it and click the left arrow to move it back.)

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