DESIGNSCHOLAR: EXAMINING CREATIVE THINKING IN AN ONLINE LEARNING COMMUNITY FOR INTERIOR DESIGN GRADUATE STUDENTS

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2009

To my boys
Joey, Joel, and Josh

ACKNOWLEDGMENTS

I would first like to sincerely thank my family for their love and support. I would also like to extend my gratitude to my committee chair, Dr. Margaret Portillo, for her amazing guidance and patience throughout my educational career. Many thanks go to my committee members; Dr. M. Jo Hasell, Dr. Colleen Swain and Professor John Maze for their expertise and wisdom for the direction of this research. Their encouragement and support for the study was greatly appreciated.

I want thank my wonderful editor, Sherry Riley, whose assistance proved invaluable. Additional thanks to my consulting statistician Kunle Kutu. Thank you to the Florida State University graduate students, who I am deeply indebted, for taking the time to take part in the essay judging process of the study, Tracie Kelly and Taneshia West.

Further, I would like to thank Dr. Jill Pable for giving me a chance to pilot test this study in her class at Florida State University during the fall of 2007. I also extend my gratitude to Dr. M. Jo Hasell at the University of Florida, Dr. Cigdem Akkurt at Iowa State University, and Dr. Janetta McCoy of Washington State University for their cooperation in coordinating student involvement in the dissertation study during the fall of 2008. Lastly, I would like to thank all the students who took part in the pilot and dissertation studies from Florida State University, Iowa State University, University of Florida, and Washington State University.

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DESIGNSCHOLAR: EXAMINING CREATIVE THINKING IN AN ONLINE LEARNING COMMUNITY FOR INTERIOR DESIGN GRADUATE STUDENTS

By

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August 2009

Chair: Margaret Portillo
Major: Design, Construction, and Planning

This study examined the creative thinking of interior design graduate students in an online learning community. This study considered potential changes in creative thinking (fluency, flexibility, originality, and elaboration) about design research resulting from peer-led online discussions. It further studied the learner characteristics of personal motivation and domain-relevant skills as predictors of creative thinking in interior design graduate students.

This study used 21 students from three interior design graduate programs across the United States. These students participated in online discussions on the *Designscholar* website for six-weeks during the fall of 2008. Personal motivation was assessed with a standardized instrument, the Work Preference Inventory, and domain-relevant skills were evaluated with a locally developed instrument. The information from these surveys was compared with pre and post-test essay measures that assessed creative thinking and the dimensions of creative thinking; (fluency, flexibility, originality, and elaboration).

The findings suggest that the use of peer discussions in an online learning community like *Designscholar* can increase the creative thinking about design research in interior design graduate students with particular benefit to incoming students who hold previous degrees in fields unrelated to interior design. It also found that intrinsic motivation positively influenced

creative thinking about design research, while extrinsic motivation had a negative impact. The interactions in the online discussions lead to significant gains in creative thinking about understanding and defining a personal interest in interior design research.

CHAPTER 1
INTRODUCTION

Introduction

Experienced design students, educators and practitioners alike can surely recall the excitement and gratification that came from solving a design problem through research and analysis of the many complex factors that influenced the design. Whether the discovery comes from studying design related information or the latest influences seen in design literature, the experience was enhanced when shared with peers. Satisfaction came from consulting with peers on a new project, brainstorming on research ideas, and discussing common challenges. These interactive experiences expanded the opportunity to dialogue with those who understood the issues. Whatever the reason for the dialogue, do these discussions also expand the desire and ability to think creatively and communicate effectively? What if beginning graduate students, regardless of their geographical location, could access an online network of peers to discuss their emerging interests, collectively analyze the disciplines that impact their design concepts, and work together to gain advanced knowledge to find new solutions to design challenges. If done in an online forum, students could not only advance their understanding of design research but become a larger network of emerging research and even improve their overall communication skills. Recent changes in technology and increasing acceptance of online learning in higher education provide the ideal opportunity to examine these issues and consider new strategies in course structure that could maximize graduate student opportunities to sharpen their creative research skills.

Background

Careful study into interior design graduate curriculum has shown that "effective educational programs require the development of thoughtful and precise research and

communication skills, including writing, critical reading, qualitative thinking, and process of analysis and synthesis" (Wolf, 1996, p. xi). These skills are essential to graduate students in interior design due to the interdisciplinary nature of this field of academic study. While faculty within programs tailor and guide thesis research, students must be able to comprehend, analyze, and synthesize complex research topics from a wide range of subjects as diverse as sustainability, historic preservation, and environmental psychology.

In addition to being interdisciplinary in nature, interior design is a constantly evolving academic discipline with a growing common body of knowledge (Carll White & Dickson, 1994; Dohr, 2007). Recipients of an interior design graduate degree are expected to build upon previous research and add to the knowledge base (Carll White & Dickson, 1994; Guerin & Thompson, 2004). Research, for the purposes of this study, is previous literature and documentation on the discovery, interpretation, and development of methods and systems for the advancement of interior design (Dickenson & Marsden, 2009). Research-based design solutions from previous research findings give future interior designers a way to base, defend, and rationalize the design decisions they make (Guerin & Thompson, 2004; Hasell & Scott, 1996). Incorporating research into design education is a way to advance the scholarly culture of interior design and bridge the practice and academic worlds (Dohr, 2007). Also, the ability to incorporate research-based design solutions into the practice of interior design has recently emerged as an important and necessary skill for interior design students. As a result, more and more educators are including this important tool in traditional studio education. This trend is reinforced by the recent change in standards for all accredited interior design programs set forth by the interior design accrediting body, the Council for Interior Design Accreditation (CIDA). The 2009 CIDA standards call for interior design students to evaluate, select, and apply

information and research findings to design and for programs to-expose students to design research and problem solving methods-in undergraduate and graduate curriculum (Council for Interior Design Accreditation, 2009). Communication and critical dialogue can help further student understanding about design research and how it is incorporated into successful design solutions.

The goal of this dissertation study was to examine an online learning community (OLC) created for interior design master's students and the impact of online discussions on changes in their creative thinking about design research. Further, it seeks to evaluate and determine the influence of personal motivation and domain expertise on creative thinking. Using online discussions as a vehicle for communication about design research allows students to heighten their awareness of research topics and methodologies. By discussing current literature, students begin to create a necessary foundation to develop original and relevant research in the field. Prior exposure to design-based research may be limited for students due to many coming from other backgrounds than design, and because research has typically not been emphasized in undergraduate interior design programs.

A focus report in the *Journal of Interior Design* on the interior design body of knowledge within the discipline highlights effective communication as a basic competency in the discipline need (Guerin & Martin, 2004). The process of transferring information from one source to another is crucial for interior designers who must convey their design solutions and decisions many times to clients, contractors, and related professionals. Without effective communication, designers will be unable to convey their visions. To further better communication, studies call on programs to "provide more opportunities for students and faculty to engage in dialogue and the exchange of ideas of scholarly merit" (Guerin & Thompson, 2004, p. 7). This needed

dialogue can takes place face-to-face or remotely using computer-mediated communication (CMC) and can be facilitated through oral and/or written means. Through the use of current technologies, CMC²s allow students to interact with special interest groups that share common research interests. These connections would not be formed in the daily face-to-face student interactions within programs.

Using a delivery method like asynchronous online discussions, students can interface with others engaged in a design research process regardless of geographic and time differences. Previous research in online discussions shows that cultivating online relationships, providing feedback, and reflecting on others' opinions can increase interactivity and scholarship among students resulting in a higher order of creative thought (Dutt-Doner & Powers, 2000; Romiszowski & Ravitz, 1997). Online discussions afford students the opportunity to reflect upon and analyze their own opinions, increase their motivation in education, and share resources with other peers interested in similar topics (Chickering & Ehrmann, 1996). Studies show that the reflective writing activities that take place in online discussions groups enhance critical and creative thinking in students and have applications across disciplines (Cisero, 2006). For interior design, research–based design relies on communication skills and reflective writing to integrate existing literature findings into current design solutions. Interior design graduate students engaged in developing a research agenda can benefit from reflective writing within online discussions through networking, sharing ideas and resources, and considering the divergent opinions within a group of peers. Likewise in design research and development, a cycle of imaging, presenting, and testing occurs where designers and researchers move away and toward problem resolution (Zeisel, 2006). Communication and the opportunity to reflect on ideas maintain the cycle of development that yields creative solutions in design practice and research.

Specifically, a graduate degree in interior design should include "both professional design content and research methods to promote the integration of research into the design process" (Weigand & Harwood, 2007, p. 3).

The online learning community tailored for interior design graduate education is a new and innovative way to increase communication skills, advance creative thinking about design research, and supplement the traditional methods of graduate seminar instruction with current technologies. Online discussions reinforce the important cycle of imaging, presenting, and testing of ideas within a supportive, discipline-specific peer audience with similar research interests. Wider exposure can also introduce a variety of design research topics and produce new theoretical and methodological approaches to design research.

Purpose

The purpose of this study is to assess the effectiveness of an online instructional module that uses online discussions to promote creative thinking about design research. The original module designed for this dissertation research, *Designscholar*, created by the author of the study, was designed to promote online interaction among graduate students at geographically diverse interior design graduate programs. The framework for the study reflects Theresa Amabile's componential model (1983) that defines creativity as a function of three learner components: creative thinking skills, personal motivation, and domain-relevant skills. The purpose of the *Designscholar* module is to tap into all three components. This study evaluates potential changes in creative thinking about design research through pre and post measures. Further, the study assesses the dimensions of creative thinking identified in previous literature as fluency, flexibility, originality, and elaboration of ideas (Torrance, 1988). Evaluating these dimensions gives insight into specific facets of creative thinking that impact participation in the *Designscholar* online module. The interconnectedness of the learner and content constructs is

central to this study, and hypothesized intrinsically motivated learners would show greater gains in creative thinking about design research than those less internally motivated counterparts. Research has shown that intrinsically motivated students appear driven by their own personal desires such as challenge and enjoyment whereas extrinsically motivated students are driven by reward and recognition (Amabile, Hill, Hennessey, & Tighe, 1994). The componential theory of creativity describes intrinsic motivation as positively affecting an individual's creativity where challenge drives the creative process (Amabile, 1983). Namely, researchers see extrinsic motivation, or creativity through reward, as detrimental to the creative process (Amabile, 1996; Kaufman, 2002). Along with examining personal motivation through a survey, the study also assesses domain-relevant skills. Through a simple background questionnaire, students provide information on their educational background, experience in design, and exposure to design research thus far. This assesses the student's previous knowledge, experience, and expertise in the field of interior design. Creative thinking, personal motivation, and domain-relevant skills are examined together as avenues to enhance creativity and the vital components of the discovery process in design research. See Appendix A for a diagram of the research design.

Problem Statement

Involving students in discussions about the significance of research and scholarship in interior design during graduate school is critically important. Not only can this heighten awareness and interest in research but it can also increase dialogue between future practitioners, educators, and/or researchers and therefore, increase the sense of community among those in the interior design field. Communities define themselves by the commonalities of membership, influence, integration and fulfillment of needs, and shared emotional connection (McMillian & Chavis, 1986). Belonging to a community of design scholars can increase exposure to new and diverse ideas about design research. The act of creating and participating in a scholarly

community is proposed to enhance the graduate student learning experience. This is especially important in relatively low enrolled programs. Of 169 CIDA accredited undergraduate programs, 52 programs additionally offer graduate degrees in interior design or related fields with a 2-3 year completion time (Interior Design Educators Council, 2009). More than 64% of these graduate programs had 10 or fewer students enrolled in 2004 with 7% reporting only 1 or 2 students.

For students enrolled in a small graduate program, discussions about interior design research with students who have similar interests may be exceedingly difficult, given the diverse research topics students gravitate to even within small programs. Using online discussions can broaden graduate student peer communication and enhance awareness and a personal interest in design research. This could also be a means for creating a community to advance research in the interior design field through nurturing members.

A few published studies have utilized online technologies to connect students from different programs who are engaged in studio design projects, but this does not seem to be systematically integrated into either coursework or curricula (Botti-Salitsky, 2005; Kucko, Prestwood, & Beacham, 2005; Matthews & Weigand, 2001). Recently, there has been more use of online technology for interior design education. The Savannah College of Art and Design has started an online blog to connect grad students (Savannah College of Art and Design, 2009). Also, Colorado State implemented a hybrid degree program that uses online classes to supplement face-to-face classes minimizing time spent on campus (Colorado State University, 2009). However, these few instances of distance delivery integration in traditional design schools truly call for more in-depth research into the changing fields of design, education, and technology to inform successful use of online learning in the discipline.

Research Questions

Questions about Creative Thinking

- What is the relationship between participation in *Designscholar* and *overall creative thinking* about design research?
- What is the relationship between participation in *Designscholar* and *creative thinking* about understanding design research?
- What is the relationship between participation in *Designscholar* and *creative thinking* about defining a personal interest in design research?

Questions about Personal Motivation

- What is the relationship between *personal motivation* and *overall creative thinking* about design research?
- What is the relationship between *personal motivation* and *creative thinking* about understanding design research?
- What is the relationship between *personal motivation* and *creative thinking* about defining a personal interest in design research?

Questions about Domain Expertise

- What is the relationship between *domain expertise* and *overall creative thinking* about design research?
- What is the relationship between *domain expertise* and *creative thinking* about understanding design research?
- What is the relationship between *domain expertise* and *creative thinking* about defining a personal interest in design research?

Table 1-1. Variables in the study.

Creative Thinking	Motivation	Domain Relevant Skills
Fluency	Intrinsic	Year Enrolled
Flexibility	Challenge	Design Education
Originality	Enjoyment	Design Work Experience
Elaboration	Extrinsic	Design Interest
	Compensation	Commercial Practice
	Recognition	Residential Practice
		Academic Teaching
		Academic Research

Limitations

This study has a modest sample size (n=21), but represented three geographically diverse interior design graduate programs across the United States. The programs involved handled participation in this module differently. The sample consisted of 14 from Iowa State University, while Washington State involved 5 students. These two of the three institutes required participation and assessed a grade for their students based on their involvement. The University of Florida started with 6 students, but only finished with 2 students who completed the module. The remaining faculty member made this an optional activity with no grade and saw high student attrition. This may speak to the importance of external motivation and/or perhaps idiosyncratic issues with the individual students.

This study focused on master's students traditional graduate theses, and project based theses with a research component. It did not measure the differences in how these two types of students reacted, and this should be considered for future research. However, these findings can be generally applied to the variety of graduate programs currently in interior design (MS, MA, MID, and MFA). Students had diverse educational backgrounds with 12 having design related undergraduate degrees including; interior design, architecture, and art, and 9 having degrees not related to interior design. This study did not have any students interested in pursuing a PhD after completion of their master's degree. Therefore future research may want to examine learning communities involving doctoral students; yet, the reality is that most master's students in interior design will not pursue research careers. It does, however, need to be acknowledged that research-based design is gaining increased recognition in the field as professionals apply an understanding of design research within their practice. Armed with a master's level specialization, these students are gaining needed domain expertise. In conjunction with domain

expertise and personal motivation, creative thinking skills contribute to overall creativity of practicing professionals and academics within the field of interior design.

Conclusion

The study explored the relationship among the key learner characteristics of creative thinking skills, personal motivation, and domain-relevant skills in an online learning module focused on design research. The outcome of the module was an online discussion forum that introduced learners to a range of design research and facilitated peer knowledge building, creative thinking, and critical discourse in an online community. This technology allowed diverse learners to advance their creative thinking about design research through existing literature and peers within the community who may have not been available for face-to-face interaction. This learner interaction incorporates multiple points of view in turn advancing expertise and needed creative thinking within a scholarly culture of design inquiry (Dohr, 2007).

CHAPTER 2
REVIEW OF LITERATURE

Introduction

The development of the interior design graduate student online learning community for this study, *Designscholar,* was grounded in constructivist educational theory. The following review defines and discusses the educational theory used in the study followed by an overview on the current state of interior design graduate education. Educational theory and interior design education are further related to the literature on creativity and dimensions of creative thinking. The closing discussion examines online learning in higher education and focuses on interior design applications.

Theoretical Background: Constructivist Educational Theory

To understand how constructivist educational theory guided the development of this research study, it is important to review the major philosophical paradigms that shaped educational theories. A paradigm is a consensus of opinion within a scientific community on the theoretical assumptions, techniques, and laws within a specific context (Chalmers, 1982). A paradigm is a "comprehensive belief system that guides research and practice in a field" (Heinecke, Dawson, & Willis, 2001, p. 295). Heinecke, Dawson, and Willis (2001) further identify paradigm characteristics as taking positions on a) ontology (the nature of reality), b) epistemology (the nature of knowledge) and c) methodology (the nature of how one comes to know). Paradigms vary from author to author, but two generally accepted competing paradigms are positivism and interpretivism ((Heinecke, Dawson, & Willis, 2001). For the purposes of this study, these two philosophies will be compared and contrasted.

The goal of a positivist researcher is to uncover universal truths. The ontology of the paradigm is that "probable" truth is knowable because it is external to that of the learners mind

and reality (Heinecke, Dawson, & Willis, 2001). The epistemology belief assumes the researcher will maintain an objective stance to obtain discoverable facts. The researcher and learner are outsiders taking in information to reach closer to an external truth. For example, instructors who align themselves with positivism see the goal of education as acquiring knowledge (universal truths) leading to the mastery of a predetermined skill set (Fosnot & Perry, 2005). Methodology systematically applies the scientific method of inquiry to uncover universal truths and sees this as the only source of knowledge. The scientific method allows objective collection and judgment of facts and uses induction to generalize "probable" truths to teach and inform.

The behaviorist educational theory is reflected in seminal works by Ivan Pavlov (1927) and B.F. Skinner (1953). It focuses teaching and learning on the teacher. Behaviorists master a pre-determined set of skills or content in learning. Behaviorism defines the learner as a participant who observes an instructor discuss a topic or demonstrate an activity. The learner needs external motivation and is perceived as a passive and submissive learner (Skinner, 1953). This method has implications in modifying behavior, but does not explain a significant change in true understanding or cognitive change. (Fosnot & Perry, 2005). The result of learning is modeling the behavior of others. The instructor assumes the role of teacher and dictates the learning process for learners. The learner becomes a recipient of pre-selected information. Differences among learners are not considered; therefore, and all learners are taught in the same manner. Some behaviorist approaches to teaching are reflected in traditional lecture formats and teacher-led discussions. Assessments are the same for all students to gauge the effectiveness of each learner's ability to recall information on a specific set of skills. From this stance, learning is thought to be universal and externally guided.

In contrast, interpretivism sees that "what we call knowledge does not and cannot have the purpose of producing representations of an independent reality, but instead has an adaptive function" (von Glasserfield, 2005, p. 3). Interpretivism is in opposition to positivism and is based in the major works of Jean Piaget (1971). The ontology of interpretivism sees reality as grounded in context that cannot be separated from the learner. Reality is a social construction of the learner and knowledge is an interpretation by the learner. Interpretivist do not dismiss external reality, they merely dismiss "the idea that it is an 'independently knowable' reality" (Heinecke, Dawson, & Willis, 2001, p. 300). Interpretivism seeks to understand information placed within a context, not to uncover a universal truth external to the learner's reality as with the post-positive perspective. Epistemology places emphasis on the subjective nature of learning and the learner because of previous knowledge and perceptions. Interpretive assumptions contend that the researcher always brings pre-existing knowledge and experience and that these undoubtedly shape and influence the learning and research processes. Interpretivism sees the goal of education as the process of learning and uncovering acceptable truths within the context of the learner. This methodology differs from the scientific method by subjectively approaching the collection and judgment of facts within a context. This collaborative approach leads to "possible" truths that emerge through individual and social context.

Constructivism educational theory, based on the writings of Lev Vygotsky (1978) and John Dewey (1938), focuses teaching and learning on the learner and their processes. Constructivism is an educational theory developed under the assumptions of an interpretivist paradigm. "According to Vygotsky, social constructivism is a variety of cognitive construction that emphasizes the collaborative nature of learning, whereby learners engage in collaborative activities, construct rather than acquire knowledge, and extrapolate their own meaning from

various experiences" (Lang, Peer, Divaharan, Chia, Williams, Wong, & Jamaludin, 2005, p 48-49). The focus of learning is on cognitive development and a deep understanding during the learning process (Fosnot & Perry, 2005). It relies heavily on the learner to initiate inquiry and discovery within a supportive community of learners. Learning is viewed as a social process supported and maintained by interactions. Constructivism contends that all learners enter the learning community equally and participate in teaching and learning. Each learner is responsible for contributing as well as learning from the social interactions with others. There are no hierarchical distinctions among learners and the goal of the interaction is the social construction of knowledge. The collective knowledge of the community cannot exist without the participation of individuals in the community (Fosnot & Perry, 2005). The knowledge community becomes larger than any one learner and reaches to support the needs of all learners. Instructors assume the roles of facilitators and respond to the learning process as it unfolds. The learner directs the flow of information and selects the information explored, making this theory adaptable to a variety of learning styles and learner personalities. Constructivist approaches to teaching are active learning techniques, such as peer-learning and problem-based learning (Oliver, 2000). Assessments such as reflective writing assignments are more individualized. These assessments focus on the process of learning for each learner, rather than on the end results of recalling information through standardized examinations.

Each of these paradigms has been used in education and online learning. A positivist educational theory, behaviorism, is the traditional approach to teaching and learning. This theory was used in the development of the initial distance education courses (Garrison, 1993). Constructivist educational theory, related to the paradigm of interpretivism, is increasingly being used in distance education and is becoming the predominant theory for distance education

delivery. This increase is due to technology catching up to the needs of the constructivist teacher; creating active learning and social connections within a community of learners. The instructor who adheres to a constructivist approach to teaching is now able to harness technology to create a community of learners.

Table 2-1. Educational Structure

Philosophical Paradigm	Positivism	Interpretivism
Educational Theory	Behaviorism	Constructivism
Educational Strategy	Passive Learning	Active Learning
Learning Technique	Instructor as Expert	Instructor as Facilitator
Activities	Lecture	Peer Discussion
Technology Tool	Presentation Software	Online Discussion Group

Table 2-1 shows the educational structure under the two competing paradigms of positivism and interpretivism. The philosophical paradigms place the educational theories within a larger philosophical context of reality and knowledge. Educational strategies guide teaching and learning goals while learning techniques structure the pedagogic activities. Technology for example compares power point to online discussions to match educational theory. These tools facilitate learning activities, techniques, strategies, theories, and overall paradigm assumptions about teaching and learning. Technology choices clearly reflect the theoretical assumptions of the educator and his or her educational paradigm.

It is important to recognize that the assumptions of each paradigm and the related educational theories impact choices on curriculum development and delivery. It is also important to point out that many times we see the overlap of theories. Aspects and techniques of different theories are implemented to deal with the variety of course content and learning styles of the students. Some scholars maintain that the positive methodology is quantitative and that interpretivism is qualitative, but often they are used to supplement one another (Heinecke, Dawson, & Willis, 2001; Jonassen, 2000). It is important to note that positivism and

interpretivism approaches to learning are not mutually exclusive. For instance, traditional lectures of pre-determined information can be integrated in collaborative peer-writing exercises that are directed and developed by the learners. Further, learning assessments can take the form of a standardized examination (quantitative) and a reflective writing piece (qualitative). This acknowledges that different learners learn and process information in different ways. Techniques and activities that support multiple learning theories may be more effective than one approach alone (Nussbaumer, 2001). Using a variety of teaching styles also facilitates a diverse range of learning styles (Ferdig & Roehler, 2003; Mupinga, Nora, & Yaw, 2006; Nussbaumer, 2001; Peggram, 2007).

The thought processes and introspection occurring during the learning process are at the center of the constructivist educational theory. Reflective writing or dialogue allows the learner to revisit ideas to improve or further focus understanding (Barab & Duffy, 2000; Cisero 2006; Oliver, 2000). Revisiting ideas also enhances the grade performance of undergraduate students (Cisero, 2006). The act of reflection is not only an important part of constructivist student learning, but is also a necessary component of the research and academic writing process. Kevin Oliver (2000) encourages the constructivist reflection cycle, seen in Figure 2-1. The cycle assumes that as "students express their conception of an idea or their mental models, they reflect on the opinions of others or feedback provided about their ideas, and they revise their initial conception to account for new opinions and feedback" (Oliver, 2000, p. 7).

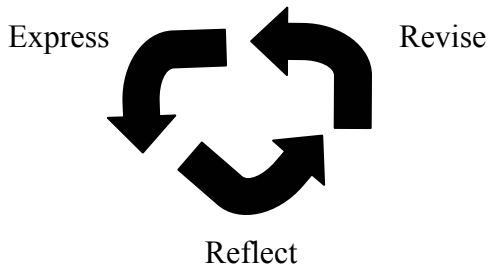


Figure 2-1. Constructivist Reflection Cycle (Oliver 2000, p. 7).

Figure 2-1 illustrates the constructivist reflection cycle adapted from Oliver (2000, p. 7). Likewise, John Zeisel's (2006) related spiral of inquiry in design research presents the design process as involving reflection after initial idea presentation to focus and refine solutions for reinterpretation. Each conceptual shift moves the researcher one step closer to the "domain of acceptable responses (Zeisel, 2006, p. 30)." This search for "possible" truths reinforces the constructivist theoretical assumption that there is not always one right answer, especially in interior design. This is also reinforced by Donald Schon's (1983) reflective practice concept which views learning as a continuous cycle of reflection on one's own experiences while being guided by professionals or experts in the field. The interior design process lends itself to multiple acceptable solutions. Designers return to reflection after idea presentation to further refine their solutions. Similarly, the constructivist reflection cycle is best facilitated through a social community of knowledge holders who respond to the expressions and revisions of others. Reflection and reflective writing allow the learner to assimilate new perspectives and information and synthesize connections to previously held knowledge (Cisero, 2006). It has also shown to increase grade performance in students. Cheryl Cisero (2006) found that when undergraduate educational psychology students were required to write reflectively on assigned readings their grades improved over those who did not. Her study found that there was a significant increase from D to C grades with a slight increase from B to A grades in the intervention group (n=166) over the control group (n=317) (Cisero, 2006). This study showed that C students or those with the least amount of understanding saw the greatest gains. The goal of reflective writing and the reflection cycle is to encourage deep understanding and learning, also thought of as creating conceptual shifts or revising "mental models" (Budd, 2000). The reflection cycle prepares students for learning through expression, reflection, and revision.

From a constructivist point of view, learning happens during conceptual shifts, or transfer and assimilation of new information (Oliver, 2000; Zeisel, 2006). These result in changes in the "mental model" students hold about information. When learners change or adapt their "mental models" to incorporate and synthesize new information into different contexts, they begin to generate knowledge for and within themselves. Shifts in student mental models happen in interior design graduate education where students are charged with incorporating previous research into their evidence-based design solutions. Incorporating research and reflective activities into interior design decisions grounds the decisions in a growing body of knowledge and continues to produce needed and necessary future research. This is evidenced in the growing use of evidence-based research in interior design graduate programs.

Interior Design Higher Education

Background in Interior Design Graduate Education

Graduate education in interior design historically has resulted in a number of degree types. These include Master of Science (MS), Master of Arts (MA), Master of Interior Design (MID), and Master of Fine Arts (MFA). First-professional students who enter an interior design graduate program with a different undergraduate background results in a primarily practice degree of an MA, MS, or MID. Others who come to graduate education with a design degree, or post-professionals, pursue research and/or practice degrees that results in a MA, MS, MID, or MFA. The varying degrees and student types in these programs has caused problems and confusion about what degrees entail and what the terminal degree type is in interior design. These degrees vary in their nomenclature, the background of the students (first vs. post-professional), accreditation status, and curriculum within the programs (Interior Design Educators Council, 2006). Graduate education has been the topic of many articles, position papers, and white papers within the community of design educators (Dohr, 2007; Guerin, 2007;

Kroelinger, 2007; Rabun, 2007; Thompson, 2007; Weigand & Harwood, 2007). The topic of these discussions has centered on how to define a terminal degree for the field and to overview what is currently offered to graduate students in interior design.

The Interior Design Educators Council (IDEC) has called for a stricter definition of the terminal degree in interior design. They propose a definition for the degree to "include both professional design content and research methods, and to promote the integration of research into the design process" (Interior Design Educators Council, 2006). Often, there has been a lack of understanding about design research at the undergraduate and graduate levels (Dickinson & Marsden, 2009). In practice, interior designers base their design decisions on both subjective and objective knowledge derived through a variety of sources (Pable, 2009). Dickinson and Marsden (2009) propose that design decisions can be informed by gathering information from soft sources via the web and trade publications, data collection through programming, the application of published findings, and conducting investigations that add to the knowledge in the field. This reaches beyond basing design decisions on intuition and hunches of the designer and places emphasis on evidence-based design.

The nature of interior design makes it a professional and theoretical field which relies on real-world practice and a knowledge base grounded in theory. IDEC recommendations are to call the degree a Master of Interior Design (MID) in order to clarify the requirements of the degree and being a professional degree that incorporates research into the design process (Interior Design Educators Council, 2006). This has been reiterated by many who voice the need to clarify the degree requirements (Dohr, 2007; Guerin, 2007; Kroelinger, 2007; Rabun, 2007; Thompson, 2007; Weigand & Harwood, 2007). The need for qualified educators has driven

much of this discussion due to many programs not accepting certain degree types as terminal degrees for teaching at the university level.

The Interior Design Educators Council (IDEC) listed 50+ job opportunities around the country at accredited institutions for interior design educators during the summer of 2007 (Interior Design Educators Council, 2007). This increasing number of job vacancies is due to faculty that are reaching retirement age, as well as to the fact that most designers go into practice to carry out their creative design solutions. Once designers have obtained their degree and licensing, they practice in a specific area of design to obtain expertise within their field. Designers returning to interior design graduate programs are diverse in their population and their learning styles (Nussbaumer, 2001; Watson & Thompson, 2001). This calls for a variety of teaching techniques and non-traditional means of delivery to meet the needs of all learners. Focusing on alternative means of delivery can also link students across different programs.

As of August 2008, 42 post-professional interior design and related programs had enrolled students. Of these 42 programs; 15 had more than 10 students, and 27 had 10 students or less enrolled. Of these 27; 15 had 5 students or less enrolled, and 5 schools only had 1 student. These small programs could broaden their student's peer community by using online technological tools for communication among students. Most of these degree programs have small enrollment numbers and diverse populations of traditional and non-traditional students. Integrating online delivery techniques into interior design graduate education can reach students without access to traditional means of education and ease the current burden of limited qualified educators in the field. Therefore, these students may find online collaboration through distance learning technology helpful in the completion of their degree. Interior design is also a field that requires a high degree of creativity to solve complex design problems (Gardner & Weber, 1990).

While online collaboration may help interior design graduate students in their degree completion, it can also enhance student's critical and creative thinking skills about interior design and the role of design research.

Componential Theory of Creativity

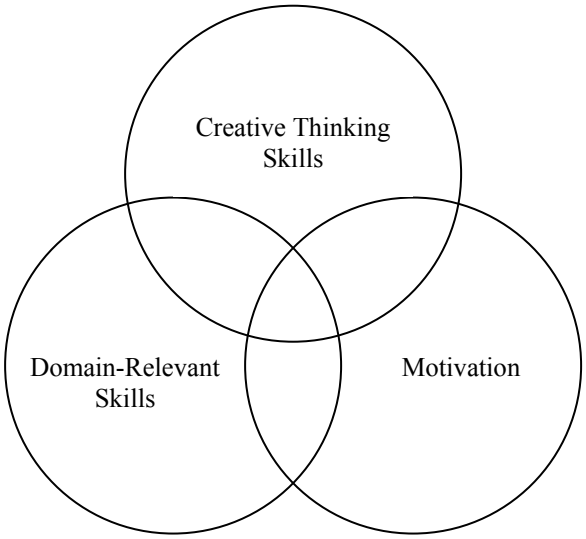


Figure 2-2. Componential Theory of Creativity Model (Amabile, 1983).

Amabile (1983) proposes a theoretical framework for the study of creativity using the componential theory of creativity. In this theory she identifies three components of creativity; creative thinking skills, task motivation, and domain-relevant skills as seen in Figure 2-2. Used across disciplines, creative thinking skills enable learners to organize and present their responses and bring information and motivation together for an appropriate yet imaginative problem solution. The use of these three aspects of creative problem solving uncovers what skills people use to arrive at appropriate problem solutions.

When processing information, motivation initiates and sustains problem solving. Motivation influences how the search for a creative solution will begin and if it will be ultimately carried out (Amabile, 1996). According to Amabile (1993), the two primary scales of motivation are intrinsic motivation, (internal challenge and interest) and extrinsic motivation (outward

reward or compensation) are present in all people. In this theory "the intrinsically motivated state is conducive to creativity, whereas the extrinsically motivated state is detrimental" (Amabile, 1983, p. 91). Intrinsic and extrinsic motivation is further sub-divided to understand what influences each primary scale. Intrinsic motivation is viewed through the sub-scales of challenge and enjoyment. Extrinsic is further analyzed as recognition and reward. These sub-scales give insight into what drives intrinsic and extrinsic primary motivation.

Domain-relevant skills are the skills each person draws upon for appropriate problem solving. These pre-existing skills shape responses and the criteria for response selection (Amabile, 1996). Mihaly Csikszentmalyi (1988, 1999) views creativity as being shaped by the individual working within a field in a specific domain. The nature of the individual and their status of knowing impacts creative processes within their particular domain of expertise. This paradox of creativity is that one must carry a certain level of knowledge about the domain in order to engage in creative thought, but they should be able to look at things in a fresh and novel way (Csikszentmalyi, 1988). The componential theory of creativity suggests that those who possess moderate to high levels of creative thinking skills, intrinsic motivation, and domain-relevant skills will produce work judged high in creativity and will likely continue to produce similar work. On the other hand, those with low levels of creative thinking skills, intrinsic motivation, and domain-relevant skills will produce work judged low in creativity and will have low interest in future similar engagements (Amabile, 1996; Kaufman, 2002). Examining this theory, a study of creative writing students and journalism students uncovered the differences in motivation on the creative process (Kaufmann, 2002). This studied the motivational orientation of students in relation to two different writing styles, creative writing and journalistic writing. He found that the intrinsically motivated students were more prevalent in the creative writing

field than in the journalism field (Kaufman, 2002). This suggests the creative writer may be more internally motivated while the journalism writer is motivated to greater degree by motivating factors of deadlines and external pressures.

Amabile's model accounts for a system of influence on creativity which includes the person, motivating factors, and their expertise. To further understand the changes in creativity among students, the individual dimensions of creativity are explored. E. Paul Torrance adopts a purely psychological perspective that focuses on measuring dimensions of creative thinking. By looking at specific aspects of creativity, a better understanding of how creativity is influenced is formed. This helps to further understand how motivation and domain-relevant skills impact creative thinking and the individual dimensions of creative thinking.

Dimensions of Creative Thinking

Research into creativity shows there are ways to operationalize and assess creative thinking. Torrance (1988) builds upon the classic work of J.P. Guilford (1967) and explains creativity through the dimensions of fluency, flexibility, originality, and elaboration. These criteria of creativity are a benchmark for quantifying the creative abilities of learners and a further way to measure intelligence (Torrance, 1974).

For example, fluency reflects the number of ideas presented. These can be easily counted to assess fluency of creative thinking. Flexibility concerns the detail of each idea, or the amount of information provided on each idea. Originality considers the deviation from the expected or the uniqueness and rarity of the ideas presented. Elaboration was the richness and detail of language used to explain ideas. Each of these dimensions contribute to creativity and yield an overall creativity score. These hallmarks of creativity have been tested and have been proved to be effective in assessing creative thought in previous research studies (Torrance, 1988).

Research has found that creativity levels of students differed depending on the major that they chose in college (Gardner & Weber, 1990). Interior design students scored significantly higher on creativity scales than those in hotel and restaurant administration. These results suggest that interior design may attract a more creative type of student. It also suggests that the curriculum within interior design programs enhances creative potential in students more than other majors such as hotel and restaurant administration (Gardner & Weber, 1990).

Judging creativity within a constructivist online learning environment with the componential theory of creativity uncovers changes in the learner's construction of knowledge. This study uses an online learning environment, *Designscholar*, grounded in the ontology, epistemology, and methodology of the paradigm interpretivism and the educational theory of constructivism. Using an online learning environment, students who would otherwise never interact have an opportunity to discuss and share information related to their educational goals. This environment promotes an online learning community that allows users to engage in creative thinking and thoughtfully consider scholarship within the field through online discussions about design research.

Online Learning in Higher Education

Online Learning Communities

Online learning communities promote interaction, allow reflection, and provide an authentic and engaging online environment. An online learning community brings people together who have similar research, professional, or educational interests. "An online learning community is a virtual environment where people come together to learn informally" (Bell, 2005, p. 68). Learning communities are used in professional fields as well as educational and professional development arenas and have shown to promote successful and sustained communication. The U.S. Department of Education meta-analysis on online learning studies

revealed that students who engaged in some or all of their course content online performed better than those who took the same or comparable course as a face-to-face interaction (Means, Toyama, Murphy, Bakia, & Jones, 2009). This study revealed that their may be an educational advantage to blended learning environments (Means, et al., 2009).

Online learning communities achieve success by meeting the needs of their specific users (Cuban, 1988). The growth of educational technologies has helped establish effective learning communities throughout the country for students in distance education programs and professionals in continuing education. Educational technologies allow people with similar interests to form a virtual community. These communities allow people with a wide range of knowledge and differing motivation to learn through interaction. Research at the Western Governor's University has shown that online learning communities foster communication, contacts, and a sense of community. They also have led to an 80% retention rate among students who are involved and enhanced student persistence and degree completion (Santovec, 2004). "Online learning communities can offer students a place where they come together virtually and feel acceptance. Virtual learning communities allow students the ability to dialog together, which contributes to peer support" (Santovec, 2004, p. 4). Participation in an online learning community supports a student's transition from an outsider looking in to an insider within an academic community (Calvery & MacDonald, 2002). "Distance educators show increasing acceptance of the idea that the development of a sense of community among learners in online courses enhances their learning experience" (Anderson, 2004, p. 183).

Roy Pea (1988) of the Stanford Research Institute states that technology can have the greatest impact on education by establishing new learning communities. The communication and volume of useful material can broaden opportunities for teachers and students alike within an

online learning community (Pea, 1988). The use of online learning communities makes information, research, and discussions more accessible to a greater number of people.

Successful online learning communities are structured to promote interaction. They provide a safe environment where people are free to express their opinions and where interaction is based on a constructive dialogue (Charalambos, Michalinos, & Chamberlain, 2004). The rules are clearly defined for participation in the community, and the communication methods are accessible to all participants (Charalambos, Michalinos, & Chamberlain, 2004). Online learning communities use many different methods to promote and increase communication among users. The technology selected for an online learning community must be appropriate for the content and for the users involved.

Computer-Mediated Communication (CMC)

CMC tools can be categorized into two broad presentation methods; synchronous and asynchronous. This categorization relates to the technology the facilitate real-time or delayed-time interactions. Synchronous tools, such as chat rooms and computer conferencing, allow learners to connect in real-time with seamless text, audio, or video. This environment requires all users to participate on the same schedule. In contrast, asynchronous technologies, such as email, listservs, and discussion forums, allow users to access information from the community when they choose. This allows for greater flexibility in participation in the community and for reflective time to respond or generate information. How these technologies allow learners to interact is important; however, it may be more important to study the types of interactions each technology tool facilitates. This ensures the tool is suitable for the content, user, and intended interaction.

Technologies must be chosen not only for user appropriateness, but for content and theoretical appropriateness. One-alone, one-to-one, one-to-many, many-to-many interactions are

related to the elements of CMC (Harasim, 1989; Paulsen, Barros, Busch, Compostela, & Quesnel, 1994). The types of interactions support different learning approaches.

One-alone communication, information retrieval, is characterized as an interaction with content. To take place, these interactions do not need support from the community (Paulsen et al.,1994). Information retrieval is used in higher education in the form of databases such as; Dissertation Abstracts and Academic Search Premier. The use of online databases in university courses has risen from 10% in 1995 to 43% 5 years later shown by the Campus Computing Project (cited in Duhaney, 2005). These databases are used by learners to gain knowledge of precedent research, allowing for categorizing and retrieval of information. Content retrieved from these databases becomes part of the content of critical educational discussions.

The most widely used one-to-one tool in educational technology is email. Campus Computing Project (cited in Duhaney, 2005) showed that over 70% of college faculty use email to communicate with students. Also, email has increased in use from only 20% of courses incorporating email into the class structure in 1995 to 60% of courses in 2000. This one-to-one tool allows time-delayed communication from one learner to another in a relatively secure and private environment. The asynchronous nature of email allows the user time to reflect and respond in a timely and appropriate manner. Instant messaging is one-to-one communication in a synchronous environment. When one learner is online, another learner can send a private message to that user. This allows for real-time private communication.

Distributed listservs also work like email. The only difference is that each individual email is sent to all members of the community making it a one-to-many technology. It is asynchronous and allows for mass communication to group members. Podcasts allow learners to play audio and/or video on demand (Beldarrain, 2006). Weblogs, or blogs, are personal web pages

dedicated to each user. The information posted is public and invites the public to interact through responses. Blogs are described as personal online journals (Ferdig & Trammell, 2004). They allow users to arrange text, images, data, and media objects for viewing online (Blood, 2002). Blog use is currently being explored in educational settings (Ferdig & Trammell, 2004; Fichter, 2005; Beldarrain, 2006). Blogs are being used as a tool for social constructivist educational activities by supporting social interaction of ideas online (Ferdig & Trammell, 2004). In educational contexts, instructors are using blogs as reflective writing tools to document the learning process and intellectual growth of the learner (Beldarrain, 2006).

Computer conferencing allows users to interact in real-time as a group. This many-to-many communication can be facilitated by an instructor or a student (Harasim, 1989). Threaded discussion forums are asynchronous environments. One member posts a message and all group members can read and respond. This type of technology also uses mass email to inform members of new information when it is posted. The difference between blogs and discussion forums is that blogs are dedicated personal web pages for each individual user, and discussion boards are managed by all members of the community (Ferdig & Trammell, 2004). Blogs are also public web pages, while online discussions within course management software are only accessible to those enrolled in the course. Asynchronous threaded discussions provide a flexible environment that supports the growth of collective knowledge within the group, not just in individual members. Discussions can be categorization and archived for retrieval. The number one technology in a WebCT course management study that impacted student achievement was asynchronous discussions for messaging between students and instructors (Hoskins & Van Hooff, 2005).

The various CMC technologies that support the four types of online interactions also support different teaching and learning approaches. Appropriate technology is driven by the needs of the users, the content, and the educational goals. All of these aspects of online learning cannot be accomplished with one technology application. Using various methods can result in a broader audience. It is important to consider the needs of learners in an environment and therefore offer a variety of teaching techniques and activities.

There are a variety of CMC tools and course management software that can be integrated into educational programs. Selection of the tools used in online learning communities is critical to maintain the involvement of users and the appropriateness for the field. Online learning communities present a unique experience for interior design graduate students by bringing people from different traditional universities together in an online environment to discuss their similar design interests. This extends the peer support community for interior design graduate students that may be in small or isolated programs. The uses of online learning communities for design education have not been explored to this point, but applications of online technologies have taken place in a small number of instances.

Online Learning in Interior Design Education

The current status of online learning in design education is small and largely exploratory at this point in time. Of 4,413 programs surveyed offering online degrees, 16 of these were in the fields of art and design (Global Network Academy, 2007). There are instances of CIDA accredited undergraduate programs such as; Colorado State University, Cornell University, Oklahoma State University, and University of Wisconsin-Madison, incorporating online learning into their curriculum to meet the needs of their students and their program requirements, but they are yet to offer fully-online degrees (Botti-Salitsky, 2005). Many of the reported instances of

online learning in interior design education have focused on the design studio at the undergraduate level (Botti-Salitsky, 2005; Kucko, et al., 2005; Matthews & Weigand, 2001).

The adoption of online learning has been slow to take place in an arts-based curriculum. The traditional view of studio classes and culture has been the largest barrier to adopting new techniques and technologies for collaboration (Bender & Good, 2003). "For example, the distance education instructional model may be viewed as incompatible with traditional teaching methods used in art-related disciplines like interior design" (Bender & Good, 2003, p. 67). Technology introduces a variety of different techniques that are not as reminiscent of the traditional Beaux-Arts approach. Research into innovative adoption targeted interior design faculty who were not currently using online technologies for instruction. Pre-test and post-test scores for adoption were compared after the sample of design faculty had seen a presentation on the positive advantages of innovation in technology and its application to interior design education. The findings showed that faculty were open to adoption, but had reservations about how effective this technology would be in a fully online art-based curriculum. Online adoption may be better suited for the graduate degree in interior design because it is research oriented and focuses on writing components more than an undergraduate degree. The following are examples of online integration in interior design education that have been documented through published research.

The Virtual Design Studio (VDS) is a concept that brings the design studio environment to a virtual environment on the internet (Botti-Salitsky, 2005). The VDS model takes the place of the traditional studio environment and uses one-to-one, one-to-many, and many-to-many computer mediated communication tools. This research was conducted by faculty and evaluated by students who were involved in the experience. The sample set was comprised of students

enrolled in a single interior design course within one university. The model utilized various software packages to aid in the collaboration and interaction needed in the design studio environment (Botti-Salitsky, 2005). The challenge for this project was to build relationships among the students and the faculty members. This interaction is needed to work through the design process. This project contributes to the information needed to implement online design studio coursework, but it has not been retested to gauge the lasting effective on design curriculum delivery.

The Consortium for Design Education (CODE) project merged students from six institutions across Canada, United States, and Mexico for a four-year period (Kucko, et al., 2005). This project not only looked at online studio collaboration for 200 interior design students, but it also addressed cultural differences and exchanged selected students over the four-year period. This international approach gave students an appreciation for interior design within a culture different from their own. The online design charette took place over an intense two-day period and was repeated yearly throughout the four years. The charette brought students together from different schools, countries and cultures. The focus of the virtual project was to expose students to the use of online technologies to create an international experience through an interior design project (Kucko, et al., 2005). This project highlights the online experience as a way to communicate and interact with those that would otherwise be inaccessible. The technology provided a positive experience for those involved by opening up communication among design students across the globe.

These studies all show that technology in the interior design education realm offers opportunities to increase communication and exposure to different points of view. The commonalities of the studies reveal that students from various geographic locations and different

disciplines show benefits from online communication with each other, whether through understanding allied disciplines or incorporating another cultural perspective. The downside to these studies is that they are often fleeting. They are only being used in singular instances and do not have longevity throughout programs.

The application of online learning communities in interior design graduate education has not been documented through published studies at this point; however, an enormous contribution to the field was made by Denise Guerin and Carin Martin at the University of Minnesota, who launched an online clearinghouse for interior design research: *Informedesign* at www.informedesign.com (Informedesign, 2009). This innovative website allows easy searches through categorized databases of interior design related research articles to help bridge the gap between research and practice. It is a valuable resource for students who are searching for literature within their topic of interior design research. It contains full citation and abstract, but does not present the full-text articles. Yet, there remains a need for engaged dialogue and further critique of the information presented. *Designscholar* seeks to add to this innovation by creating a seamless community of scholarship in design, providing a forum for further engagement, dialogue, and critique of design research.

Research has currently extended the body of knowledge to web-based information sites like Wikipedia (Mendoza, 2009). This tool highlights the interdisciplinary nature of interior design research by using an alternative approach to the body of knowledge by removing the boundaries that previously defined interior design research (Mendoza, 2009). Mendoza (2009) suggests that the online Wikipedia approach can be inclusive and create a systemic body of knowledge.

These online ventures highlight the need for more research in the area of Interior Design online education. This research differs in that it is not interested in communication and collective knowledge building for the research experience and process. The nature of connecting and sharing information in a research class lends itself to online distance education delivery. The textual nature of research literature review and writing is easier to accommodate in an online environment than is the experiential nature of the studio class. Colorado State recently launched a series of online courses to accelerate graduate degree completion. This hybrid approach, however, still requires students to travel to a traditional classroom for a small portion of the courses (Colorado State University, 2009). For the most part, techniques in online learning are being utilized in small numbers in interior design programs. Most of the course offerings, like higher education in general, are single stand-alone courses that are integrated into a traditional curriculum, or traditional courses with an embedded online component. Further exploration and research should be conducted to see if expansion of these ideas can enhance interior design graduate education. To gauge the effectiveness of the constructivist learning environment the *Designscholar* online learning community, the conceptual shifts of the students involved were measured through the componential theory of creativity (Amabile, 1993). This theory uncovered the changes that took place in the learner's creative thinking skills.

Conclusion

The literature reviewed for this study included educational theory, interior design graduate education, creative thinking, and online learning in higher education. Constructivist educational theory and the componential theory of creativity can best serve as the educational basis for this study. These theories, along with previous research into online learning and interior design programs, guided the choice of activities and tools for online learning community, *Designscholar*. A number of studies have examined the educational online learning community

and the opportunities offered by this new technology. In the field of interior design, more research is needed.

CHAPTER 3
METHODOLOGY

Introduction

The purpose of the methodology is to create and test the effectiveness of an online learning community, *Designscholar*, for interior design graduate education, examining the impact of this learning experience on creative thinking about design research. The assessment tapped into the learners' creative thinking skills (fluency, flexibility, originality, and elaboration), motivational orientation, and domain-relevant skills. Chapter three also discusses the study's sampling, procedures, and requirements for the construction, development, and implementation.

Theoretical Foundation of *Designscholar*

Constructivist education theory guided the development of the online learning community, *Designscholar*. Therefore, the assumptions upon which the online learning community rests are: the learner is an active creator of knowledge, all participants add to the collective knowledge of the community, knowledge is created and exists within the community, reflective writing supports the reflection and revision of ideas, and the instructor assumes a supportive role (Cisero, 2006; Fosnot & Perry, 2005; Lang, et al. 2005; Oliver, 2000). This community enabled interior design graduate students to make and maintain social connections to explore meanings of research in their field through online discussions during a six-week period. The intent of the online learning community was to expand discipline-specific collective knowledge of the group and enable each participant to think more creatively about design research. Using asynchronous discussion groups, students read and responded to peers in an online environment. This study frames learners as the producers of knowledge within a specific

context and the online learning community as a place where their collective knowledge is shared and distributed.

Designscholar was influenced by the researcher's personal experience in an online course, Instructional Computing 1, offered by Rick Ferdig in the School of Teaching and Learning at the University of Florida. This eight-week course included a weekly online discussion module for group members to discuss pertinent research articles relating to their thesis topics. The discussions with others enrolled in the course led to revelations about online learning communities in interior design education and ultimately reflected in this current study.

For this dissertation study, the researcher developed *Designscholar* using Moodle, a free, open-source course management software available on the internet through www.moodle.org. Moodle was launched in August 2002 and was targeted at small university level courses. Research was conducted on the nature of collaboration and reflection that occurred within the platform. Through this research, subsequent versions have been released making Moodle a constant and evolving work in progress. Moodle is suitable for fully online courses as well as a tool for supplementing face-to-face courses as well. Other course management software, such as WebCT and Blackboard, were available and could have been employed in the study; however both are driven by a more behaviorist approach to learning and did not fit the researcher's assumptions about teaching and learning.

Moodle developer Martin Dougiamas built this software to mirror the most prevalent research in online learning on theories such as constructivism and social constructivism. This position focuses on collaborative discourse to develop a community of learners or practice. Moodle supports individual development of meaning through sharing of texts, theories, and other artifacts of meaning (Dougiamas & Taylor, 2002). It is used successfully in many professional

and educational organizations to create meaning and learning for the whole community by creating communication among the individuals involved.

The researcher purchased the domain name www.designscholar.com, as well as a host server service through www.siteground.com from 2006-2008. During the pilot study in 2007, another server service was purchased through www.moodlerooms.com because the original server proved unreliable. This purchase of another server service resulted in a change in the web address to http://designscholar.unlocklearning.net. This web address was used for the remainder of the pilot study and renewed for 2008 for use in the dissertation study.

Instruments

Both the pilot and dissertation study tested the efficacy of six instruments: Constructivist Online Learning Environment Survey (COLLES), Attitudes Towards Thinking and Learning Survey (ATTLS), Myers-Briggs Type Indicator (MBTI), Work Preference Inventory (WPI), Creative Thinking Assessment of Design Research Essay, and Background Survey. Some of these instruments from the pilot study ultimately proved not to be effective for assessing the key variables of the study (e.g., creative thinking skills, personal motivation, and domain-relevant skills). Below is an overview of the instruments used during the dissertation study. For information on the instruments used in the pilot study see Appendix (B).

Work Preference Inventory (WPI)

The WPI was used in the pilot study and proved to uncover interesting results about student motivation. It was also used for the dissertation study (see Appendix C). This instrument was designed to measure people's motivational orientation in relation to work or school concerns (Amabile, et al, 1994). The WPI was created under two grants awarded to Teresa Amabile: "Mechanisms of Creativity", from the National Institute of Mental Health, and "Creativity in the R&D Laboratory", from the Exxon Educational Foundation (Amabile et al.,

1994). The instrument comes in two forms: the Student Work Preference Inventory and the Adult Work Preference Inventory. The two show only slight changes in wording to address the intended population. This study utilized the Student Work Preference Inventory to uncover motivational orientation towards school-related activities. The Student WPI consisted of 30 questions scored as follows: "Always true of me, Often true of me, Sometimes true of me, Never true of me". The survey presented two scales, intrinsic motivation and extrinsic motivation, and assigned a score to each scale for each respondent. WPI scales of motivation have been used to assess the intrinsic and extrinsic motivations' effect on creative tasks (Amabile, 1985; Amabile et al., 1994; Kaufman, 2002). This looks at the learner's motivational orientation when engaging in school related creative tasks. Studies of motivation have shown that high intrinsic motivation translates to a higher perceived level of creative product. Research into creative writing students' motivation shows that when intrinsic motivation is driving the creative writing process, the end product is perceived as more creative by writing critics (Kaufman, 2002). Conversely, when extrinsic forces are driving creative writing tasks, the perceived end product is judged much lower in creativity (Amabile, 1985).

The intrinsic motivation scale was scored from 1- 4 and represented the level of challenge and enjoyment for engaging in school-related tasks. The extrinsic motivation scale, also scored 1-4, represented the level of engagement in school-related tasks when outward recognition and grades were considered. Previous studies using this survey found that the mean of the undergraduate population was 2.99 for intrinsic motivation and 2.57 for extrinsic motivation (Amabile et al., 1994).

This survey has been correlated with measures of personality, attitude, and creativity such as; Myers-Briggs Type Indicator (MBTI; Myers, 1962), Strong Interest Inventory (SII; Hanson

& Campbell, 1985), Kirton Adaption-Innovation Inventory (KAI; Kirton, 1976), and Creative Personality Scale (CPS; Gough, 1979). Relationships between these questionnaires and surveys have been established as well as meaningful factor structures and internal consistency for the instrument (Amabile et al., 1994). The WPI has been used to rate journalism students in higher education and creative writers in education and in the workplace (Amabile et al. 1994, Kaufaman, 2002). Amabile's research (1994) states that student samples showed completing of the WPI at 6, 12, and 24 month intervals after the initial test administrations. These retests have proven the short stability of the instrument with a Cronbach's Alpha ranging from 0.76 to 0.85 (Amabile et al., 1994). This instrument showed good short term reliability that slightly decreased over time.

The two primary scales of intrinsic and extrinsic motivation were further divided into sub scales of challenge and enjoyment within the intrinsic scale, and outward and compensation within the extrinsic scale. The WPI does not label learners as either only intrinsically or extrinsically motivated. It examines both types of motivation co-existing within the learner (Amabile, et al., 1994). The level of each intrinsic and extrinsic motivation is assessed. One is seen as a dominant orientation. Further exploration into the subscales can determine what specific aspects of intrinsic or extrinsic motivation are driving students to engage in school related tasks.

These findings suggest that personal choice and internal motivation of challenge and enjoyment are more conducive to creative activities. Studies in online learning technologies have also shown that voluntary use or intrinsic motivation to use instructional resources and technologies in education correlates to achievement (Hoskins & Van Hooff, 2005). Motivation is a variable that is missing from much of the online learning literature and calls for further

questioning of what drives people to utilize online learning and educational technologies (Hoskins & Van Hooff, 2005). Limitations to this are that students may answer differently about their motivation depending on what school related activities they might be thinking of or involved in at the time of the survey.

The WPI was given in hard copy format to the students in the pilot study because this was how the researcher received the survey from the author. The dissertation study used Survey Monkey online to distribute the survey after gaining approval from the author, Amabile. The WPI produced data about student motivational orientation by assessing intrinsic and extrinsic motivation scores.

Creative Thinking Assessment of Design Research Essay

To assess creative thinking about design research, students were asked to explain their knowledge about design research and to describe their personal interest in design research. These pre and post-test essays were the Research Knowledge Essay and the Research Interest Essay. Each student wrote the pre-test essays during the first week of the study and then completed the post-test essays during the last week of *Designscholar*. The pre and post-test essays were judged on a 7-point likert scale using the dimensions of creativity from Torrence (1988): fluency, flexibility, originality, and elaboration. The judging revealed scores for each dimension ranging from 0-6, and an overall creativity score ranging from 0-24. Appendix D contains the rubric used for the pre and post-test judging. Two Florida State University graduate students judged the essays. These two students were both involved in crafting their own research thesis and both were one semester from graduating with an MFA in interior design. The researcher trained the judges to identify fluency, flexibility, originality, and elaboration within the essays and revealed a reliability level within the judging process above .80. Each judge was asked to read all the essays and code each for fluency or number of ideas presented. After this

initial reading, they were asked to read each again for the flexibility or depth of the ideas presented. A final reading of all the essays resulted in coding the originality, or diversity, of the ideas and the elaboration of the language used to describe the ideas. This data produced a measured change in creative thinking skills that was analyzed alongside personal motivation and domain-relevant skills. This data was used for the remainder of the study.

Background Survey

A straightforward background survey examined the study participant's demographics, experience in interior design, and interest in and interest in design research and practice (See Appendix E). The survey contained 10 questions pertaining to undergraduate degrees, current degree program, the year they were currently enrolled, and their interest level in design practice and research.

Pilot Study

Before collecting the dissertation data, a five week pilot study took place during the fall semester of 2007. This allowed the researcher to pretest the technology to identify and correct any unforeseen problems as well as compare standardized instruments that assessed student learning styles and motivation. The pilot study used 26 graduate students enrolled at Florida State University, a CIDA accredited school. The make up of the class was 23 females and 3 males. This module was used in conjunction with a graduate level course entitled, "Design Issues." This course met face-to-face once a week, and each student was required to participate. The professor of the Design Issues course participated in the discussions and assessed a participation grade for each student. This pilot study module took place from September 3, 2007 to October 7, 2007. Permission was asked of all participants. During the first class meeting, all participants signed and submitted appropriate human subjects forms. The students completed the Constructivist Online Learning Environment Survey, the Attitudes Towards Thinking and

Learning Survey, the Myers-Briggs Type Indicator, the Work Preference Inventory, and the Background survey. The researcher tracked each student's frequency of participation. Table 3-1 presents a weekly outline of the expectations for the students during the pilot study.

Pilot Study: Lessons Learned

The lessons that were learned from the pilot study refined the organization of the dissertation study. Adjustments to the final study focused on: technology and accessibility of the online environment; the selection of standardized tests; required level of participation; development for guidelines for the selection of peer reviewed publications; and privacy concerns.

The results from the pilot study located some technical problems. The original server and web address were slow to come online and many times were unavailable. This caused frustration among the students. Two weeks into the pilot study a more reliable service provider and new web address were secured. This information was emailed to students and they used the new address with no further complications.

The pilot study also helped the researcher select the most appropriate standardized tests for the study. The Constructivist Online Learning Environment Survey (COLLES) pre and post-tests were positively biased therefore this instrument was not used by the researcher. Students commented that they thought they were being led to answer items a certain way, so the survey was not used in the dissertation study. The pre and post-tests were the same instrument and results did not significantly correlate with learning or motivation style.

The Attitudes Towards Thinking and Learning Survey (ATTLS) was explored in the pilot study as a viable option for assessing learning type, but actually returned no new data in light of having the Myers-Briggs Type Indicator (MBTI) results. The MBTI assessed the same profile, but is much more widely used in architecture and design student populations. The pilot study

Table 3-1. Pilot study weekly outline of activities

Week	Description of pilot study activities
1	Register to become a member of *Designscholar* at http://www.designscholar.com Create personality profile for class. Complete Myers Briggs Type Indicator (MBTI) survey online. Complete Constructivist On-Line Learning Environment Survey (COLLES) pre-test survey online. Create your blog and post your introduction. Submit MBTI type and blog address online through course page website.
2	Complete the Attitudes Towards Thinking and Learning Survey (ATTLS). Post an article reflection assignment to your personal blog. This is a reflection and analysis on an article in an area of design research. This should include key points and quotes from the article, a discussion in why it is noteworthy research, and a discussion on what is means to your research. Respond to at least one article reflection from one of your peers.
3	Complete the Work Preference Inventory Survey (WPI). Post an article reflection assignment to your personal blog. This is a reflection and analysis on an article in an area of design research. This should include key points and quotes from the article, a discussion in why it is noteworthy research, and a discussion on what is means to your research. Respond to at least one article reflection from one of your peers.
4	Post an article reflection assignment to your personal blog. This is a reflection and analysis on an article in an area of design research. This should include key points and quotes from the article, a discussion in why it is noteworthy research, and a discussion on what is means to your research. Respond to at least one article reflection from one of your peers.
5	Post an article reflection assignment to your personal blog. This is a reflection and analysis on an article in an area of design research. This should include key points and quotes from the article, a discussion in why it is noteworthy research, and a discussion on what is means to your research. Respond to at least one article reflection from one of your peers. Complete COLLES post-test.

data showed correlations with MBTI types and motivational orientation. They also showed relationships between the students' profiles, and their level of involvement in online discussions. However, once the pilot study was completed and the focus of the dissertation study refined, a decision was made not to use the MBTI since it did not measure the primary variables of the study.

Besides determining which standardized measures to use, the pilot study also helped gauge how students were interacting with each other in the module. Frequency of interaction was tracked for the five-week study. The number of posts for each student was dependent on the length of the module. The first week required students to post one introduction. During the subsequent weeks, students posted one time and responded one time. This resulted in a minimum number of nine posts and responses for the duration of the module. The minimum amount of posts was set so that interaction could truly be measured above and beyond a certain required amount. Setting a required amount was important for comparison of the level of involvement among groups. Previous research in online discussion design states that constructivism is the predominant educational theory in online learning and it allows the student to decide their participation level. All attempts were made to increase participation and the student motivation to engage. Forced involvement leads to less quality, therefore the module attempted to tap into the internal motivation of the students to engage in the community.

Throughout the pilot study there were 104 articles posted by the 26 participants. The resulting number of posts and responses during the module was 396. Each student was expected to post a minimum of nine times over the five weeks. The average number of posts per person was 15.2. This resulted in participation of 69.2% above the required minimum participation for the group. The most referenced publications were *Journal of Interior Design, Contract*

Magazine, Interiors and Sources, and *Design Studies*. About half of the articles posted came from scholarly peer-reviewed journals and were located initially through www.informedesign.com. The other half came from trade and popular press sources including online websites. The dissertation study required students to use peer-reviewed journals so that all participants would be discussing research that was deemed scholarly for the field.

During an informal interview session with the students in their face-to-face Design Issues seminar course, the researcher asked students to reflect on the experience they had had with their weblogs and with *Designscholar*. A few students did not like the public nature of the weblogs and wanted a private way to discuss this information with their class. One student said she had been the victim of a stalker and did not like that the weblog information was public. She chose to use a "code name" instead of her own with her weblog, as did a few others. They also thought there were too many weblogs to review and thought it would be a good idea to have smaller topical groups instead of having to search through 26 weblogs to find personally relevant postings. These insights from the student interviews in the pilot study guided changes made to *Designscholar* for the dissertation study.

Dissertation Study

The researcher and the Chair of the dissertation committee made initial contacts to graduate programs through phone calls and emails to identify potential faculty and programs for the study. This resulted in participation of the University of Florida (UF), Iowa State University (ISU), and Washington State University (WSU). The programs selected within their respective universities were similar in terms of program quality, research expectations and were housed in similarly configured academic units. In the past five years, *DesignIntelligence* highly ranked the three selected interior design programs. Further, the programs are all located in Association of American University (AAU) research-intensive universities. Finally, the selected programs offer

comparable degrees and are housed within Colleges of Design that also include architecture programs. The University of Florida and Washington State also offer interdisciplinary doctoral programs with an interior design concentration; Iowa State University does not. All participating students were seeking a graduate degree in interior design and had the expectation to complete an original research thesis. Some theses would be defined as traditional research and others a thesis project with a research component. The schools were geographically diverse representing the Southeast, Midwest, and Northwest regions of the United States.

The University of Florida, Iowa State University, and Washington State University have first and post-professional programs tailored the variety of students entering the degree programs. The UF post-professional program requires 36 hours of coursework and thesis for an interior design undergraduate to obtain a Master of Interior Design (University of Florida, 2009). For those coming from other fields seeking a first-professional degree, the requirements are 85 hours of coursework including leveling courses from the undergraduate studio curriculum and a university thesis. For students with architecture or design related undergraduate degrees, the requirements are 58 graduate credit hours of leveling courses and thesis writing. The leveling courses for non-interior design majors ensure that all students engage in a significant number of studio class and support classes to be qualified to practice interior design and meet requirements to sit for the licensing examination. Graduate curriculum relies on research methods, seminars, and specialized independent study culminating in a thesis reflecting the student's research interest.

Similarly, Iowa State University (ISU) offers a post-professional program that requires 34 graduate credits to obtain a Master of Arts. The university also offers a first-professional degree that requires 40 hours of preparatory coursework in addition to the 34 graduate course credits for

a Master of Arts (Iowa State University, 2009). This results in a thesis project with a research component. ISU also offers a Master of Fine Arts degree which requires a minimum of 60 course hours with a research thesis (Iowa State University, 2009). All of these degrees incorporate some degree of design studio curriculum with research writing components.

Washington State University (WSU) offers a Master of Arts in interior design in a two-year and three-year track. The two-year track is for post-professionals who hold an interior design or related undergraduate degree. This degree culminates in a university thesis and requires 46 hours of course work (Washington State University, 2009). The first-professional track is a project based thesis that results in 75 hours of coursework (Washington State Univeristy, 2009). Both of these degrees require students to have skills in writing and research.

This research involved graduate students from the three universities and therefore required approval from the Institutional Review Board (IRB) at the University of Florida. The IRB granted approval after reviewing an abstract of the study, the three survey instruments, and the appropriate consent forms. After identifying the programs willing to participate in the study, a mailer was sent to the faculty member who was teaching the graduate level research methods seminar (UF and WSU) or the independent study course (ISU). An informational packet contained a letter of introduction, an overview of the project, and the human subject forms for student consent (see Appendix F). Participating students signed the consent forms and returned them by mail to the researcher. The professors at the schools then overviewed the project to the participating students in their respective seminars or meeting times. A handout from the packet directed participating students to visit the *Designscholar* website at http://designscholar.unlocklearning.net to become registered in the study. Evaluation of student participation was left to the discretion of the professors at each of the respective schools. The

professor had no responsibility for administering the study; two of the three professors opted to grade participation. Students could withdraw from the module voluntarily at anytime.

Sample

The *Designscholar* module took place completely online from September 08, 2008 to October 19, 2008. The sample for the dissertation study consisted of 21 interior design master level graduate students from the University of Florida (n=2), Iowa State University (n=13), and Washington State University (n=6). The sample included 18 females (86%) and 3 males (14%). Ages ranged from 23 – 44 with an average age of 28.35. There were 7 (33%) students enrolled in the first semester of their second year of graduate school and 14 (67%) in the initial semester of their first year. There were 21 students holding bachelor degrees with12 of these in art and design related fields. Table 3-2 is a list of the undergraduate degrees represented in the sample.

Table 3-2. Background degrees in the sample

Undergraduate Degree Discipline	Students (n=21)
Interior Design	8
Art	3
Communications	2
Marketing	2
Agriculture	1
Architecture	1
Biology	1
Mathematics	1
Modern Languages	1
Nursing	1

Of the 21 students in the study, 14 (67%) were in the MA degree program, 3 (14%) were in the MID degree program, and 4 (19%) were in the MFA degree program. There was one Ph.D. student who participated in the study; data was not used. Previous work experience in an art and design related field for the sample was reported as 12 (57%) having previous experience and 9 (43%) having no experience.

The judging process involved two master's students from Florida State University. They analyzed and coded pre and post-test essay data to establish the creative thinking level of each essay. The pre-test essay questions were, "What is design research and why is it important to the field?", and "What are your interests in design research?" The post-test essay questions were, "With your new understanding from the online discussions, explain what design research is and why it is important to the field?", and "What are your interests in design research and have they changed after the online discussions?" These essays were coded for fluency, flexibility, originality, and elaboration and afterwards assigned a score for each dimension. This coding resulted in an overall creativity score. The dimensions of fluency, flexibility, originality, and elaboration were judged on a likert-type scale ranging from 0 to 6. After meeting with a consulting statistician, the data were analyzed for inter-rater reliability using Cronbach's alpha. Cronbach's alpha determines the internal consistency or average correlation of items between raters to gauge their reliability (Nunnaly, 1978). Higher scores represent a high level of agreement between the judges and translate into reliable findings. Reliability of the judging process lends confidence to the findings used for the remainder of the study.

Table 3-3. Interrater reliability analysis of judging process.

	Cronbach's alpha α		
	Research essay	Interest essay	Combined essays
Overall Creativity	0.94*	0.95*	0.95*
Fluency	0.91*	0.92*	0.92*
Flexibility	0.94*	0.90*	0.93*
Originality	0.78*	0.78*	0.78*
Elaboration	0.82*	0.92*	0.89*
Pre-test	0.95*	0.88*	0.92*
Post-test	0.91*	0.95*	0.93*

* above 0.70 agreement

The pre and post-test essay questions that assessed creative thinking yielded a reliability level above the generally accepted level of .70 or higher for social science research (Nunnaly, 1978). The judging process was statistically established as having a high level of reliability for each of the essays judged. Table 3-3 reveals that the Research Knowledge Essay pre-test showed a Cronbach's alpha of .95 and the post-test was .91. Also, the Research Interest Essay pre-test was .88 with the post-test of .95. These reliability levels show that the creative thinking change data were judged consistently by the two judges.

The essays that were judged averaged 300 words per essay. These essays were untimed and completed during the first week of the *Designscholar* module. The essays were coded for dimensions of creativity; fluency, flexibility, originality, and elaboration on the essay score sheet. A coded student example is provided in Appendix I. The average and range of word counts for each essay are reported in Table 3-4.

Table 3-4. Word count range and average for Research Knowledge and Interest Essays.

	Word Counts			
Descriptive Statistics	Knowledge Essay Pre-test	Knowledge Essay Post-test	Interest Essay Pre-test	Interest Essay Post-test
Range	73 - 459	117 - 791	52 - 525	90 - 383
M	278	368	263	219

The researcher tracked and calculated data from the background survey, the Work Preference Inventory (WPI) survey, the design research essay rubric, and participation within the online module. The six week study took place completely online on the *Designscholar* site.

Module: Week One

During the first week, students completed a number of activities to prepare for the online discussions. First students logged onto the site to become a member and selected a username and password. After this, they created a personality profile for others to view. The personality profile contained information about them, their research interests, and provided an opportunity to

post a picture. Once the profiles were created, students completed two surveys by linking to *Survey Monkey* from the *Designscholar* site. The first survey was the background survey that yielded data on their domain relevant skills. This survey took approximately five minutes to complete. The second instrument was the WPI which assessed the level of intrinsic and extrinsic motivation for school related tasks. This survey took about 10-15 minutes to complete. To assess a baseline for each student's creative thinking skills, the pre-test essay was written and uploaded to the website as a word document. Lastly, students were asked to read other's personality profiles and the scaffolding examples provided by the researcher of the upcoming discussions. The scaffolding examples are presented in Appendix G. These examples were provided to give students an understanding of what was expected of them and to show samples of quality and critical online discussions.

The information gained from the personality profiles and the essays about their interest in design gave the researcher topics for group assignments. The topical groups were: workplace design, hospitality design, restoration, sustainability, universal design, healthcare design, and cultural implications in design. Each group began with three to four people with similar research interests. This resulted in seven discussion groups for the study. Due to attrition, one group was left with two students. The group assignments were posted on the site and the researcher sent an email to the students asking them to check the site and locate their other group members.

Module: Week Two

The second week started the online group discussions and these lasted for the remainder of the five weeks of the study. For the first discussion, students were guided to www.informedesign.com and asked to locate an article in their area of research. This article was assigned as the topic for their first discussion post. Each group member started a discussion and included three main ideas in their post; a summary of the main points, a discussion on why the

article was important, and an explanation on how it related to their research. Each group member then visited their other group member's posts and responded to each of them.

Module: Week Three

Week three guided students to one of four peer reviewed journals in the field; *Journal of Interior Design, Design Issues, Design Studies*, or *Environment and Behavior***.** They were asked to post information about the article that including the three main ideas of; the summary of main points, why the article was important, and what it meant to their research, from one of the sources and to respond to all of their group member's posts.

Module: Week Four

Week four asked students to find an article from any peer reviewed journal that was not listed the week prior. This week again required students to post the article review about the main points of the article, why it was important to design research, and what it meant to them. They were also asked to respond to each of their group members.

Module: Week Five

During the fifth week students visited their respective school's library website and found a thesis or dissertation from their department to overview. Students posted a review of the thesis or dissertation that included what the main points of the theses, why it was important, and what it meant to their research. Again, they were asked to respond to each of their group member's discussions about their selected thesis or dissertations.

Module: Week Six

The final week of the study asked students to reflect on the online discussions and the experience in *Designscholar* for their final post. These posts were to include their thoughts on the online discussions and to critique *Designscholar* as a tool for graduate education. They also responded to each of their group members reflections as well. This last week also included

finishing the design thinking post essays for comparison in order to measure the change in creative thinking. These were written as word documents and uploaded to the website.

Summary

The methodology for this study assessed creative thinking skills, personal motivation, and domain-relevant skills to evaluate the effectiveness of an online learning community, *Designscholar* for encouraging creative thinking about design research through online discussions and individual investigations. The methodology not only yielded data on the characteristics of students who participated in *Designscholar* but also on their perceptions of what constitutes design research. Correlating student motivation with creative thinking skills data and domain-relevant skills data within the online learning environment answered the research questions posed for the study. The results of the pilot study helped focus the methodology of the dissertation study and improved the evaluation of the learning experience arising from *Designscholar.*

CHAPTER 4
RESULTS

Introduction

This goal of this dissertation study was to examine an online learning community created for interior design master's students and study the impact of online discussions on creative thinking about design research. Further, it sought to evaluate and determine the influence of personal motivation and domain expertise on creative thinking. These findings describe the analysis of statistical data on the three components of creativity; creative thinking skills, personal motivation, and domain-relevant skills from the componential model of creativity (Amabile, 1983). Participation data are also presented to understand the use of the *Designscholar* online discussions. Creative thinking skills were measured in pre and post-test essay questions designed to calculate a change in creative thinking and the individual dimensions of creative thinking about design research. Personal motivation was assessed with the Work Preference Inventory (WPI) (Amabile, et al, 1984) and domain expertise was measured through a background survey. Both motivation and domain-relevant skills were examined for their influence on creative thinking and the dimensions of creative thinking. Table 4-1 overviews the three primary variables believed to influence creativity (Amabile, 1983). An alpha level of .05 was used in all the statistical tests performed on the data.

Table 4-1. Variables in the study.

Creative Thinking	Motivation	Domain Relevant Skills
Fluency	Intrinsic	Year Enrolled
Flexibility	Challenge	Design Education
Originality	Enjoyment	Design Work Experience
Elaboration	Extrinsic	Design Interest
	Compensation	Commercial Practice
	Recognition	Residential Practice
		Academic Teaching
		Academic Research

Assessing Change in Creative Thinking

Questions about Creative Thinking

First, this study was interested in seeing if there was a significant change in the creative thinking scores for both essay questions. This question examined the overall change in creative thinking from the online module.

- What is the relationship between participation in *Designscholar* and *overall creative thinking* about design research?

The data from both the Research Knowledge Essay and the Research Interest Essay were collapsed for analysis. A non-parametric paired t test, the Wilcoxon signed ranks test, was used to establish change through yielding a Z score and p-value. The data from each essay questions were combined to provide an overall measure of creativity before and after the online discussions. The data in Table 4-2 reveals a significant change (p=.000) in overall creative thinking skills about design research from the pre-test to the post-test measure. Further, there was also a significant change in 3 of the 4 dimensions of creative thinking. Flexibility (p=.001), originality (p=.000), and elaboration (p=.000) showed significant change, but fluency did not appear to change significantly.

Table 4-2. Comparison of creativity pre and post-test scores: Overall creativity.

	Pre-test Mean	Post-test Mean	Wilcoxon signed rank test (two-tailed)
Creative Thinking	6.28	11.54	Z = -3.81, p = .000*
Fluency	1.80	2.39	Z = -1.71, p = .088 / NS
Flexibility	1.62	2.35	Z = -3.22, p = .001*
Originality	1.98	2.28	Z = -3.59, p = .000*
Elaboration	1.22	2.09	Z = -3.56, p = .000*

*p<.05

Next, this study was interested in seeing if there was a significant change in creativity scores for the Research Knowledge essay. This essay question asked participants to explain their understanding of design research and how it relates to the field of interior design.

- What is the relationship between participation in *Designscholar* and *creative thinking* about understanding design research?

This question examined the data collected from the Research Knowledge Essay that focused on each participant's understanding of design research. The data were analyzed with the Wilcoxon signed rank test to show change in understanding about design research. The data show significant change in creative thinking reporting a p-value of .000 in Table 4-3. Further, it also shows that three of the four dimensions of creative thinking are significantly changed; fluency (p=.001), flexibility (p=.000), and elaboration (p=.002), but the remaining component of originality showed no significant difference.

Table 4-3. Comparison of creativity pre and post-test scores: Research Knowledge Essay.

	Pret-test Mean	Post-test Mean	Wilcoxon signed rank test (two-tailed)
Creative Thinking	5.57	10.85	Z = -3.77, p = .000*
Fluency	1.80	3.08	Z = -3.22, p = .001*
Flexibility	1.30	3.60	Z = -3.81, p = .000*
Originality	1.20	1.72	Z = -1.25, p = .211 / NS
Elaboration	1.27	2.42	Z = -3.03, p = .002*

*p<.05

Finally, this study was interested in seeing if there was a change in the creative thinking scores of the Research Interest Essay. This question sought to uncover whether creative thinking about the participant's interest in design research had changed over the 6 weeks of the *Designscholar* module.

- What is the relationship between participation in *Designscholar* and *creative thinking* about defining a personal interest in design research?

This question used data from the Research Interest Essay where participants were asked about their personal interest in design research. The data were analyzed with the same non-parametric paired t test, the Wilcoxon signed rank test. The results in Table 4-4 showed significant change (p=.007) in participant's personal interests in design research. Further, Table 4-6 highlights that two of the four dimensions of creative thinking were significantly changed; originality (p=.001), and elaboration (p=.014). The remaining two dimensions of fluency and flexibility showed no significant change when discussing the participant's personal interest in design research.

Table 4-4. Comparison of creativity pre and post-test scores: Research Interest Essay.

	Pre-test Mean	Post-test Mean	Wilcoxon signed rank test (two-tailed)
Creative Thinking	6.98	8.92	Z = -2.68, p = .007*
Fluency	2.01	1.70	Z = -.645, p = .519 / NS
Flexibility	2.42	2.60	Z = -1.01, p = .313 / NS
Originality	1.77	2.83	Z = -3.28, p = .001*
Elaboration	1.17	1.88	Z = -2.45, p = .014*

*p<.05

Summary

These comparisons show that creative thinking was significantly impacted from pre to post-test measures over both essays. Also, flexibility, originality, and elaboration of creative thinking were significantly different. Further, there was a significant change in the fluency, flexibility and elaboration of the Research Knowledge Essay and change in the originality and elaboration of the Research Interest Essay. Establishing significant change in the pre and post-measure of creative thinking allows this data to be studied further to explain why the change occurred. This information was used in the remainder of the data analysis to further understand how the variables of personal motivation and domain relevant skills impact creative thinking and the dimensions of creative thinking.

Assessing Personal Motivation and Its Impact on Creative Thinking

Following the Componential Theory of Creativity (Amabile, 1983), that states creativity is a function of creative thinking skills, motivation, and domain-relevant skills, this study was interested in learning if and how motivation impacts creative thinking. This study further examined motivational orientation scores as a predictor of the change in creative thinking scores. Personal motivation for involvement in school-related activities was assessed with a standardized test, The Work Preference Inventory Student Version (WPI). This survey assesses the student's locus of motivation in school related tasks (e.g., intrinsic and extrinsic). There are also secondary scales of challenge and enjoyment for intrinsic and reward and recognition for the extrinsic scale. Intrinsic and extrinsic scores were reported for each participant with one being more dominant than the other. Also, subscale data were reported and analyzed for the impact on creative thinking. Linear regression was used to analyze the impact of the primary and secondary scales of motivation on the measured change in creative thinking in the online discussions. The statistical test, linear regression, attempts to model the relationship between variables and determine if one variable is a predictor of the other (Cohen, J., Cohen P., West, & Aiken, 2003). This test reports a p-value for establishing significance and a positive or negative Beta value to determine the direction of influence one variable has on the other.

Questions about Personal Motivation

Personal motivation scores were first compared with overall creative thinking scores on both essays. This question compared the impact of intrinsic and extrinsic personal motivation on the change in overall creative thinking skills seen from participation in the module.

- What is the relationship between *personal motivation* and *overall creative thinking* about design research?

Table 4-5 and Figure 4-1 show that intrinsic motivation positively influenced the change in overall creative thinking (p=.009). Specifically, the secondary scale of enjoyment also significantly influenced creative thinking across both essays (p=.030). Extrinsic motivation primary and secondary scores had no impact on overall creative thinking.

Table 4-5. Linear regression analysis: Probability of intrinsic motivation scales as a predictor of creative thinking: Combined Essays.

	Primary and secondary predictors (motivation)						
	Intrinsic						
Outcomes			Challenge		Enjoyment		r2
Combined Essay	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	.573	.009*	NS	NS	.456	.030*	0.35
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	NS	NS	NS	NS	NS	NS	0.34
Originality	NS	NS	NS	NS	NS	NS	NS
Elaboration	NS	NS	NS	NS	NS	NS	NS

*p<.05

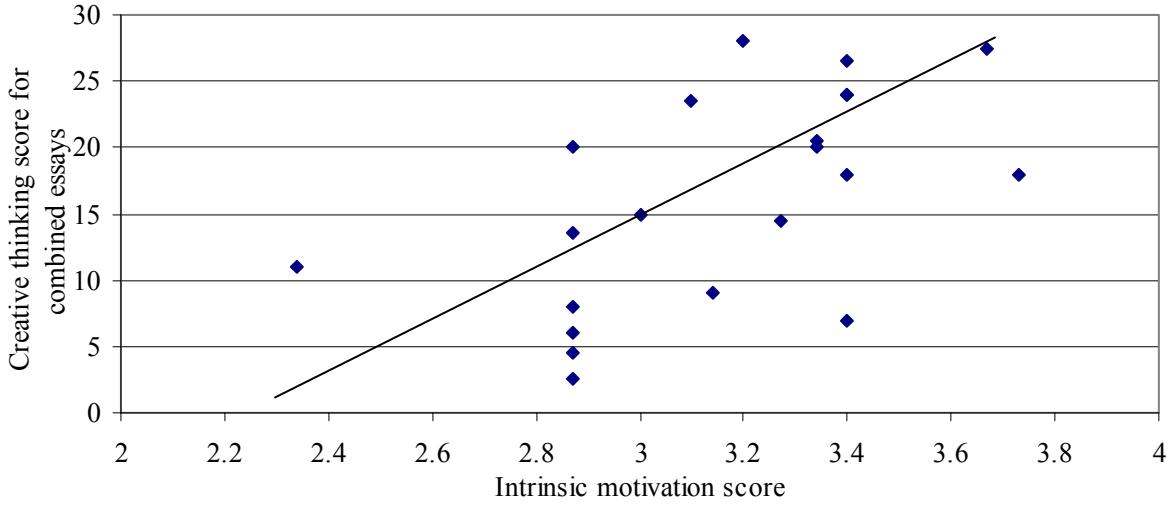


Figure 4-1. Scatterplot of the impact of intrinsic motivation on overall creative thinking.

Personal motivational scores were also compared to the creative thinking scores of each individual essay. This question was interested in the impact of personal motivation on the change in creative thinking about understanding design research from the Research Knowledge Essay.

- What is the relationship between *personal motivation* and *creative thinking* about understanding design research?

Intrinsic motivation positively influenced the change in creative thinking (p=.002) about understanding design research as seen in Table 4-6 and Figure 4-2. Further, intrinsic motivation predicted increased flexibility in creative thinking about design research. Those with higher intrinsic motivation scores showed an increase in their flexibility of creative thinking. Also, the secondary scale of intrinsic motivation, enjoyment, was shown to be a predictor as well.

Table 4-6. Linear regression analysis: Probability of intrinsic motivation scales as a predictor of creative thinking: Research Knowledge Essay.

	Primary and secondary predictors (motivation)						
	Intrinsic		Challenge		Enjoyment		r2
Outcomes Research Knowledge Essay	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	.574	.002*	NS	NS	.499	.050*	0.57
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	.505	.017*	NS	NS	NS	NS	0.34
Originality	NS	NS	NS	NS	NS	NS	NS
Elaboration	NS	NS	NS	NS	NS	NS	NS

*p<.05

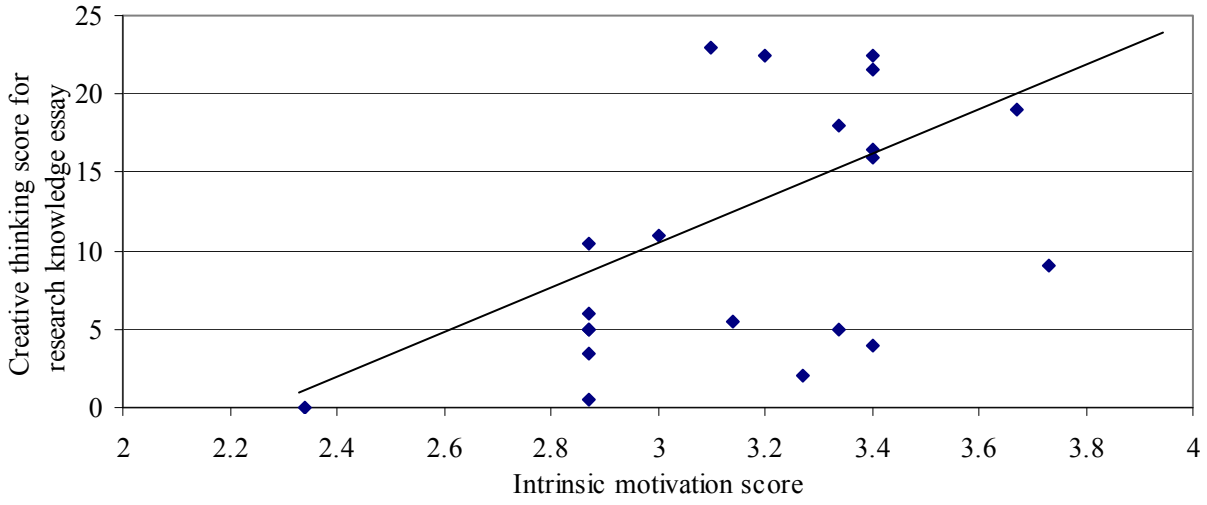


Figure 4-2. Scatterplot of intrinsic motivation on creative thinking in the Research Knowledge Essay.

Extrinsic motivation produced a negative effect on the change in creative thinking for the Research Knowledge Essay as seen in Table 4-7 and Figure 4-3. Also, the secondary extrinsic motivation scale of recognition (p=.008) showed a negative effect on creative thinking about design research with a coefficient of -0.58.

Table 4-7. Linear regression analysis: Probability of extrinsic motivation scales as a predictor of creative thinking flexibility: Research Knowledge Essay.

	Primary and secondary predictors (motivation)						
	Extrinsic						
Outcomes Research			Reward		Recognition		r2
Knowledge Essay	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	-.513	.006*	NS	NS	-.58	.008*	0.57
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	NS	NS	NS	NS	NS	NS	NS
Originality	NS	NS	NS	NS	NS	NS	NS
Elaboration	NS	NS	NS	NS	NS	NS	NS

*p<.05

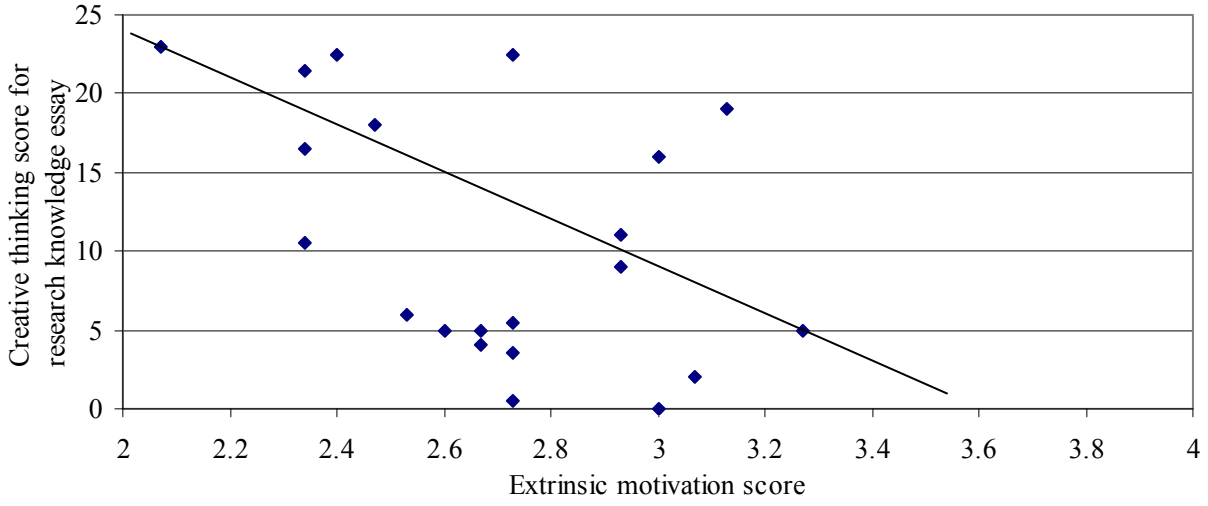


Figure 4-3. Scatterplot of extrinsic motivation on creative thinking in the Research Knowledge Essay.

Finally, this study compared motivational orientation to the creative thinking score from the Research Interest Essay. This question examined the influence of personal motivation scores on creative thinking about personal interest in design research.

- What is the relationship between *personal motivation* and *creative thinking* about defining a personal interest in design research?

Extrinsic motivation had a positive impact on creative thinking about personal interest in design research (p=.001). In Table 4-8, creative thinking was also influenced by the extrinsic secondary scale of recognition. There were two dimensions of creativity that were also affected by personal motivation scores; originality and elaboration. Originality was influenced by the secondary scale, recognition. Creative thinking elaboration was influenced by the primary extrinsic score and both the secondary scores of reward and recognition. Intrinsic motivation was seen to have no impact on changing personal interest.

Table 4-8. Linear regression analysis: Probability of extrinsic motivation scales as a predictor of creative thinking elaboration: Research Interest Essay.

	Primary and secondary predictors (motivation)						
Outcomes	Extrinsic						
Research			Reward		Recognition		r2
Interest Essay	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	.698	.001*	NS	NS	.634	.007*	0.51
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	NS	NS	NS	NS	NS	NS	NS
Originality	NS	NS	NS	NS	.593	.016*	0.43
Elaboration	.617	.004*	.532	.008*	.402	.050*	0.57

*p<.05

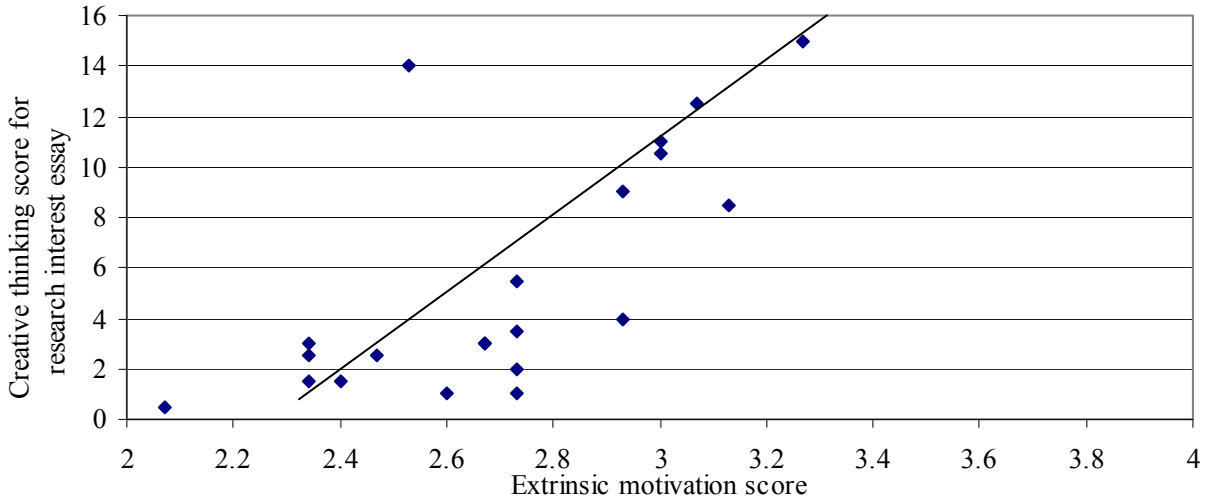


Figure 4-4. Scatterplot of extrinsic motivation impact on creative thinking in the Research Interest Essay.

Summary

Personal motivation was a predictor of creative thinking across both the essay questions. Intrinsic motivation had a positive influence on overall creative thinking and creative thinking about understanding design research. Extrinsic motivation had a negative effect on the essay about understanding design research, but had a positive impact on the essay about personal research interests.

Assessing Domain Expertise and Its Impact on Creative Thinking

Along with looking at motivation as a predictor of creative thinking, this study was also interested in examining the impact of domain relevant skills on creative thinking. Information on each student's domain expertise was gathered through a background survey given at the beginning of the module. This survey asked 10 questions of each participant about their interests, experience, and education level in design and related design research. This information was analyzed alongside change in creative thinking from the pre and post-test measures. The data were analyzed using simple and multiple regression where creative thinking was the dependent variable and the independent variables were year enrolled in graduate school, undergraduate educational background, previous design work experience, and interest in design practice.

Questions about Domain Expertise

Domain-relevant skills were first analyzed with the creative thinking scores combined from both essays. This question addressed the impact of student domain expertise in the field of interior design on overall creative thinking in both the Research Knowledge Essay and the Research Interest Essay.

- What is the relationship between *domain expertise* and *overall creative thinking* about design research?

Table 4-9 shows that overall change in creative thinking was significantly influenced by the year in which each student was enrolled in graduate school and their undergraduate educational background. The negative coefficient of -0.642 shows that the effect was negative resulting in first year students showing significant gains in their overall creative thinking over the students who had advanced further in their programs.

Table 4-9. Linear regression analysis: Probability of domain relevant skills as predictors of creative thinking: Combined Essays.

	Primary predictors (domain-relevant skills)						
	Year Enrolled (0=Y1/1=Y2)		Design Degree (0=N/1=Y)		Career Goal (0=Edu/1=Prac)		r2
Outcomes Combined essays	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	-.642	.002*	-.403	.030*	NS	NS	0.6
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	NS	NS	NS	NS	NS	NS	NS
Originality	NS	NS	NS	NS	.612	.007*	0.46
Elaboration	NS	NS	-.473	.050*	NS	NS	0.26

*p<.05

Also, students without a previous design degree exhibited significant achievements in creative thinking (p=.030), and specifically elaboration of creative thinking (p=.050). Previous work experience in design did not appear to impact overall creative thinking. Also, career interest showed a significant influence on originality of creative thinking.

Table 4-10. Linear regression analysis; Probability of residential career interest as a predictor of creative thinking: Combine Essays.

	Secondary predictors (domain-relevant skills)		
	Residential Practice (0=N/1=Y)		r2
Outcomes Combined Essay	Beta	sig.	
Creative Thinking	.732	.002*	.52
Fluency	NS	NS	NS
Flexibility	.614	.014*	.40
Originality	NS	NS	NS
Elaboration	.571	.025*	.34

*p<.05

Further, Table 4-10 shows that an interest in residential design practice has a significant impact on overall creative thinking (p=.002), flexibility (p=.014), and elaboration (p=.025).

Therefore, students who identified an interest in residential design exhibited significantly higher gains in overall creative thinking and increased flexibility and elaboration of ideas compared to students with other career interests of research, teaching, and commercial practice.

Domain-relevant skills were next compared with creative thinking scores about the understanding of design research. This question used data from the Research Knowledge Essay which discusses the participant's understanding of design research.

- What is the relationship between *domain expertise* and *creative thinking* about understanding design research?

Table 4-11. Linear regression analysis: Probability of domain relevant skills as predictors of creative thinking: Research Knowledge Essay.

	Primary predictors (domain-relevant skills)						
Outcomes Research Knowledge Essay	Year Enrolled (0=Y1/1=Y2)		Design Degree (0=N/1=Y)		Career Goal (0=Edu/1=Prac)		r2
	Beta	sig.	Beta	sig.	Beta	sig.	
Creative Thinking	-.815	.000*	-.329	.031*	NS	NS	0.73
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	-.472	.048*	NS	NS	NS	NS	0.32
Originality	NS	NS	NS	NS	NS	NS	NS
Elaboration	-.637	.005*	NS	NS	NS	NS	0.48

*p<.05

Change in creative thinking about understanding design research was significantly influenced by the year in which each student was enrolled in graduate school (p=.000). There were also significant changes, seen in Table 4-11, for first year students in the flexibility (p=.048) and elaboration (p=.005) of creative thinking about understanding design research. Also, the negative coefficient of -0.329 showed students without previous design degrees exhibited significant gains in their overall creative thinking about understanding design research.

Even though there was no significant influence of career goals on creative thinking, the sub scale of residential career interest did produce an impact as seen in Table 4-12. This table shows that in the Research Knowledge Essay, students with a high degree of interest in a

residential design practice career had significant gains in their creative thinking and in the flexibility of creative thinking over those with other interests.

Table 4-12. Linear regression analysis; Probability of residential career interest as a predictor of creative thinking: Research Knowledge Essay.

	Secondary predictors (domain-relevant)		
	Residential Practice (0=N/1=Y)		
Outcomes Research Knowledge Essay	Beta	sig.	r2
Creative Thinking	.595	.020*	0.34
Fluency	NS	NS	NS
Flexibility	.539	.041*	0.27
Originality	NS	NS	NS
Elaboration	NS	NS	NS

*p<.05

Lastly, this study was interested in how domain relevant skills impacted the creative thinking scores on the Research Interest Essay. This question looked at the impact of domain expertise in the field of interior design on creative thinking about personal interest in design research.

- What is the relationship between *domain expertise* and *creative thinking* about defining a personal interest in design research?

Table 4-13. Linear regression analysis: Probability of domain relevant skills as predictors of creative thinking: Research Interest Essay.

	Primary predictors (domain-relevant skills)						
	Year Enrolled (0=Y1/1=Y2)		Design Degree (0=N/1=Y)		Career Goal (0=Edu/1=Prac)		
Outcomes Research Interest Essay	Beta	sig.	Beta	sig.	Beta	sig.	r2
Creative Thinking	NS	NS	NS	NS	NS	NS	NS
Fluency	NS	NS	NS	NS	NS	NS	NS
Flexibility	NS	NS	NS	NS	NS	NS	NS
Originality	.616	.012*	NS	NS	NS	NS	0.34
Elaboration	.501	.041*	NS	NS	NS	NS	0.27

*p<.05

The only variable to influence creative thinking was year enrolled in the current degree program. Those who were enrolled in their second year of graduate school saw a greater impact on originality (p=.012) and elaboration (p=.041) of creative thinking about a personal interest in

design research. Table 4-13 shows that the domain expertise variables of undergraduate educational background, prior work experience in design, and interest in design practice showed no significant impact on the student's personal interest in design research.

Summary

This information shows that some of the domain-relevant skills in the study impacted creative thinking and the dimensions of creative thinking about design research. The most influential variable was the year enrolled in current masters' program and residential design career interest.

Participation Data

This study also collected data about student participation on *Designscholar.* The primary themes of the participation data include tracking the frequency of interaction and cataloging references used in the online discussions. This section also includes two examples taken from the online discussion groups to illustrate the type of discussions that took place and to give an insight into the use of *Designscholar*.

Table 4-14. Interactions of topical groups in online discussions over six-weeks.

# ppl	Group Topic	total interactions	min. interactions	percentage over min.
3	Workplace Design	56	45	24%
3	Restoration / Historical Design	54	45	20%
3	Cultural / Housing Design	54	45	20%
3	Sustainability Issues	66	45	47%
3	Universal Design	45	45	00%
2	Hospitality Design	32	20	60%
4	Healthcare Design	92	80	15%

Frequency of interaction was tracked for each topical group and illustrated in Table 4-14. This shows that the average interaction was 23% above the minimum requirement. The group with the most frequent interaction was the healthcare group, but they were also the only group

with 4 people. As a result, they were required to interact more than groups with 2 or 3. The sustainability group interacted more than any other group with 3 people. The group with two people showed the most interaction, but their minimum number of interactions was lower than the other groups.

References are organized by topical groups in Appendix J. This also contains complete citations of each article and thesis reference used during the first four discussions. Further, Table 4-15 shows all journals used and the frequency of use during the discussions.

Table 4-15. Journals used by students during the first three online discussions.

#	Journal	times cited
1	Journal of Interior Design	12
2	Design Issues	10
3	Environment and Behavior	10
4	Journal of Environmental Psychology	6
5	Journal of Architecture and Planning Research	4
6	Journal of Consumer Research	2
7	Journal of Corporate Real Estate	2
8	Addictive Behavior	1
9	Applied Ergonomics	1
10	Cornell Hospitality Quarterly	1
11	Cornell Hotel and Restaurant Administration Quarterly	1
12	Crime Prevention Studies	1
13	Ergonomics	1
14	Family and Consumer Sciences Research Journal	1
15	Housing and Society	1
16	Housing, Theory and Society	1
17	ICON (Magazine of ASID)	1
18	International Journal of Contemporary Hospitality Management	1
19	International Journal of Hospitality Management	1
20	Journal of Personality	1
21	Journal of Physiological Anthropology	1
22	Journal of Retailing and Consumer Service	1
23	Journal of Urban Affairs	1
24	Merrill-Palmer Quarterly	1
		63

The first three discussions asked students to post information on an article from a journal related to their research and respond to their group members. An example of an online discussion is the following retail discussion group discussing an article during discussion 3:

> Student A posts: "The article I read was Determinants of Consumers' Aesthetic Responses to Point-of-Purchase Materials. It was written in 2002 by C. Jansson, B. Bointon, and N. Marlow. The article discusses research that was done about point-of-purchase (POP) displays and how they will affect the consumer into purchasing whatever is being displayed. The researchers were testing to see how the consumer responded to aesthetic values in POP displays in regards to clarity, mystery and legibility. They had 100 people between the ages of 18 and 35 look at cardboard cutout displays that were designed to display and advertise a specific product. The subjects were given a questionnaire to fill out to evaluate the complexity, mystery, coherence, and legibility of each POP display. They found that only clarity and mystery were statistically significant but mystery had a stronger influence on aesthetic response than clarity. This is a noteworthy article because it takes a fairly simple approach to answering a rather complicated idea. They realized when doing this study that there are limitations to it and in order to get a more accurate conclusion further study would need to be done. I think this could be a fascinating study if it was developed even further and made it to be more accurate. This could be done by asking a few stores to be a part of this study and then they would be able to supply the POP displays. Then the researchers could adjust different factors to see how the subjects would respond to them. This way the displays are of a more accurate quality than homemade POP displays, thus the subject's responses would be more accurate."
>
> Student B responds: "I have myself participated in several studies conducted by apparel merchandising graduate students concerning POP displays and other similar retail environment issues. I think this article compliments your research very well. POP displays are a big part of modern retail environments. I wonder if studies conducted in retail establishments with different price points would have different results concerning the importance of the variables being studied. I would guess that clarity would be more important in a budget store and mystery more important in a high-end retail environment."
>
> Student A responds: "This relates to my research because I want to see how consumers respond to every area of a high end retail store. POP displays play a huge role in retail design and it is key that these displays attract consumer's attention and allow them to quickly see what the store is offering. Also these displays need to done in a way that makes the consumer want to buy whatever is being offered."
>
> Student B responds: "I also think it would be interesting to see how interior designers could take the results of this study - that clarity and mystery are the most important elements of POP displays - and try to incorporate these elements directly into the entire retail environment. That itself might be an interesting long-term sort of study. Are those elements most important in POP displays? Would consumers be more willing to spend in an environment based off of those specific principles?"

> Student C responds: "It is very interesting to me to read about retail design. I haven't had the opportunity to research it myself, or design any retail projects in school. This is such a unique field of design. Whereas other designs may focus on drawing people into an environment to stay a while and be comfortable in the space, retail is focused on drawing people in and getting them out. I think the POP displays is a good illustration of that concept. How can we quickly draw upon interest, quickly inform, and inspire to purchase? I agree with (Student B) regarding the design of the space. It equally must quickly draw upon interest, quickly inform and inspire to purchase. It seems that there are other important elements in the successful design of both the POP display and the retail environment. For example, color, contrast, lighting, or sensory experiences such as the tactile. These elements have a significant psychological and physical affects upon the occupant. Maybe the researcher considered these design elements as contributors to clarity and mystery. Regardless, I think the study can be thicker by considering other design elements besides mystery, complexity, coherence and legibility. I want to know how they decided that these four components were the only ones to consider. If more specific elements and principles of design were tested in regards to the POP display, the results could translate more clearly into the interior environment. Regarding your suggestions for strengthening the study, I wonder if there would be more variables if the study implemented authentic POP displays. For example, familiarity with the product, both positive and negative, may influence the results. Using home-made displays may have granted the researcher more control over the study. However, I do agree that authentic displays would yield a more accurate study. Maybe if there were 5 different products that were each represented by 3 varying POP displays. This way the products are not only compared to one another, but design elements are tested by varying the design elements and keeping the product constant."

The fourth discussion of *Designscholar* asked student to post information about a thesis related to their research and respond to their group members. This is an example of an online discussion in the workplace group discussing a thesis from discussion 4:

> Student A posts: "This study examines the physical work environment and explores how to utilize natural elements for reducing stress at work. There is little research on the relationship between work and stress, despite the fact that 50% of working people work in and office environment. There is much research that supports the idea that natural elements may help alleviate stress. This study examined ways to optimize natural elements in the physical environment to alleviate stress and increase performance. The methodology used to determine if natural elements had an affect on stress and performance included a paper based survey. The survey was given to seven participants who evaluated different office environments. There were 4 different images used and each participant had to determine weather or not the environment was stressful. The images used included one with obvious amounts of natural elements, obvious amounts of manufactured elements, and combinations of both. The next part of the survey used ten statements based on the perceived stress scale. A statistical analysis was performed in order to evaluate the survey. Results = participants perceived that natural elements may reduce stress; natural materials may create a less stressful environment that manufactured ones; participants perceived no

difference; between actual wood and laminate materials; using natural materials for furniture may reduce stress more that using natural; materials on the floor and wall finishes. This is relevant to my study because stress can be a giant factor in the process of giving birth. If natural elements can be used to reduce stress in work environments it is likely that they can also be used in birth environments. Lee, K. (2007) *Using Natural Elements for Reducing Stress Potential at Work*. Unpublished masters thesis. Washington State University."

Student B responds: "This thesis makes sense in a way, but in other is lacking an issue: design preference. Many pictures of birthing rooms I have seen have natural materials, but in styles I particularly detest. So the variable design style should be accounted. Don't you think so?"

Student A responds: "Preference is an important issue, I think this study was does look at the preference between man made materials and natural materials. When I think about typical office environments many things come to mind as common place. Plastic used to make furniture, metal for shelving and cabinetry, man made fibers for carpet and upholstery like nylon, rayon and polyester. When thinking about natural materials the study found that people prefer Wool, and cotton, and silk for carpet and upholstery, wood for furniture and shelving. It is preference taken down to one of the lowest common denominator, removing color, pattern, and style."

Student C responds: "I'm surprised to know that the participants perceived no difference between the real natural materials and artificial look materials. This could be a key to add natural elements in less cost, which is the main reason for not adding the actual real natural materials in office spaces. I can't imagine the stressful state after birth that requires the need to be calmed down but I encourage the need of natural elements in birth environments as long as they do not interfere with the sterilized space. Studying the consequences of natural elements, such as attracting bugs or causing molds, will be required when the powerless new mother and "fragile" infant are the main users in that space."

Student D responds: "what about the natural view? is it count as one of a natural elements? of is it only talking about the natural material?"

Student A responds: "There is definitely a place for natural views, but it was not in the scope of this thesis. It just examined natural elements that are on the interior of the space."

Student E responds: "I think the natural materials mainly indicate wood, bamboo and something else have warm touch sensory and natural smell. However, I think, according to stone, like marble and granite, which have less effect on alleviating stress. Because they feel so cold and tough, maybe their pattern can help people release stress."

Conclusion

The research questions for the study can be answered using data from the three areas of the componential theory of creativity (Amabile, 1983), creative thinking, motivation, and domain-

relevant skills. This study produced reliable data, establishing consistency in the judging process. It also showed that significant change in creative thinking did occur in both the areas of understanding design research and defining a personal interest in design research after the online discussions in *Designscholar*. Further, it explored the primary (intrinsic and extrinsic) and secondary (challenge, enjoyment, recognition, and reward) variables of motivation and the level of the student's domain-relevant skills as predictors of creative thinking and the dimensions of creative thinking.

CHAPTER 5
DISCUSSION

Introduction

This study considered potential changes in creative thinking (fluency, flexibility, originality, and elaboration) about design research resulting from online discussions with peer groups. It further studied the relationship between learner characteristics of personal motivation and domain-relevant skills as predictors of creative thinking about research in interior design graduate students. This chapter also explains the data that surfaced in terms of specific creative dimensions. These results will be discussed and interpreted in relation to the pedagogical literature. The findings from this study appear to validate the constructivist educational theory of the online learning community, *Designscholar*, and the technological tool of online discussions as an appropriate means of increasing creative thinking about design research. The participation in the online discussions and the limitation of this study are also presented. The chapter concludes with future research recommendations for enhancing *Designscholar* and developing online learning communities for interior design graduate education.

Questions about Creative Thinking

The questions about creative thinking test a change in the pre and post measure of creative thinking. These questions needed to be answered before other analyses could be made. The analysis of the data focused on the combined data from each of the essays.

- What is the relationship between participation in *Designscholar* and *overall creative thinking* about design research?
- What is the relationship between participation in *Designscholar* and *creative thinking* about understanding design research?
- What is the relationship between participation in *Designscholar* and *creative thinking* about defining a personal interest in design research?

The results of the study uncovered the change observed in creative thinking due as a result of the *Designscholar* online learning community. *Designscholar* showed a significant impact on the change in creative thinking about design research for the students involved.

> "I agree that design research can and should be incorporated into the design profession. We as designers should design based on what research is out there to better our designs and improve the experiences of those who spend time in the spaces we create."

> "Overall, I think forums such as this are excellent ways to connect with other students in the field as well as gain a sometimes different perspective on a variety of different issues."

Through socially engaging in written dialogue about design research, participants appeared to enhance their understanding of design research and better define their own personal research interest. They also gained skills in locating and reading research articles for their research topics. As in the constructivist reflection cycle (Oliver, 2000), the process of expression, reflection, revision of ideas occurred in the online discussions. Using a community of peers, students were able to build upon their knowledge of design research. This community succeeded in creating a resource for students to share and discuss ideas in order to advance the understanding of research in the interior design field. This finding validates the constructivist pedagogy that underlies the development of *Designscholar* as an appropriate way to engage students in actively thinking about design research. Overall change in creative thinking about design research emerged as did dimensions of fluency, flexibility, originality, and elaboration in the student reflections in their essays. The Research Knowledge Essay asked students about their understanding of design research and its implication to the field. Answers to this question revealed a significant change in this area after the completion of the module. The Research Interest Essay asked students about their own personal interests in design research. The answer to this question also revealed a significant change in creative thinking about specific interests in design education. This information not only validates the underlying educational theory of

Designscholar, it also supports online discussions as an appropriate tool for a constructivist way of teaching and learning. This finding is in line with the study by Cisero (2000) that looked at sharing reflective writing as a way to increase creative and critical thinking in undergraduate students. By engaging students in written reflection followed by peer discussions about design literature, students increase their ability to think about the subject matter. This enhances student understanding of design research and can increase the previously observed lack of understanding of what design research is and how it is used to inform design decisions (Dickenson & Marsden, 2009). Research has also shown that learning through a community that builds collective knowledge is an effective way to increase critical thinking (Oliver, 2000). *Designscholar* met success as a constructivist learning environment that enhanced creative thinking through the use of reflective writing shared through a community of learners. It was shown to increase understanding and focus personal interest in design research. However, some discussions revealed naïve assumptions about design research that were reinforced by their peers. If an instructor was involved as a facilitator then the discussions could have been clarified and misconceptions and alternative explanations could have been raised.

To get a better view of where creativity specifically changed the dimensions identified by Torrance (1974) of fluency, flexibility, originality, and elaboration were further examined. Overall, *Designscholar* increased these dimensions but variation did appear between the two parts of the pre and post-tests. Students saw a positive change in these dimensions when discussing their understanding and personal interests in design research. The dimension of fluency did not impact the change in overall creative thinking. This shows that students did not change the amount creative ideas. However, there was a significant positive change in the

flexibility of their design research ideas where students acknowledged a wider range of research topics than had previously considered. For example one student commented:

> "Design Scholar has allowed me to see the possibilities for a variety of focuses within a specific topic."

Also, the dimension of originality increased as well. Students offered more novel or original ideas about design research once involved in the online discussions. The change in elaboration was seen through the increased use of appropriate language when discussing design research. Through exposure to literature in the field and discussions centered on design research, students began to incorporate scholarly language into their reflective writings. This was not only due to exposure to previous design literature, but also to peers using the appropriate language in their online discussions. Students modeled the scholarly language from the research articles they received, reviewed, and critiqued. The precision in online discussions increased because of the use of domain-specific language and growing content knowledge in the field. This speaks to the development of expertise, which is also the third component of Amabile's framework in addition to creative thinking skills and motivation. The students began using language that separated them from those without an understanding of design in turn building upon their domain-relevant skills. The specific dimensions of creativity were also independently studied for each of the essay questions where interesting outcomes surfaced.

Students had an increase in fluency, flexibility, and elaboration of their creative thinking when they discussed their understanding of design research. The change in fluency was seen through student identification of more topics under the broad umbrella of design research after taking part in the online discussions. Instead of referring to the broad topic of hospitality design, for example, the students who participated in *Designscholar* began to suggest information about

hotel, restaurant, and bar designs showing maturation in their thinking about research topics. The following student excerpts allude to growth and development.

> "I think these past discussions have been very interesting both in terms of the variety of topics discussed as well as seeing everyone's feedback and opinions. There were definitely some subjects discussed which I knew next to nothing about, like narrative inquiry, so it was quite interesting to learn more about it. Other topics I had studied a bit before so it was interesting to hear everyone else's thoughts on them."

> "Going through this unique experience, I've been exposed to new design areas and explored different design issues in addition to my familiarized research topic. Learning more about design research and the effect of design elements, such as color, lighting, and natural elements, forms a mental block filled with new experiences from a variety of topics. We have been exposed to different environments and settings such as retail, commercial spaces, hotels, and healthcare institutes. Reading about different methods of research and design tools, such as P.O.E, interviews, and surveys, was valuable knowledge for future, or current, research uses."

Also, tied to the increase in topics was an increase in the depth of understanding about each topic, or increased flexibility. The pre-test essays showed that students listed topics of design research but their understanding of each was limited. After the online discussions, their knowledge had increased by understanding each topic with more depth. They began to related and connect topics such as lighting design informing lighting choices in hospitality sector; hotels, restaurants, and bars. Students were able to discuss each in more detail and understand its relevance to design in a connected way.

> "Also I was curious about some topics we discussed before and then I was able to study them more and more."

> "Over the past few weeks during the discussions on design scholar, I've come to realize the extent of which research topics can be studied. First of all there are an unlimited number of thesis topics all of which could take a different approach to the topic of study."

The change in the dimension of elaboration was seen in the choice of language. Students used language they had seen in literature that was appropriate to design and inherent to discussing the field in a more scholarly way. The post-test essays contained references to sustainability, accessibility, and post-occupancy evaluation; terminology that did not appear in

the pre-test essays. These changes displayed an increase in topics, a deeper understanding of topics, and an appropriate use of design language when discussing these topics in detail.

The one dimension that did not seem to show much change was originality. This is actually understandable because this essay question asked students to explain their level of understanding about the topics that had been discussed in their groups. Originality did not factor into the change in creative thinking because the information in student essays contained the collective knowledge built within the group. There may have not been enough concentration within a certain stream of research to remark whether or not it was original. Students may not have had enough depth of understanding about research in a given area, such as sustainability, to ascertain originality. The essays often provided information on the same topics the group discussed as a whole.

When discussing understanding of design research, the study showed that certain dimensions influenced a change in creative thinking. The dimensions that impacted change in personal interest were originality and elaboration. Fluency and flexibility did not change. Students kept their original personal interests and did not add to the list of topics they wanted to pursue. This, in fact, is a positive aspect of the study. It appears that students came in with a personal interest and, through the online discussions, focused on their interest instead of adding unrelated topics. However, flexibility was not changed. Students maintained their depth of understanding about their topics of personal interest.

> "I have found this discussion forum to be an interesting way to evaluate and think through my thesis topic as well as give feedback to others."

The dimension of originality changed from pre to post-test measures. This is an understandable and very interesting finding of the study. While originality was not changed in the essay about understanding design research, it was significantly changed in the essay about

personal interest. This means that students began to personalize and focus their interests after participating in the online discussions. Their explanations were also more in-depth when they identified a research focus area and appeared better equipped to discuss their research.

For example, Appendix I shows the development of a research idea from pre to post essays. First, the student expresses an interest in work environments and ways in which movement in the workplace could help fight obesity. Then the student expressed more original ideas in the post essay which contained references to studying a specific population in the work environment; the millennial. The essay further focused on how work environments could reflect this cohort's social values and characteristics.

Designscholar had a significant impact on the way design students creatively think about their understanding and personal interests in design research. The data show that online discussions are an appropriate tool for communication among peers about scholarly literature in the field of design. Data also show that this interaction impacts overall student thinking and learning. The data was further analyzed to determine what variables influenced the observed change in creative thinking. The following information on personal motivation uncovers how motivation impacted the creative thinking of students involved in the online discussions.

Questions about Personal Motivation

The questions about personal motivation examined how personal motivation might predict creative thinking and change in the dimensions of creative thinking. Motivation scores were compared to the change in overall creativity and for the individual essays.

- What is the relationship between *personal motivation* and *overall creative thinking* about design research?
- What is the relationship between *personal motivation* and *creative thinking* about understanding design research?

- What is the relationship between *personal motivation* and *creative thinking* about defining a personal interest in design research?

Personal motivation was assessed through the Work Preference Inventory survey. This survey was scored and compared to the changes observed in creative thinking and its components. Overall, the sample was highly intrinsically motivated. The sample also showed moderate levels of extrinsic motivation. Also, 17 of the 21 showed higher intrinsic scores, while 4 showed higher extrinsic scores. A larger sample is needed to test these findings but these findings seem to suggest that when compared to overall creative thinking, intrinsic motivation had a positive and significant impact on the observed change. This follows the previous literature on the componential theory of creativity by Amabile (1983) that states intrinsic motivation is conducive to creative thinking. Extrinsic motivation did not influence creative thinking change when the data from both essay questions were collapsed. However, when each essay question was examined independently, the findings were a bit different.

Intrinsic motivation positively influenced creative thinking change about understanding design research, which follows the assumptions of previous research (Amabile, 1983; Kaufman, 2002). When extrinsic motivation was analyzed, it actually showed a negative effect on creative thinking. This finding is also in line with the componential theory of creativity that states that extrinsic motivation is detrimental to creative thinking (Amabile, 1983). More specifically, the component of flexibility was positively influenced by intrinsic motivation. This means that students with higher intrinsic scores exhibited wide ranging understanding about design research. Extrinsic motivation did not significantly influence any of the individual components of creativity. Overall, higher scores in extrinsic motivation negatively impacted creative thinking.

However, the negative impact observed in the understanding of design was not seen when students discussed their personal interest. Interestingly, extrinsic motivation showed to have a

positive influence on creative thinking and intrinsic motivation showed no impact. When the components of creativity were studied, elaboration surfaced as the component that was impacted significantly by extrinsic motivation, while the other components were not affected at all.

This study shows that some extrinsic motivation is helpful, but beyond that, intrinsic motivation becomes the primary driver to complete research related tasks. This is evidenced in the student who went above and beyond frequency and quality of discussions.

Personal motivation was observed to influence creative thinking about understanding and personal interest in design research. The componential theory of creativity not only lists personal motivation as an influencing factor, it also presents domain expertise as the third component of creativity. The following information will explain how domain expertise also impacts creative thinking within the *Designscholar* online discussions.

Questions about Domain Expertise

Domain expertise was examined to determine the effect of interior design content and knowledge on creative thinking and the dimensions of creative thinking. The combined essay score along with the individual scores for both the essay questions were compared.

- What is the relationship between *domain expertise* and *overall creative thinking* about design research?
- What is the relationship between *domain expertise* and *creative thinking* about understanding design research?
- What is the relationship between *domain expertise* and *creative thinking* about defining a personal interest in design research?

Domain expertise was evaluated through a background survey given at the beginning of the 6-week *Designscholar* study. This survey yielded data on four components of domain expertise, year enrolled in graduate school, undergraduate educational background, previous design work experience, and personal interest in design practice and academic careers. This

sample consisted of graduate students who are acquiring research knowledge and skills, therefore, they are not considered experts.

Overall creative thinking was influenced by the year the student was enrolled in graduate school. This means that students who were in their first year of graduate school saw a significant change in their overall creative thinking about design research compared to those who were further along in their programs. These first year students also had significant gains in the originality and elaboration of their overall creative thinking. A second year student commented that this tool would have been most useful during her first year in the interior design graduate program when she was searching for a thesis topic. This opinion was expressed by several student participants as follows:

> "This discussion forum has been helpful in that it has forced me to begin some research for my thesis (even though I am really not yet to that stage.) I think that the best part about it was getting to hear opinions and thoughts on my discussion topics from students of other schools."
>
> "I wish this online discussion was provided in the beginning of my masters program."

Another variable that had a significant impact on creative thinking was domain expertise. Students with undergraduate degrees in fields that were outside of interior design had a larger change in creative thinking than those with degrees in interior design, architecture, or art. Therefore, students with low levels of domain-relevant skills saw the most significant gains in how they thought about interior design research. This finding is reflected in the paradox of creativity argument which states that creativity needs to strike a balance between the challenge of the task and the skill of the performer (Csikszentmihalyi, 1989. This also speaks to having enough knowledge about a certain topic to engage in discussions about it, but to be fresh and look at things from a new perspective. The incoming students with non-design backgrounds had the most to gain in the discussions because they had the most to learn. Each student's previous

design work experience was not an influencing factor, but a high amount of interest in a practice did influence creative thinking. An interest in an academic career change overall creative thinking, but it did increase the dimension of originality. This could speak to the nature of interior design researchers in academic careers looking for a specific original research agenda. Specifically, the students who were interested in a residential design practice career saw a larger change in their overall creative thinking. The change was traced to a significant impact on the components of flexibility and elaboration. These students came away with a deeper understanding of design research and used more design related language after the online discussions. This is an interesting finding because students interested in residential design often come to design education with a focus on aesthetics of home interiors rather than critical design research. They also may have not fully understood the depth of the research base in the field. This group of students stands the most to gain by participating in the online discussions.

Students with an interest in a career in residential design practice not only showed the biggest increase in creative thinking change about understanding design research, but also in the dimensions of flexibility and elaboration. Also, first year students saw the biggest change in creative thinking and, more specifically, saw this change in the component of elaboration.

Personal interest was not impacted by any of the domain expertise variables. The change in creative thinking about personal interest cannot be attributed to any of the domain expertise factors. The data showed that the year enrolled in graduate school, undergraduate degree background, previous design work experience, and interest in practice or academic careers did not influence student personal interest in design research. This means that change in creative thinking about personal interest in design must be attributed to reasons other than domain expertise in the field. The change is likely because of what is being discussed in research and

what they are learning in their current graduate education curricula. It can also be attributed to the fact that many students had already chosen topics for study and stayed with them because they were near the end of completion of their thesis and degree. These outcomes suggest further refinements of *Designscholar* for future study.

Participation

Members of the *Designscholar* online learning community overall were quite engaged in the six-week learning experience. Each student was required to post one article or thesis assignment a week and respond at least once to each of their group members. On average, students interacted 24% more than was required. The majority of the groups in this study were comprised of 3 participants. It is the researcher's recommendation that online discussion groups use 3-4 participants to give a variety of opinion, but still be manageable for meaningful individual engagement for all discussions. When comparing this to the participation of the pilot study, there is a marked difference. The pilot study yielded a participation level of 80% more than required. This is attributed to the involvement of the instructor during the pilot study. The instructors involvement help strengthen the community and the involvement of all the members. This is confirmed through previous studies that state hybrid methods of teaching may be the most beneficial to diverse populations of students. This study would recommend using an instructor or mentor in the development of online discussions.

At the close of the six-week study, students were asked to reflect on the experience. Of the 21 participants, 15 had positive comments about the online discussions while 6 had neutral and/or negative comments. Some of these positive comments from the student reflections underscore the importance of creating a sense of community:

> "It sure is helpful to have a network of design researchers that are in the process of conducting their theses."

> "We belong to a culture in which the majority of our social networking takes place online. I think it is valuable to utilize this for design education. It has been beneficial to me to share my topic and receive input."
>
> "I think it this was very beneficial to me because I could get more information from my group members. Also it encourages me to do research. Thus I appreciated all members input. We were talking about our own interesting research related to our thesis and it is very good for me because I have a chance to know others processes on how to develop a thesis by using research."
>
> Other comments centered on areas for improvement:
>
> "I find that this forum has been very difficult to exchange information. Not only are our areas of interest dissimilar, the lack of real-time exchange that exists in studio allows for a more conversational approach for solving the problems at hand."
>
> "I do not think I would participate in this again, it was too time consuming."

When entering a new discipline, it is critical for new learners to form a sense of belonging within the field. This can be done through learning the new scholarly language, understanding what is recognized and valued in the knowledge base, and identifying gaps in previous literature. Becoming part of a community involves sharing values and norms with others in the community. An online learning community offers a place for new learners in a field to get an understanding of what is involved in their new community. This can aid those coming from diverse backgrounds in what the community is about and how they can learn and give back to it.

All of the 21 students who finished the requirements of the study influenced this research in one way or another through their comments and their responses about design research. Overall, the participation of the students involved uncovered mostly positive and some negative aspects of *Designscholar*.

The study began with 26 participants and finished with 21 who stayed actively involved in the online discussions. Instructors at two of the three schools required student participation and assessed a small participation grade for their involvement. The remaining school did not require participation and saw 4 students drop out in the first three weeks. This was a result of the time

commitment for participation and the fact that many students saw this as an extra activity on their already full plates.

> "Overall, I think that a discussion forum like this is a great idea, but I am not sure if it would actually be used to its full potential when its users are not being forced to use it routinely."

> "This would be a good project over the summer; frequently graduate students are looking for some additional inspiration during the summer as there are not a lot of courses available to us; and we are usually doing research or interning. Attempting to complete this during the regular semester was very difficult along with our mandatory coursework."

Limitations

The study had some limitations in its research design including its small sample size of 21 students from three interior design programs. Also, the study was 6 weeks long, so people were brought together for only a limited period of time. Ideally, it would have been very insightful to track if participation in *Designscholar* ultimately proved to enhance the student's end product, but this was beyond the scope of the dissertation. Longitudinal research could begin to ascertain whether or not involvement in online discussions about design research impacts the quality of graduate level research. The student in Appendix I suggested two important ideas for further study; the idea of reviewing precedent cases, and the idea of building upon previous generational work environment studies. This suggests that this student sees their personal interest in design incorporating previous research to inform their decision. This speaks to a possibility that using online discussions about design research can instill the use of research in design decision making as a primary skill.

Furthermore, students were at different points of completion in the master's degree programs. Ideally this would be recommended for incoming masters students who have a limited understanding of interior design research and who have yet to develop a strong personal interest in design research. Interaction was possibly too short to develop any lasting personal

connections. There were 26 students who started *Designscholar*, but 21 completed the six-week study. Not all programs required students to participate, and therefore the study lost 5 over the course of the online discussions. As discussed previously, the difference in accountability of students from different schools presented a few problems. Because some students were not required to participate, they slowly dropped out. This left groups with fewer members who were actively involved leading to less dialogue and fewer opinions for reflection.

> "I do think the forum has a great potential, but it should be incorporated in a theory class course, and reward the participants with credit for doing it. Otherwise people just get swamped with other things, especially studio, and kind of give up, or don't put much effort in it."

Students may have been more actively involved not only if their participation had been required, but also if their instructor had commented on the discussions. Involvement from educators or practitioners could boost the performance of those with high extrinsic motivation simply because they would know they were being held accountable. The role of the instructor in the online learning community was different in the pilot and dissertation studies. The pilot study witnessed larger participation numbers in the weekly discussions and this can be in part contributed to the active role of the instructor during the pilot study. This study was a success due to the overwhelming number of intrinsically motivated individuals who tend to go above in beyond, but could benefit from a participating role of a lead instructor to guide the discussions.

> "This study could also benefit from online technologies other than asynchronous online discussions. The technology used for this study reflected a widely available tool that the researcher was able to find and offered a low cost solution. This study could benefit from upgraded technology. Using real-time discussions or instant messaging could potentially increase involvement and facilitate student interaction if they did not have to wait for responses."

> "Having to post, then wait, then wait some more is very frustrating. We all have a lot of projects going on at the same time and making time to check to see if we have a response is very non-conducive to the immediate process of learning and designing."

Along with changing technological tools, the study could also change the organization of the peer discussion groups. The students displayed a diverse population of interests and their level of completion within their programs was different as well. This resulted in broad topical groups for the online discussions. Students were grouped as close as possible to others with similar interests, but this may have reinforced a narrow view of the topic. In interdisciplinary design research we see that influences can be found in diverse topics and opinions.

> "I really appreciated other students coming into our group, and vice-versa, to discuss topics and give feedback. Thus, the individual groups seemed a little restrictive."

> "One option is to have it always open without deadlines or assigned groups. In this way we could use it to get in touch with likeminded researchers, and exchange information as the need arises."

The students that participated in *Designscholar* were at different stages of their degrees. Some were first year students searching and refining topic selection and some were second year students nearing completion of their thesis. These types of online discussions may better serve first year students who are exploring design research topics and learning about research's role and use in graduate education.

> "I believe that the use of design scholar is more beneficial at the literature review phase once we have our topics of interest selected so we can use the shared documents and journals as references. On the other hand, it won't hurt using this before selecting our interests to browse through the contents and explore different areas of research."

> "I found that there are so many interesting ideas out there through the discussion, and I wish that I was exposed to these before I determined my research topic for thesis this year."

Students were also experiencing *Designscholar* through a variety of courses within their programs. Some students were participating as part of a studio course, some from an independent study 1 hour credit, while other where enrolled in a research methods type seminar course. The different expectations of each class may have put different demands on the individual students. This experience may serve students better if they are on level playing fields

of what is expected from their programs along with their *Designscholar* work (i.e. literature review or studio project). These limitations of the study offer recommendations to *Designscholar* and to future research in online learning communities in interior design education.

Future Research: Recommendations for *Designscholar*

This research study uncovered fundamental ways *Designscholar* or a similar type of online learning community could be changed to enhance the learning experience of graduate students. These fundamental changes came from the research in the pilot and dissertation studies and from student comments about the online discussions. The following outlines some of the major changes for assessments, users, and organization of the module that could be made to the *Designscholar* online learning community.

Recommendations for assessments are to add student learning style measures like the Meyers-Briggs Type Indicator to assess the diversity of learning styles in an online community. The online environment could also me measured using a survey created from constructivist educational theory constructs in order to analyze the effectiveness of the online community as a true constructivist environment. Student dialogue could also be analyzed dialogue to uncover themes in the discussions in order to understand and enhance the discussion through an intervention of questions or comments. Surveys could also uncover student attitudes about their use of research in design problems before and after the module. This could also incorporate surveying students after their degree completion to see if research became an integral part of their design decision making in their theses. Assessing the sense of community created in the online learning community through the Sense of Community Index (SCI) could measures membership, influence, integration and fulfillment of needs, and the shared emotional connection that is created online.

Recommendations for users are to involve instructors at the programs to evaluate and give feedback to better the community. Using online discussions could increase communication between teacher and student by involving instructors in the discussions. It is also important to involve instructors to increase accountability and oversight of participation. Even though this could be a valuable tool for students, the study showed that students need to be graded or held accountable for their participation in the community. Instructor involvement could also be paired with adding outside experts to increase the quality and diversity of knowledge in the online discussions.

Recommendations for module are to target incoming students for semester long enrollment. This could help students with a preliminary topic search and understanding of design research. Also start students by looking to popular sources of information gathering first, then build to peer reviewed journals followed by thesis and dissertations. Mentors or second year school liaisons could be used to mentor groups of incoming students.

It may be beneficial to give each group an article to read and discuss. This could be recommended by their instructor or by one group member. Keeping discussions focused may be a way to elicit better quality discussions. Another effective technique for sharing resources may be through cataloging the articles and theses that have been discussed for easy access. This could be a searchable database that allows others to view a group's dialogue on a certain article or thesis. Also, articles could be uploaded to each post so students could reach the original article easily. Finally, using upgraded technology could make this experience more interesting for the students and instructors. This study could benefit from newer technologies that allow for seamless real-time communication, web meetings and conversations could be recorded and archived.

Recommendations for Online Learning Communities for Interior Design Education

The development of online learning communities should be considered within interior design programs for a number of reasons. They could be used within courses, programs, or across programs to strengthen knowledge building and inter-personal relationships. The following are recommendations for using an online learning community like *Designscholar* within and across programs.

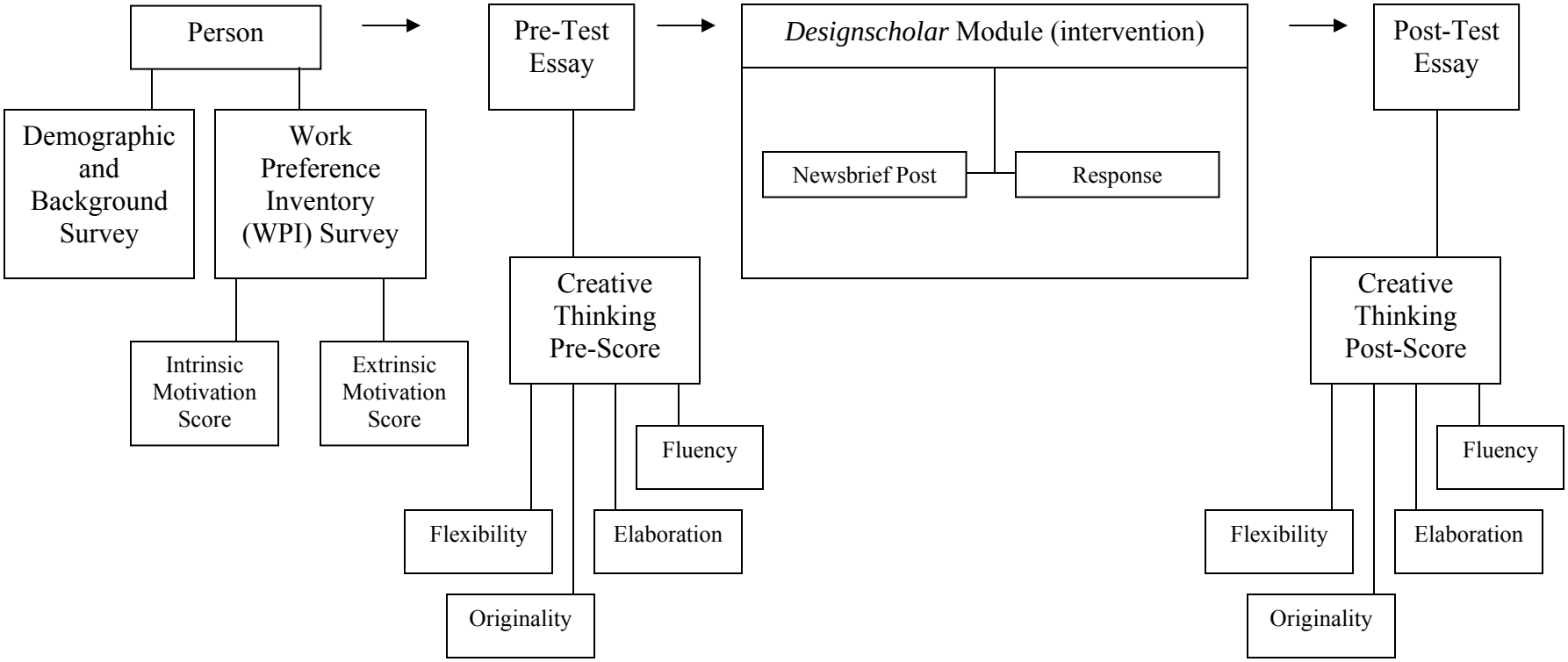
Recommendations for uses within programs are for mentoring incoming students with more experienced graduate students. Online learning communities could be beneficial to graduate students across levels to create an ongoing dialogue open to all students and faculty members to reach beyond face-to-face classes. This could create a consistent link among programs for graduate students to ask questions, respond, mentor, share resources, and gain diverse opinions and advice about design research topics. The community could be enriched and diversified by engaging in discussions with other programs internationally. It could also strengthen relationship of schools and the students who will be entering the work force together.

Conclusion

The purpose of this study was to determine if creative thinking about design research changed from online discussions on *Designscholar*. More specifically, the study explored the specific dimensions of creative thinking -- fluency, flexibility, originality, and elaboration –to determine whether or not development occurred through participation in an online learning module involving graduate students across programs. Further, the influence of personal motivation and domain relevant skills was studied for its possible influence on creative thinking. The study found that graduate students' creative thinking about design research significantly changed from the online discussions. It also found that those students who appeared intrinsically motivated had a positive influence in their creative thinking about design research, while

extrinsically motivated students saw negative impact. Domain expertise, along with personal motivation and creative thinking skills, also appeared to impact the level of creative thinking about research seen in the participants of the study. This supports the premise that knowledge is socially constructed and that discussing knowledge within a community can boost the knowledge of all involved. The more the students are immersed in the field they are able to expand their discipline-specific ideas and hopefully research contributions to the field. *Designscholar* shows much promise as a means for socially constructing knowledge and advancing the development of research skills in interior design. As technology continues to change and evolve, it is a tool that assists in connecting those of a specific community together. Ultimately, online approaches hold great potential for building and sustaining an informed and engaged community of learners in all disciplines.

APPENDIX A
RESEARCH DESIGN


Person
Demographic and Background Survey
Work Preference Inventory (WPI) Survey
Intrinsic Motivation Score
Extrinsic Motivation Score
Pre-Test Essay
Creative Thinking Pre-Score
Fluency
Flexibility
Elaboration
Originality
Designscholar Module (intervention)
Newsbrief Post
Response
Post-Test Essay
Creative Thinking Post-Score
Fluency
Flexibility
Elaboration
Originality

APPENDIX B
PILOT TEST INSTRUMENTS OVERVIEW

Constructivist Online Learning Environment Survey (COLLES)

The COLLES instrument assesses the online teaching environment. It compares student's preferred online learning environment with what they actually experience in an online environment. The pre and post-test were given during the pilot study. These tests were embedded within the Moodle course management software and were taken online at the beginning and end of the pilot study. The pre-test asked focused questions on the student's preferences in their online learning environment and is taken before student participation. The post-test asked the same questions, but framed the questions to examine the student's experience in the *Designscholar* online environment after their participation. The 26 questions covered topics related to relevance, reflective thinking, interactivity, tutor support, peer support, and interpretation. Students were given the options of "Almost Never", "Seldom", "Sometimes", "Often", and Almost Always". The pre and post measures were examined to compare the student's perception of an online learning environment prior to participation with their views of the online environment after their experience. The limitations of this survey are that it only deals with quantitative data and should incorporate a qualitative component to further inquire about the learning environment.

Attitudes Towards Thinking and Learning Survey (ATTLS)

The ATTLS asked students about their learning styles and their attitudes towards learning in an online environment. This was also given during the pilot test. This test was housed in the Moodle system, like the COLLES, and was given to all participants of the pilot study during the first week. This survey was composed of 20 questions that were answered with "Strongly Disagree", "Somewhat Disagree", Neither Agree or Disagree", Somewhat Agree", and "Strongly Agree". The results show how students feel about peer discussions in their learning and label them as connected or separated learners. Connected learners are those who tend to approach learning as a collective and social experience, and separated learners are those that approach learning as a more individualized task. The limitations of the ATTLS are that students can be pigeon-holed as one of two types of learners, not taking into account differences within each scale.

Myers-Briggs Type Indicator (MBTI)

The MBTI is an instrument that gauges student learning styles. This was given to all participants of the pilot test. It is a well research and widely used instrument to assess personality profiles and learning styles (Myers, 1962; Myers & McCaulley, 1985; McCaulley, 1987). The MBTI was developed from Carl Jung's theory of psychology types. These are described as four mental powers of sensing, intuition, thinking, and feeling; and four attitudes of extroversion, introversion, judgment, and perception. The MBTI contains a series of 96 questions that yield a four-letter learning type referencing Jung's (1923) powers and attitudes. The 8 variables create a total of 16 learning types that emerge; (E) extrovert – (I) introvert, (S) sensing – (N) intuitive, (T) thinking – (F) feeling, and (J) judging – (P) perceiving. These pairs are scored with one dominant variable being, although both types are present, resulting in the 4-

letter type for each learner. Measures of attitude are seen in the first and last letters of the learning type. The first pair, (E) extrovert – (I) introvert, are two different ways people interact with the world around them. The last, (J) judging – (P) perceiving, are two ways people prefer to order their lives and world (Quenk, 2000). One of the two middle variables in the learning type, (S) sensing – (N) intuitive, are ways that people gather and process information. The other middle variable, (T) thinking – (F) feeling, is representative of how people make decisions with the above information (Quenk, 2000). Limitations to the survey are that people tend to change learning styles over time and many times score differently on the test depending on when it was taken (Quenk, 2000). Limitations to the MBTI are that users can actually change types depending on when and where they take the survey.

APPENDIX C
INSTRUMENT: WORK PREFERENCE INVENTORY (WPI)

#_____ 5/19/95

Work Preference Inventory
Student Version
Teresa M. Amabile, Ph.D.

Please rate each item in terms of how true it is of you. Please circle one and only one letter for each question according to the following scale:

N = **never** or almost never true of you
S = **sometimes** true of you
O = **often** true of you
A = **always** or almost always true of you

N S O A 1. I am not that concerned with what other people think of my work.
N S O A 2. I prefer having someone set clear goals for me in my work.
N S O A 3. The more difficult the problem, the more I enjoy trying to solve it.
N S O A 4. I am keenly aware of the goals I have for getting good grades.
N S O A 5. I want my work to provide me with opportunities for increasing my knowledge and skill set.
N S O A 6. To me, success means doing better than other people.
N S O A 7. I prefer to figure things out for myself.
N S O A 8. No matter what the outcome of a project, I am satisfied if I feel I gained a new experience.
N S O A 9. I enjoy relatively simple, straightforward tasks.
N S O A 10. I am keenly aware of the GPA goals I have for myself.
N S O A 11. Curiosity is the driving force behind much of what I do.
N S O A 12. I am less concerned with what work I do that what I get for it.
N S O A 13. I enjoy tackling problems that are completely new to me.
N S O A 14. I prefer work I know I can do well over work that stretches my abilities.
N S O A 15. I am concerned about how other people are going to react to my ideas.
N S O A 16. I seldom think about grades and awards.
N S O A 17. I am more comfortable when I can set my own goals.
N S O A 18. I believe that there is no point in doing a good job if no one else knows about it.
N S O A 19. I am strongly motivated by the grades I can earn.
N S O A 20. It is important for me to be able to do what I enjoy most.
N S O A 21. I prefer working on project with clearly specified procedures.
N S O A 22. As long as I can do what I enjoy, I am not that concerned about exactly what grades and awards I can earn.
N S O A 23. I enjoy doing work that is so absorbing that I forget about everything else.
N S O A 24. I am strongly motivated by the recognition I can earn from other people.
N S O A 25. I have to feel that I am earning something for what I do.
N S O A 26. I enjoy trying to solve complex problems.
N S O A 27. It is important for me to have an outlet for self-expression.
N S O A 28. I want to find out how good I really can be at my work.
N S O A 29. I want other people to find out how good I really can be at my work.
N S O A 30. What matters most to me is enjoying what I do.

APPENDIX D
DESIGN RESEARCH ESSAY RUBRIC

Pre-Test Rubric

Pre-Test Essays / Participant #_____ Reviewed by _____ Date_____

Question 1 – What is design research and why is it important to the field?
Overall Creativity Score_____

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Question 2 – What are your interests in design research?
Overall Creativity Score_____

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Post-test Rubric

Post-Test Essays / Participant #_____ Reviewed by _____ Date_____

Question 1 – With your new understanding from the online discussions, explain why design research is important to the field.
Overall Creativity Score_____

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Question 2 – What are your interests now in design research and have they changed after the online discussions?
Overall Creativity Score_____

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

APPENDIX E
INSTRUMENT: BACKGROUND SURVEY

Name_____

Sex_____ Age_____

Highest Educational Degree Completed_____

Previous Degree Field of Study_____

Current Degree Program in Interior Design (circle one)

M.A. M.S. M.F.A. M.I.D. PhD.

What year are you currently working on in your degree program (circle 1)

1st year 2nd year 3rd year 4th year

Professional Work Experience in Design (circle one)

None Moderate (1-4years) High (5+years)

Interest in Design Research (circle one number)

0 1 2 3 4 5 6
Not interested Very Interested

Career Goal Interests: Commercial Practice (circle one number)

0 1 2 3 4 5 6
Not interested Very Interested

Career Goal Interests: Residential Practice (circle one number)

0 1 2 3 4 5 6
Not interested Very Interested

Career Goal Interests: Design Education (circle one number)

0 1 2 3 4 5 6
Not interested Very Interested

Career Goal Interests: Design Research (circle one number)

0 1 2 3 4 5 6
Not interested Very Interested

APPENDIX F
INSTRUCTOR PACKET

Introduction Letter

August 18, 2008

Janetta M. McCoy, Ph.D.
Associate Professor
PO Box 1495
Interdisciplinary Design Institute
Washington State University
Spokane, WA 99210-1495

Dr. McCoy,

Thank you for agreeing to participate in the current Designscholar online learning community for the fall 2008 semester. This mailer contains information you will need for your students to get started. Enclosed are the informed consent forms from the University of Florida for the participating students to sign, along with a stamped return envelope to mail them back at your convenience. I have included a handout for each student with my contact information, which also explains how to log onto and access the Designscholar website http://designscholar.unlocklearning.net . The participation of you and your students is such a great help in validating this study and helping me achieve my ultimate goal of degree completion. Your assistance is greatly appreciated.

If there are any questions, please feel free to contact me at marloransdell@yahoo.com or 850-508-5061.

Thank you and I hope you have a great semester,

Marlo Ransdell
Doctoral Candidate
Department of Design, Construction, and Planning
University of Florida

Instructor Guide

Instructor's Guide to Designscholar

What is the purpose of the study?
The purpose of this study is to assess the effectiveness of an instructional module on developing creative thinking about design research. The module, *Designscholar*, has been created to promote online interaction among interior design graduate students at different universities.

Who is involved in the study?
Graduate students in interior design from three land grant universities--the University of Florida, Iowa State University, and Washington State University--will participate in this on-line learning experience. All of these programs have been highly ranked by *DesignIntelligence* in the past five years, and offer comparable degrees that are housed within Colleges of Design across three regions of the United States.

What is involved in this study?
Students will complete 2 online surveys, a Demographic and Background Survey and the Work Preference Inventory. They will write a short design research essay the first week and again the sixth and final week of the module. They will also be involved in weekly online discussions that center on design literature. Each week students will be directed to different databases and journals to find and read appropriate articles for the online discussion groups. Here are the sources that students will use:

- These will be Informedesign.com (week 2),
- *Journal of Interior Design, Design Issues, Design Studies,* or *Environment and Behavior* (week 3),
- Other peer reviewed journals in allied fields (week 4)
- Thesis from the students' home department or program (week 5).

This information should be given at the introduction of the module to allow students time to find all the necessary literature for the module.

What is my role as an instructor?
All information about the module is detailed in full on the website. The instructor will introduce the module and ultimately assign a participation grade. The instructor is welcome to join the website in order to monitor students, but is asked to not participate in the discussions.

How do I login to the site:
1. Visit: http://designscholar.unlocklearning.net
2. Create an account by choosing a username and password and entering your email contact information.
3. You will receive an immediate email containing a link to follow to complete your account.
4. Your enrollment key is: **research.** This will be entered when completing your account.
5. You are now ready to access the Designscholar Online Learning Community.

How do I grade student involvement in the module:
Each instructor will be sent a spreadsheet at the close of the six week study with information about their participating student involvement. This spreadsheet will track the frequency and the timeliness of involvement. This information will show if students met the basic requirements of participation in the module activities.

Where do my students and I go for questions or problems related to the site or module?
Please contact Marlo Ransdell anytime at marloransdell@yahoo.com or at 850-508-5061.
Major Professor Meg Portillo can also be contacted by the instructors at mportill@ufl.edu .

Student Handout

DESIGNSCHOLAR
CONTACT AND LOGIN INFORMATION

Visit: http://designscholar.unlocklearning.net

Create an account by choosing a username and password and entering your email contact information.

You will receive an immediate email containing a link to follow to complete your account.

Your enrollment key is: **research**

You are now ready to access the Designscholar online learning community.

For questions or further information please contact
Marlo Ransdell at marloransdell@yahoo.com or 850-508-5061

Informed Consent Document

Protocol Title: *Designscholar*: Examining Creative Thinking in an Online Learning Community for Interior Design Graduate Students.

Please read this consent document carefully before you decide to participate in this study.

Purpose of the research study:

The purpose of this study is to assess the effectiveness of an online instructional module (Designscholar) on promoting creative thinking about design research.

What you will be asked to do in the study:

You will be asked to register online at http://unlocklearning.designscholar.net for participation in the study. The first week will require 2 surveys, the Work Preference Inventory to assess motivational orientation and a short demographic and background survey to assess demographics and expertise. You will also be asked to respond to two essay questions of "Why is design research important to the field?" and "What are my interests in design research?". After this you will be assigned to a small 3-4 person groups based on your design interests. These groups will be used for the remainder of the study. During the following 5 weeks you will be asked to read design related research articles. You will find and read one article each week and post a summarized response to the article to the online discussion for your group. You are also asked to respond to each of you peers within your group on their research article dicsussion. During the last week of the study you will be asked to write two essays on the following questions: "With your new understanding from the online discussions, why is design research important to the field?" and "What are your interests now in design research and have they changed after the online discussions?"

Time required:

6 weeks.

Risks and Benefits:

There are no risks associated with participating in this study.

Compensation:

You will not be compensated for this study by the investigator, but you will receive a participation grade for taking part from your instructor at your University.

Confidentiality:

Your identity will be kept confidential to the extent provided by law. Your information will be assigned a code number. The list connecting your name to this number will be kept in a locked file in my office. When the study is completed and the data have been analyzed, the list will be destroyed. Your name will not be used in any report.

Voluntary participation:

Your choice to participate in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study:

You have the right to withdraw from the study at anytime. Your instructor at your University will assign a participation grade, so this should be addressed to them. There is no penalty assigned by the website or the principal investigator.

Whom to contact if you have questions about the study:

Marlo Ransdell, Graduate Student, Department of Interior Design, University of Florida.

Address: 1733 River Birch Hollow, Tallahassee, Fl, 32308

Phone: 850-508-5061

Email: marloransdell@yahoo.com

Supervisor: Dr. Margaret Portillo, Chair and Associate Professor, Department of Interior Design, University of Florida

Address: P.O. Box 115703, Gainesville, FL 32611-5703

Phone: 352-392-0252 ext. 334

Email: mportill@ufl.edu

Whom to contact about your rights as a research participant in the study:

IRB02 Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; phone 352-392-0433.

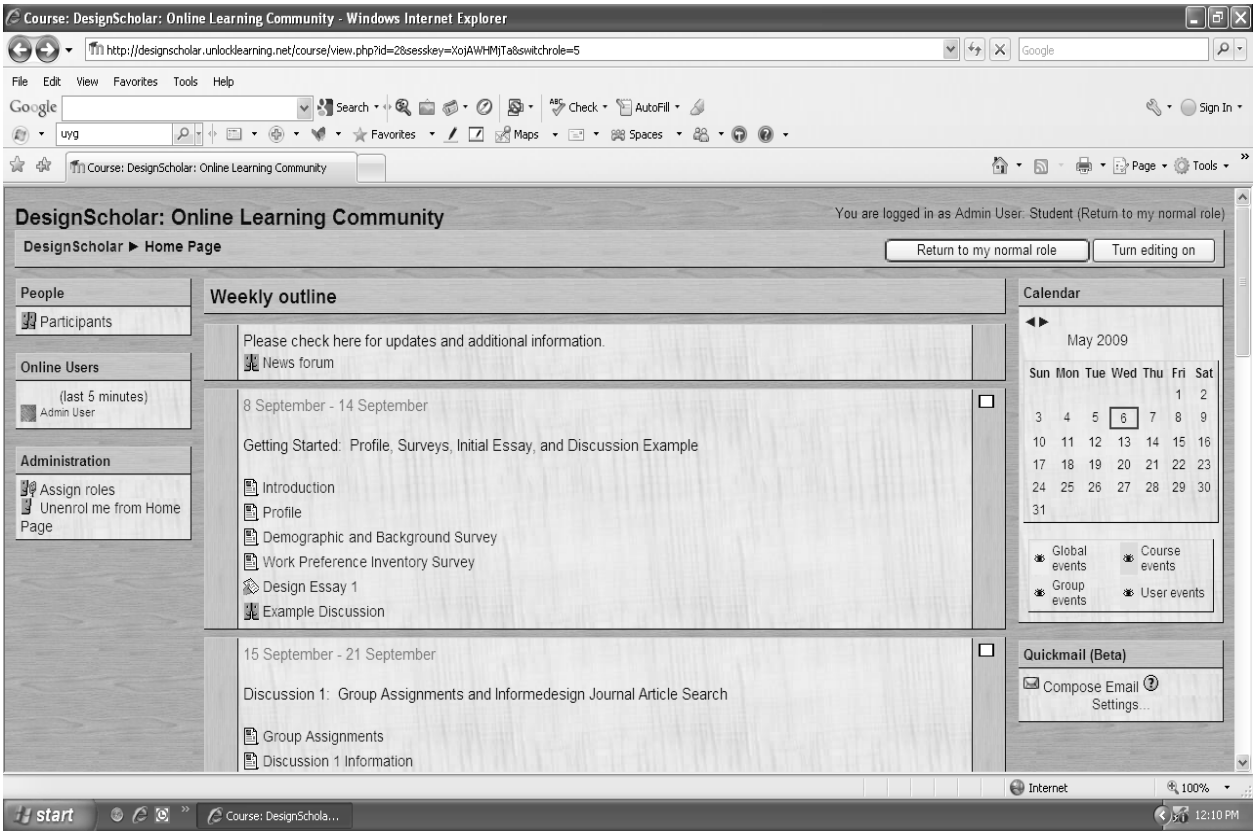
Agreement:

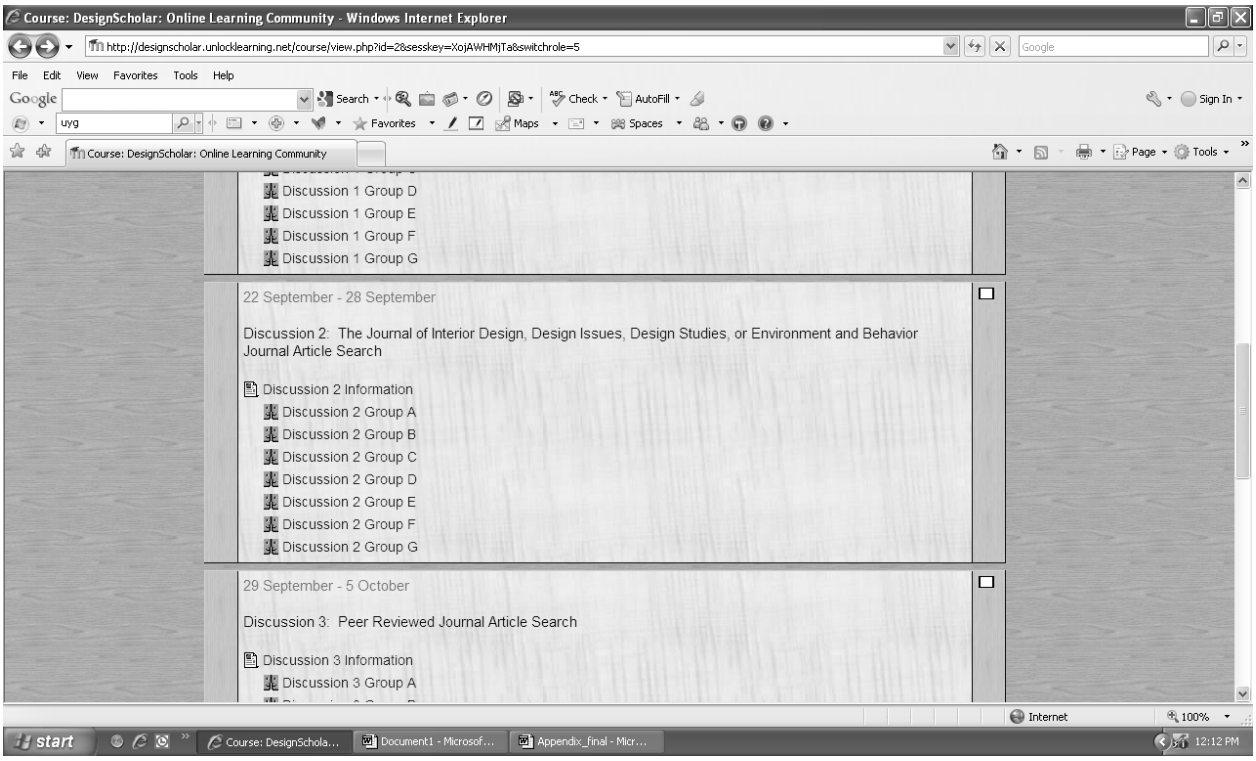
I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant: _____ Date: _____

Principal Investigator: _____ Date: _____

APPENDIX G
SCREEN SHOTS OF DESIGNSCHOLAR HOMEPAGE





APPENDIX H
SCAFFOLDING EXAMPLES

Discussion Example 1

Student	Online Discussion
Student A Post	Key Concepts and/or quotations - After reading, writing, and sharing narrative stories as part of the design process, students indicated that the process helped think about space more holistically; aided them in overcoming their own biases; facilitated emotional connections with space; and encouraged more collaborative, detailed work. - Many students indicated they may use narratives in the design process in their professional practice, particularly as a tool to communicate ideas to clients. However, few students voiced concern that the narrative methods may be well-received in professional settings. Once student believed the narrative interventions had a negative impact on the design process. Why this is noteworthy - The authors believed that there is a new design philosophy in a holistic way to make the potential benefits of using "storytelling" methods in the design process. The article mentioned few approaches: - This design philosophy would convince people especially design students and professionals to involve a human-centered design method. - The authors felt that the previous research of using narratives may expand the understandings of human-centered design issues and improve interpersonal and leadership skills. - Narrative methods prefer use verbal thinkers – this is a new design challenge for the visual learners. What this means to me - This new design method may be becoming a 'trend' in the design education, however the participants' responses brought me a concern. These positive and negative responses may affect these students' traditional ways of thinking. - *"The story forced us to focus our thoughts and clarify concepts…"* - *"I believe that stories pushed our thinking to a greater level…."* - *"The use of stories in studio had a big impact on my choices…."* I believe that students and professionals should try this design method to see if they are willing to move out of their comfort zone. However, my findings from these sources show many students are favoring to avoid this design method in order to save their "traditional thinking" and at least, their future design careers. Let me ask all of you a few questions: 1. Visual learners (or picture thinkers) or verbal thinkers? *(I'm pretty much visual thinker than seeing "floating words" in my head).* 2. Are you willing to try this narrative method? *(I am willing to try this method, but it is highly likely to go back to my old-fashioned visual thinking).* Article - Danko, Sheila; Meneely, Jason; Portillo, Margaret. "Using Narratives in the Design Process". Referred from the InformeDesign. "Humanizing Design through Inquiry". The Journal of Interior Design, Volume 31, No. 2, pp 10-28.
Student B Responds	This is a great topic. I believe that I am a combination of both but more so a visual thinker. In design, for example, I can visualize exactly what a room should look, smell, feel like and I make design choices to reach that visualization. However, because I have a learning disability, somethings like new words or words in a foreign language I have to see the word a few times before I can make the connection of what it is and how it is constructed even if I spell it the first time I see it. I would like to try to use the story telling method of learning. I think it would be interesting to see if that allows for a more creative process to designing

Student C Responds	I must be a combo learner. I see things visually, for the most part, but I also see words when I try to recall information. I think often it is helpful to create narratives about the potential occupants of a space (especially when they are too numerous or are not available for face-to-face interview... like in a hotel or hospital). Narrative creation is a really neat process--I incorporated it into my undergraduate thesis as well. It is interesting what you can create when you design a space to tell the story of its occupant. Check out the book "Story Starters" for help developing a narrative--for fun or for design.
Student A Responds	To me, this concept is a lot like explaining our perspective drawing in class to someone else. We are forced to be extremely articulate and justify each design decision. While we also explain our design decisions when presenting a project in class, I think this method would force us to analyze our work more intensely.

Discussion Example 2

Student	Online Discussion
Student A Post	Key points: This article looks at the increasing use of computer rendered presentations in design education compared to hand rendered presentations, how the manner in which a studio project is presented affects the final assessment or grade."...one of the debate areas indicates the problem that fully supporting computer aided presentations in design education is feared to lead to the loss of hand drawing skills in time". The authors evaluate this debate by braking down possible negatives of computer rendering compared to hand rendering into three areas: (1) loss of author identity: "the traceable features in a drawing that distinguish the author of the design/drawing from the others" (2) problems on authenticity: "the authenticity of a drawing is directly proportional to its capacity to reflect the author's identity." (3) proficiency of the instructor(s) in computers: "the expectation of a gap between the instructors with hand drawing backgrounds and students skilled in computer techniques". After questioning students and teachers, they found that students prefer a combination of hand and computer rendered presentations, although sometimes the computer techniques used in drawing may "cast shadows" on the overall design content and that it is possible for presentation to loose the character that would have been gained from hand rendering. They all "agreed on the fact that computers will be dominant in the design practice, yet that does not seem to be so for design education...hand skills will preserve their value in the near future". There are also obvious problems with using computer rendering when the skill level is poor, that the student uses the computer "as a scapegoat....'The computer did it!'" "...the devotion of hand drawing in academia does not stem from pure conservatism. It is the warmth of the hand touch that is sought for...the anxiety is partially based on the suspicion that computers might be dragging the whole act of design towards a more-engineering look. As much as practice and academia shift to computers, the value of hand touch increases that much, in inverse proportion." What this means to me and the field: First of all, I'm glad to see that there is literature out there on this subject, as we are presently involved in this debate and are constantly concerned with developing both our computer and hand skills. There are also several factors which this article does not address such as other important attributes of hand rendering and how this whole debate translates to professional practice. One of the biggest arguments is that hand skills are invaluable when dealing with clients. Not everything is a one-time studio presentation. Clients will disagree and request that the design immediately start working out other possibilities. The design that can respond with an informative sketch on demand will be the most effective. It would be incredibly helpful for a study to be conducted among the top designers to see how computer and hand rendering is evaluated. Article: "The (in)secure position of the design jury towards computer generated presentations". *Design Studies*. Vol. 26 No. 3 May 2005.
Student B Responds	I know we always talk about this topic, and I am glad that you found this article valuing the hand skills. Read my blog about graphic facilitation this week, it goes along with your interest. So far, I have found that understanding and having the ability to hand render has helped tremendously in learning computer aided drawing as well. Sketching is the backbone of all visual media and to lose or never learn this ability is sort of like handicapping oneself...

Student C Responds	I too think that sketching is the backbone of communicating a visual idea. I wish there was more information out there indicating which skill will be more used in the work force. I know that computer drawings are the "wave of the future", but hand rendering I find to be my favorite part and I actually really dislike using VIZ. Although it might add a more "realistic" view of the space, I feel it makes it too technical and no longer connected to the designer and the client.
Student D Responds	To add to Student C… I think that computer renderings also make the client feel like the design in set and final, whereas hand renderings have a way of communicating flexibility in the design solution. So many students these days see CADD and VIZ and other computer software as the begin all / end all tool to designers. The value of hand skills are rarely given their due. For me hand rendering is basically an art form. The "realistic" look you get with the VIZ software actually looks to cold and unfriendly. I think that the human hand adds the “author’s identity” or personality to the piece that gives it passion and life. Give me hand-rendering any day please.
Student A Responds	I definitely agree that there is a loss of the "author's identity" when it comes to CAD/VIZ drawings. I have used both, and I also feel that sometimes it is the combination that makes a presentation better. I sometimes use CAD/VIZ to determine the exact sizes of things, but then I will trace over them, and hand render. This is a great way to combine the advantages of computer renderings with the feel of hand drawings. I think that the computer also exaggerates certain things(intensifying colors, or allowing the user to create unrealistic materials). All in all, I think that any user has more control if they are doing things by hand. I value things a lot more if I created them, or rendered them myself. I chose this article because I see the relevance in the field and in our current education.
Student D Responds	I thought I would also add one of my experiences. I recall the first time I handed a client my "shop drawings" for a rather complex project. I only do hand drawings for renderings. I'm not a purist by any stretch: I just stink at Autocad or any of the other software choices. I found after trying to teach myself Autocad for the seventeenth time I tended to simply grip the mouse tighter hoping for some sort of high-tec osmosis to happen between me and the evil Autocad beast. Once I decided to just shelve the software my road to calmed nerves and overall health was a short one with a nice cul de sac at the end. My clients chuckle at the novelty hand rendering everything seems to be, but I usually win the project and there is no denying that I am the artist/author of the renderings. Would the sketches and drawings of Frank Wright be as treasured if they were a .DWG file? HA! (rhetorical)
Student A Responds	What a great thought about FLW drawings!! Hand renderings have a way of being seen as art as well as communication, where computer drawings are more likely to be seen as final representations of space. The artist is removed from drawings because anyone could create the same line, color, and texture with the computer.

APPENDIX I
DESIGN RESEARCH ESSAY: STUDENT EXAMPLE

Pre-Test Rubric

Pre-Test Essays / Participant # 22A Reviewed by TK Date 10/01/08

Question 1 – What is design research and why is it important to the field?
Overall Creativity Score 7

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Question 2 – What are your interests in design research?
Overall Creativity Score 7.5

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Pre-Test Example

Research Knowledge – What is design research and why is it important to the field?

Design is the production, which is conceived as a built form, responding to clients, programs, budgets, and other "real-world" factors. Design research is the activity that is contained in design process to find applicable, reasonable, and solid strategy, tactic, hypotheses based on literatures or case studies. During design process, we see this back-and-forth activity between design research and concept, schematic, and design development stages. Design research is certainly important in design activity since it tests and informs validity and reasons for design activity.

I see Interior Design as an applied practical and direct human-environment-interactive art discipline. The art of interior design is functional and leads to the enhancement of the quality of life and culture of occupants. I believe that understanding the relationship between environment and human is the most important aspect in an Interior Design. As we all have heard of, we spend most of our life in an indoor environment. Consequently, it is necessary to study how the certain indoor environment has impact on human behaviors and activities.

Interior Design is often perceived as either subordinate of architecture or decorating practice which has emphasis on aesthetical attractiveness of an indoor space. These perceptions are result of lack of design research in Interior Design. It is no doubt that Interior Design contains critical link to create successful indoor environment with deep understanding of human factors and exterior context. Understanding the relationship between human behaviors and environment cannot solely rely on designer's intuitive and creative thinking. It requires rigorous design research that informs tactic, strategy, and hypotheses. Interior Design always deals with human welfares and public safety which are very important in everyday human life. In that respect, it plays critical role in creating livable environment and enhancing the quality of human living. By design research, the analytical and logical design activity, Interior Design establishes credibility and concrete reasoning which further becomes plausible and solid academic discipline, promoting effective solution to Interior Design problems.

Research Interest – What are your interests in design research?

My interest in design research is looking at health and movement in work environment. In health aspect, I focus on increasing problem of obesity. The health problem of obesity is major issue across all generation. Work environment is experiencing diversity in generations and their differences. Consequently, my design research concentrates on finding out why increasing problem of obesity is such a threat to health and well-being of people in work environment across generations and how Interior Design can ameliorate the problem. Research shows that regular exercise is one of best strategy to fight obesity. Looking at the elements of physical environment, promotion of movement becomes effective tactic in fighting obesity. By considering effectual space planning and understanding internal and external context, I plan to develop design guide that promotes movement in work environment to fight increasing cross-generational health problem, obesity. The challenge of my design research is finding out tactics and strategies of accommodating both promotion of movement and productivity in work environment.

Post-test Rubric

Post-Test Essays / Participant #: 22A Reviewed by: TK Date: 11/14/08

Question 1 – With your new understanding from the online discussions, explain why design research is important to the field.

Overall Creativity Score 16.5

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Question 2 – What are your interests now in design research and have they changed after the online discussions?

Overall Creativity Score 14.5

Creative Thinking	N/A	Very Low	Low	Average	Above Average	High	Excellent
Fluency: Amount of ideas presented Comments:	0	1	2	3	4	5	6
Flexibility: Detail of ideas presented Comments:	0	1	2	3	4	5	6
Originality: Uniqueness or rarity of ideas presented Comments:	0	1	2	3	4	5	6
Elaboration: Richness of language presented Comments:	0	1	2	3	4	5	6

Post-Test Example

Research Knowledge – With your new understanding from the online discussions, explain why design research is important to the field?

Design research is important because it informs design. Design becomes logical and clear based on rigorous design research. Without thorough research on certain topic, argument cannot be made to enrich your design. If the design does not have logic and reasons behind it, it does not make sense which becomes a bad design. Design research also guides and makes you more knowledgeable about the certain topic you are interested in. Design scholar was particularly another means of research process. It had a value in that under the one umbrella of topic, there were different means of the topic. For example, in my group A, the umbrella was work environment, and there were people looking at air craft interior, hospital, and home environment to interpret what "work" means to us linking to various interior environment characteristics. Looking at various possibilities of work environment certainly broaden my viewpoints about my research.

I am personally familiar with work environment and lighting. For work environment, as I discovered, it does not pertain in office environment. It can be air craft, home, hospital, or school. I think we can call everyday living itself is working in a way, so the boundary of work environment is limitless. The physical characteristics of work environment are some of valuable details that we as designers should consider when we approach to design workplace. People tend to work better in comfortable space. And, that is what we need to research. What kind of physical environment make people feel comfortable and satisfying to work? Many researches show that there needs attention for spatial organization, architectonic details, ambient conditions, resources, and view or visual access of the environment. So, question is whether those physical characteristics are only applicable for the work environment. The answer is no. These can be applied to any other environment.

Lighting is another topic that gains a lot of attention in terms of sustainability, energy efficiency, health, and beauty in these days. Lighting is one of elements in ambient condition. Consequently, as you can see, these topics are all related closely in certain distances and influence each other in various degrees. So, what do we need to do about design research as designer? More researches we do, more valuable relationships of these elements we can find. Design always needs to focus the big picture of the human context relating design context. Design cannot solely stand alone without human context. Whether it is social problem or political problem, we need to define the challenges/problems in human context, research about the causes of the problems, address the problem in design context which becomes design solutions.

To get to the solution, design research is crucial. Without understanding the context of the problem and precedents, how can we approach to design which means we will suggest a new way? Interior design is the study that informs how human will live and work in an indoor environment. It plays critical role in creating livable environment and enhancing the quality of human living. By design research, the analytical and logical design activity, Interior Design establishes credibility and concrete reasoning which further becomes plausible and solid academic discipline, promoting effective solution to Interior Design problems.

Research Interest – What are your interests now in design research and have they changed after the online discussions?

My interest in design research has been changed dramatically from the beginning of design scholar. I definitely gained various insights and got to find out that there are so many interesting research topics out there that I have not been exposed to.

My research topic is the millennial generation (born 1980-1999) and work (office) environment. In this research, I examine physical characteristics of work environment and sociological aspects of the millennial generation. I find that one research topic cannot stand by itself, but many other researches inform the research that I try to get to. Some of detail points I need to study about physical characteristics would be spatial organization, architectonic details, ambient conditions, resources, and view or visual access of work environment. Since I am linking these properties to the characteristics of the millennials, I need to find out how the characteristics of one generation are reflected in the work environment. In order to do that, I will study precedents' cases on work environment, and find out how values and characteristics of particular generation either affected or are considered in the design of work environment. Consequently, my research is adding another chapter of work environment design for this new generation, the millennials.

This is very valuable study in workplace design and also any interior that considers the population of the millennials. Especially, seventy-six million of the millennials are entering the workplace, the workforce is expecting some changes. There are significant differences among generations in characteristics, values, and experiences. Many companies are concerned about potential collisions between the millennials' needs and wants and what is provided in the current workforce. Consequently, there is a need for research about the relationship between the current physical workplace and the millennials' unique characteristics, values and culture that would inform what kind of changes are needed in designed environment to accommodate their needs and wants. This understanding of generation in spatial context can open the door for various other research topics; school or hospital work environments.

APPENDIX J
REFERENCES USED IN *DESIGNSCHOLAR* DISCUSSIONS

Topical Group References

Group Topic	Journals used (used more than once)
Workplace Design	*Design Issues; Environment and Behavior (2); Ergonomics; ICON(ASID); Journal of Corporate Real Estate (2); Journal of Environmental Psychology; Journal of Interior Design*
Retail Design	*Cornell Hotel and Restaurant Administration Quarterly, Design Issues (3), Environment and Behavior; International Journal of Hospitality Management; Journal of Interior Design; Journal of Retailing and Consumer Service; Journal of Urban Affairs*
Cultural / Housing Design	*Design Issues; Environment and Behavior (2); Family and Consumer Science Research Journal; Journal of Architectural and Planning Research; Journal of Environmental Psychology; Journal of Interior Design (2); Journal of Personality*
Sustainability Issues	*Cornel Hospitality Quarterly; Design Issues (3); International Journal of Contemporary Hospitality Management; Journal of Architectural and Planning Research (3); Journal of Interior Design*
Universal Design	*Environment and Behavior; Housing and Society; Housing, Theory, and Society; Journal of Environmental Psychology; Journal of Interior Design (3); Journal of Physiological Anthropology; Merill-Palmer Quarterly*
Hospitality Design	*Addictive Behaviors; Crime Prevention Studies; Environment and Behavior (2); Journal of Consumer Research (2)*
Healthcare Design	*Applied Ergonomics; Design Issues; Environment and Behavior (3); Journal of Environmental Psychology (3); Journal of Interior Design (4)*

Discussion 1 References

Group (n=7)	Journals discussion 1 (n=21)
Workplace Design	▪ Veitch, J. & Newsham, G. (2000). Exercised control, lighting choices, and energy use: An office simulation experiment. *Journal of Environmental Psychology*, 20 (3), 219-237. ▪ DeCroon, E., Sluiter, J., Kuijer, P., & Frings-Dresen, M. (2005). The effect of office concepts on worker health and performance: A systematic review of the literature. *Ergonomics*, 48 (2), 119-134. ▪ Pullen, W. (2001). Flexibility in the workplace: Instrumental or creative? The case of the Dutch Government Buildings Agency. *Journal of Corporate Real Estate*, 3 (2), 121-131.
Retail Design	▪ Sulek, J. M, & Hensley, R. L. (2004). The relative importance of food, atmosphere, and fairness of wait: The case of a full service restaurant. *Cornell Hotel and Restaurant Administration Quarterly*, 45 (3), 235-247. ▪ Lloyd, R. (2002). Neo-Bohemian: Art and neighborhood redevelopment in Chicago. *Journal of Urban Affairs*. 24(5) 517-532. ▪ Siu, K.W.M. (2003). Users' creative responses and designers' roles. *Design Issues*. 19 (2), 64-73.
Cultural / Housing Design	▪ Blankenship, C. (2005). Cultural sustainability in design, Outside the center: Defining who we are. *Design Issues.* 21(1), 24-31. ▪ Kahana, E., Lovegreen, L., Kahana, B., & Kahana M. (2003). Person, environment and person-environment fit as influences on residential satisfaction of elders. *Environment and Behavior,* 35 (3), 434-453. ▪ Manzo, Lynne. (2003). Beyond house and haven: Toward a revisioning of emotional relationships with places. Journal of Environmental Psychology. 23(1). 43-61.
Sustainability Design	▪ Tzschentke, N., Kirk, D., & Lynch, P. (2004). Reasons for going green in serviced accommodation establishments. International Journal of Contemporary Hospitality Management. 16(2), 116-124. ▪ Levi, D. (2005). Does history matter? Perceptions and attitudes toward fake historic architecture and historic preservation publication. *Journal of Architecture and Planning Research*. 22 (2), 148-159. ▪ Blankenship, C. (2005). Cultural sustainability in design, Outside the center: Defining who we are. *Design Issues.* 21(1), 24-31.
Universal Design	▪ Miller, A. & Maxwell, L. (2003). Exploring the role of home design in fostering family interaction: The use of programming methods in research. Journal of Interior Design. 29 (1&2), 50-65. ▪ Hansen, E.B. & Gottschalk, G. (2006). What makes older people consider moving house & what makes them move? *Housing, Theory, and Society*. 23(1), 34-54. ▪ Staff Writer, (2006). Violence exposure, IQ, academic performance, and children's perception of safety: Evidence of protective effects. Merrill-Palmer Quarterly. 52 (2), 264-287.
Hospitality Design	▪ Bellis, M. A., Hughes, K., & Lowey, H. (2002). "Healthy nightclubs and recreational substance use from a harm minimisation to a healthy settings approach." Addictive Behaviors 27, 1025-035. ▪ Thompson, C. J., & Arsel, Z. (2004). The Starbucks brandscape and consumers' (anticorporate) experiences of globalization. Journal of Consumer Research. 31, 631-642.

Healthcare Design	▪ Baskaya, A., Wilson, C., & Ziya Ö. (2004). Patient wayfinding within complex clinics. Environment and Behavior. 36(6), 839-867. ▪ Shin, J., Maxwell L., & Eshelman P. (2004) Hospital birthing rooms mothers prefer: A study of mothers' perception of hominess. *Journal of Interior Design*. 30(2). 23-36. ▪ Dijkstra K, Pieterse M.E., Pruyn A.Th.H. (2008). Individual differences in reactions towards color in simulated healthcare environments: The role of stimulus screening ability. *Journal of Environmental Psychology*, 28, 268-277. ▪ Park, N.-K., & Farr, C. A. (2007). The effects of lighting on consumers' emotions and behavioral intentions in a retail environment: A cross-cultural comparison. Journal of Interior Design , 33 (1), 17-30.

Discussion 2 References

Group (n=7)	Journals discussion 2 (n=21)
Workplace Design	▪ Danielsson, C. (2008). Office type in relation to health, well-being, and job satisfaction among employees. *Environment and Behavior*, 40 (5), 636-668.
	▪ Zukowsky, J. (1997). Design for the jet age: Charles Butler and Uwe Schneider. *Design Issues*, 13(3), 67-78.
	▪ Magee, J. (2000). Home as an alternative workplace: Negotiating the spatial and behavioral boundaries between home and work. *Journal of Interior Design.* 26(1), 35-47.
Retail Design	▪ Davies, J. (2004). Interior design: Using the management services approach in retail premises. *Design Issues*. 48(7). 10-13.
	▪ Chayutsahakij, P. (1998). The effects of lighting design on preference in the retail interior environment. *Design Issues*. 14(2). 18-26.
	▪ Waxman, L (2008). The coffee shop: Social and physical factors influencing place attachments. *Journal of Interior Design.* 31(3), 35-53.
Cultural / Housing Design	▪ Kaya, N. and Weber, M.J. (2003). Territorial behavior in residence halls: A cross-cultural study. *Environment and Behavior.* 35, 400-414.
	▪ Wang, D. (2006). A form of affection: Sense of place and social structure in the Chinese courtyard residence. *Journal of Interior Design*. 32(1), 28-39.
	▪ Danko, S., Meneely, J., & Portillo, M. (2006). Humanizing design through narrative inquiry. *Journal of Interior Design*. 31(2), 10-28.
Sustainability Design	▪ Frascara, J. (2007). Hiding lack of knowledge: Bad words in design education. *Design Issues*. 23(4), 23-37.
	▪ Wahl D.C. and Baxter, S. (2008). The designer's role in facilitating sustainable solutions. *Design Issues*. 24(2), 72-83.
	▪ Stieg, C., (2006). The sustainability gap. *Journal of Interior Design*. 32(1). vii-xxi.
Universal Design	▪ Johansen, T. H. (2007). An exploratory study of disabled tenants' level of satisfaction under the Fair Housing Amendments Act. *Journal of Interior Design.* 32(2). 28-43.
	▪ Park, N.-K., & Farr, C. A. (2007). The effects of lighting on consumers' emotions and behavioral intentions in a retail environment: A cross-cultural comparison. *Journal of Interior Design, 33* (1), 17-30.
	▪ Kahana, E., Lovegreen, L., Kahana, B., & Kahana M. (2003). Person, environment and person-environment fit as influences on residential satisfaction of elders. *Environment and Behavior,* 35 (3), 434-453.
Hospitality Design	▪ Gueguen, N., Jacob, C., Guellec, H., Morineau, T., and Lourel, M. (2008). Sound level of environmental music and drinking behavior: A field experiment with beer drinkers. *Environment and Behavior.* 32,1795-1798.
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Sustainability Design	▪ Butler, J. (2008). The compelling "hard case" for "green" hotel development. *Cornell Hospitality Quarterly*. 49, 234-244. ▪ Stern, A. L. & MacRae, S. (2003). Understanding the consumer perspective to improve design quality. *Journal of Architectural and Planning Research.* 20(1), 16-28. ▪ Zwarts, A. & Coolen, H. (2006). The meaning of preferences for residential environment feature: A case study among apartment dwellers in the Netherlands. *Journal of Architectural and Planning Research*, 23(3). 200-215.
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Cultural / Housing Design	▪ Lee, Sang Hae, (1986). *Feng Shui: Its context and meaning*. Published doctoral dissertation, Cornell University.
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Universal Design	▪ Berry, E. (2008). *Everyday habits and routins: Design strategies to individualize home modifications for older people.* Unpublished masters thesis, Washington State University.
	▪ Zhou, Y. (xxxx). *Flexible design in senior housing.* Unpublished masters thesis.
	▪ Wang, Yanlin. (2005). *Creating Positive Wayfinding Experience*. Unpublished masters thesis (M.F.A.), Iowa State University.
Hospitality Design	▪ Fernandez, M. (2005). *Crime prevention and the perception of safety*. Unpublished masters thesis, Louisiana State University.
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BIOGRAPHICAL SKETCH

Marlo Ransdell currently lives in Tallahassee, FL with her family. She teaches full-time at Florida State University in the Department of Interior Design. She earned her Bachelor of Arts Degree in Interior Design from the University of Kentucky in 2002, and completed her Master of Science Degree in Interior Design at University of Kentucky in 2004. She enrolled in the University of Florida college of Design, Construction, and Planning during the fall of 2004 to pursue her doctorate degree.