

**A game-based design studio: An exploration of an interior design studio environment  
for implementing game-based learning**

by

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The student author and the program of study committee are solely responsible for the content of this dissertation. The Graduate College will ensure that this dissertation is globally accessible and will not permit alterations after a degree is conferred.

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**DEDICATION**

I dedicate my dissertation work to my husband, Firas Shalabi. He has never left my side throughout the entire journey of my doctorate program. There are not enough words to express my gratitude to him. This work and degree would not have been possible without his emotional and physical support with our child, Leya, and household. I thank him for the many, many hours and chores he took on so I can get to my classes, complete classwork, work on my dissertation and have a successful career. Firas and Leya, thank you for being my best cheerleaders for the past six years.

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## CHAPTER 1. INTRODUCTION

The design studio is an active, participatory, and experimental learning environment. Since the 19th century, the studio has been a place for learning through doing with a community of peers seeking knowledge, skills, and a space for unleashing creativity. The advancement in teaching and learning has shown to address a variety of instructional issues in a variety of fields using digital technology and innovative pedagogies. The design studio, despite its many affordances, has been criticized over the past decade for multiple reasons. This three-article dissertation focuses on using the game-based learning (GBL) pedagogy to address three instructional issues in interior design studios; time management and workload distribution, high dependency on the master-apprentice model, and ambiguity of assessment measures of student work. Each of the three articles stands as an independent piece of scholarly work. Yet all articles complement each other in multiple ways. In the following sections, I introduce each article and elaborate of aspects that are distinguished and specific. I also attempt to explicitly make the connections among all three articles and how they build upon each other.

### **Article 1: Game-based Learning Approaches and Instructional Challenges in Design Studios**

The first article is a conceptual piece and attempts to identify and discuss literature supporting the presence of instructional issues in the traditional design studio pedagogy and proposes a framework to address them. The framework builds upon the activity system theory and the affordances of game-based learning to develop a structured studio environment to nurture skill acquisition, increase student engagement, and improve their learning experience.

The article summarizes the different definitions of design studios as a learning environment, and attempts to develop a definition taking the activity system theory perspective. It then elaborates on specific deficiencies in the design studio pedagogy, and displays

affordances of game-based learning as a structuring component to the different elements and activities within the studio environment. The article also discusses the several and specific applications of game-based learning elements and attributes to address the identified studio pedagogy deficiencies.

The audience of this conceptual article are mainly design educators interested in implementing innovative pedagogies such as game-based learning in their studio environments. The framework proposed strikes a balance between the systematic and the creative aspects of the design process; activity theory defining studio elements, while game-based learning engages students. Future directions for this research include conducting research to identify the process behind designing game-based learning environments within studios, and to understand students and instructors' perceptions of such an approach, therefore informing implications of such pedagogies for the future of interior design and design education.

The second article in this dissertation addresses the design process of game-based learning environments in design studios, while the third article is a case-study of an interior design studio where game-based learning was implemented.

### **Article 2: Design and Evaluation of a Game-based Interior Design Studio**

The second article, an instructional design piece, builds upon the framework developed in the first article and explains how it can be used to design a game-based learning environment for a design studio. The course described in the article is an undergraduate level interior design studio course that was delivered mainly face-to-face while using an online learning management system as the arena of the game-based structure. The article highlights the importance of taking a multidisciplinary approach between game design, instructional design, and learning theories to the success of game-based learning environments design.



To build the design approach of the course on a theoretical foundation, the article employs both the experiential learning theory and the activity system theory to describe how game-based learning elements and attributes can be employed to address instructional issues in design studios. The course design approach aligns the Quality Matters Rubrics Standards, game-based learning elements and attributes, and interior design studio strategies. The paper finally provides a summary of the course design evaluation and suggestions for improvement via feedback from a professional instructional development specialist and students who used the course.

The audience for this article is educators interested in design education, game-based learning environments, and instructional design. The significance of this piece stems from the lack of comprehensive and identified approaches to design game-based learning environments where students are not playing games to learn, but rather become immersed in a game-like structure to benefit from game-based learning affordances. Also, this article is an example attempt to evaluate game-based learning environments using instructional design best practices. The lack of evaluation tools for the design of game-based learning environments suggests benefiting from well-founded disciplines such as instructional design, along with its affordances of highly valid assessment tools and rubrics.

### **Article 3: Game-based Learning in Interior Design Studios: A Case Study**

The third and final article is an empirical piece that employs a case study methodology to understand perceptions of interior design students after using the game-based studio course designed and developed in Article 2. In this article, I attempt to understand and create meaning of the perceptions of six undergraduate students enrolled in an interior design program at a public university, who used the game-based studio approach over a period of 16 weeks. This

article focuses on fully explaining the research design of the case study methodology. It provides detailed description of data collection and analysis measures, issues of trustworthiness, sample description and demographics, the study's limitations, and several other aspects of qualitative research. The article condenses the categories of codes that emerged from the data into five major themes. Participants quotes support the five major themes which further expanded upon to arrive at the study's main findings. The findings are synthesized to provide instructors interested in using game-based learning for design studios with considerations for the design, development, and implementation of the approach. The highly iterative and adaptive nature of the game-based learning approach highlights the importance of these considerations to better inform instructors of challenges they may face, or modifications that may need to adopt.

The audience of this third article are educators and qualitative researchers. The considerations provided at the end of the article can inform the work of practicing educators. This piece of research can show some of the implications of using innovative pedagogies in non-lecture, open-ended problem solving courses, which extends the applications of such approaches beyond the traditional lectures and lab educational environments. Additionally, research in game-based learning is mainly focused on measures of achievement and effectiveness of instruction. Therefore, researchers in the field of game-based learning may find this piece significant due to the use of qualitative methods to understand participants' perceptions rather than impact on achievement. The three articles in this dissertation provide independent yet congruent perspectives on design education, game-based learning, and learning theories.

## **CHAPTER 2. GAME-BASED LEARNING (GBL) APPROACHES AND INSTRUCTIONAL CHALLENGES IN DESIGN STUDIOS**

Modified from a paper published in  
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### **Abstract**

The design studio pedagogy has long been a topic of controversy in the field of design education. This paper attempts to identify instructional issues in the traditional design studio pedagogy and proposes a framework to address them. The framework is based on developing a studio activity system using a game-based learning (GBL) approach to structure the different tasks and actions nurturing skills acquisition, increase students' engagement, and extend their communication. The framework can be beneficial to educators who wish to implement innovative pedagogies and instructional strategies in educational settings are based on creative learning and experimentation.

## Introduction

The pedagogy of design studios has long been a topic of change and controversy in design education due to interdisciplinary influences from fields such as educational technology (Franz, Lindquist, & Bitner, 2011; Ku, 2016). Despite the current and continuous adaptation of instructional and educational technologies in a variety of educational fields, design education seems to be one of the late adopters (Cho & Kim, 2015). Current studies support the need for further research into the dissemination of knowledge from fields of educational technology to other disciplines such as design and engineering (Hokanson & Gibbons, 2013; Nelson & Annetta, 2016). This paper attempts to identify gaps in the traditional interior design studio pedagogy and proposes a framework to address these gaps using a game-based learning (GBL) approach within an activity system theory.

Design education that is based on the master apprentice model has proved to be problematic over the years, especially in terms of the structures of studio courses and how they affect student time management (Belluigi, 2016; Boling & Smith, 2013; Edstrm, 2008; Findeli, 2001; D. Smith & Lilly, 2016; K. M. Smith, 2013; Wang, 2010). Research shows that the personal, subjective, illogical, and not cumulative process of design pose challenges to both educators and students (Wang, 2010). This paper reviews a significant body of literature from 1980 until today, identifying and discussing critical instructional issues in the interior design studio structure.

To ground this research in theory, I have adapted an activity system theory perspective. This perspective defines the studio-based learning environment is an activity system that incorporates a sense of community, actively engaged participants, and activities (Engestrom, 2001). The activities can be categorized into those requiring physical skills such as construction

and artistic expression, and those requiring cognitive skills such as communication and inquiry (Dewey, 1915). GBL as a pedagogical approach can provide a structuring framework for these activities while increasing students' engagement, extending lines of communication, and enhancing decision-making processes. Game based learning has broken the monotony of traditional education and proved to be a successful pedagogical approach to learning and teaching (Kapp, 2012; Kiili, 2005; Pivec, Dziabenko, & Schinnerl, 2003; Prensky, 2005; Van Eck, 2006). It has been shown to result in better attitudes towards learning, increase student motivation, fosters higher-order thinking, and impacts decision-making processes (Kapp, 2012). Within design studios, game-based learning can be employed to help students in several ways. Using clear rules, goals and taking advantage of GBL's adaptability as an approach can help students acquire skills to develop strategies for time management and workload distribution. It can also help them understand the complex and intertwined processes of a design project without the immediate need for the instructor's presence. This aids in overcoming the reliance on the master-apprentice model through incorporating clarified learning outcomes, needed scaffolding and timely feedback. Game-based learning may also equip design students with ability to conduct sophisticated analyses to overcome issues of ambiguity in evaluation criteria through clarifying goals, expectations, and learning outcomes.

In conclusion, this GBL framework can benefit design educators who are interested in implementing innovative pedagogies in their studio environments while following an activity-based system for the intended actions and tasks. The affordances of the game-based learning approach along with the structure provided through the activity system theory fits well into design studio environments where a balance is required between the systematic and the creative aspects of the design process. Future directions for this research include conducting a case study

to understand students and instructors' perceptions of such an approach, and informing implications of such pedagogies for the future of interior design and design education.

### **Definition, History, and Challenges in Design Studio Pedagogy**

#### **Definition of the Design Studio**

The design studio can refer to the creative conceptual and practical process of design (Broadfoot & Bennett, 2003). After reviewing the literature, three scenarios emerged for defining design studios as a pedagogical approach. The first defines the studio as an opportunity for materialistic experimentation through creative reflection and collaboration (Blevis, Lim, Stolterman, Wolf, & Sato, 2007; Wolf, & Sato, 2007; Schön, 1984; Yurtkuran & Taneli, 2013). The second defines the studio as a culture of systems that are self-organizing and enable an open-ended process of discovery under the direction of the instructor (Findeli, 2001; Senturer & Istek, 2000). The third describes design studios as an environment for cultivating a collection of critical elements/ skills that prepare students for their future professional careers (Kuhn, 2001).

Despite the different elements between the three scenarios, they share several common aspects of identifying essential skills necessary for students to hone in a studio environment. First, communication among students and with the instructor is a valuable skill to be developed in a studio environment (Ledewitz, 1985; Schön, 1984; Valkenburg, 2001; Wang, 2010; Yurtkuran & Taneli, 2013). It is with communication that students can deliver and demonstrate their ideas verbally and visually to instructors in preparation for their future careers when they would need to sell paying clients on their design ideas. Second, collaboration is also a significant skill for students to acquire (Gross & Do, 1997; Valkenburg, 2001; Wang, 2010; Yurtkuran & Taneli, 2013). Students' collaboration with each other in a studio environment allows them to

develop teamwork strategies that would benefit them in their future careers. Third, creativity and self-expression provides students with tools to develop and create design proposals that are innovative and individualistic (Micklethwaite, 2005; Wang, 2010). Finally, Research skills play an important role in informing the design process (Ledewitz, 1985; Yurtkuran & Taneli, 2013). Students' ability to perform accurate research is critical to making well-informed decisions throughout the design process.

### **Brief History of Pedagogy of Design Studios**

The traditional format of the design studio in disciplines of architecture, interior design, landscape architecture, urban planning, graphic and environmental design has originally stemmed from the pedagogy used in the French school of fine arts in the nineteenth century (Carlhian, 1979; Kuhn, 2001). The pedagogy of the studio was mainly structured into three phases: conception, development, and assessment (Carlhian, 1979). Ledwitz (1985) elaborated further on the methodology of the design process by describing it as a linear, rational and positivist approach to problem analysis and synthesis.

During the past decade, scholars have depicted a shift in design pedagogy (Wang, 2010). The design process is no longer perceived in a problem-solution continuum, but rather a holistic system that requires the introduction of artistic and scientific approaches. This shift requires a change in the role of the designer from working against the questioned system to working with it to accomplish the needed change (Findeli, 2001). It also calls for a change in thought and practices of the design studio pedagogy to borrow and learn from other disciplines. Design educators can benefit from other disciplines by using approaches that may address instructional

challenges effectively, while keeping in mind the changing needs and advancements of today's learners in terms of technology use in learning and teaching.

### **Status and Challenges in Design Studios**

To understand the current status and challenges that are critical to the design studio pedagogy, it is important to first comprehend the sequence of tasks in a traditional design studio. Sara Kuhn (2001) explains the process in a simple but effective manner. Students work on open-ended, ill-structured problems through taking on a project (or two) within a single semester. Throughout the semester, students develop a set of multiple responses to the problem on hand. These responses gradually change while increasing in complexity as the semester passes in accordance with students' changing understanding of the problem. Students receive feedback through continuous critique sessions that take place with the instructor(s), peer students, and visiting experts or jurors. A two-way exchange of materials usually takes place throughout the course of the project(s) or semester. Instructors use multiple resources and media to provide students with needed knowledge and constraints to continue with their projects. Students also use multiple forms of media and visual communication tools to demonstrate their ideas and progress in addressing the project's problem.

As interactive as the description of the design studio instructional processes may seem, it is not always performed in such manner. Studio-centrality in design education has been criticized for a variety of reasons including: (1) student workload distribution, (2) heavy reliance on the master-apprentice model, and (3) the ambiguity of assessment measures.

**Student workload distribution.** The time allocated for studio sessions within the curriculum for different design disciplines has been continuously questioned and criticized (K.



M. Smith, 2013, 2015; Yurtkuran & Taneli, 2013). The nature of the studio process forces students to commit their time and effort on semester basis leading to wasting too much time in the studio session itself (Kuhn, 2001; Moore, 2000). Therefore, reflection and collaboration, which are critical aspects of experiential learning in studios (Schön, 1984), are not performed which contributes to less than an effective learning experience (Groat, 2000). According to a study by Smith (2013), interior design students have “overwhelmingly identified that getting studio projects done within the time permitted was one of the major difficulties they faced through-out their undergraduate design education experience.” The mismatch between the workload and the time allotted is obvious (K. M. Smith, 2015), which adds to the inefficiency of the traditional design studio format.

**The master-apprentice model.** The master-apprentice model has been a dominant pedagogical approach in design education (Ghassan, Diels, & Barrett, 2014 2014) since it had been first introduced in the medieval guilds of craft artisans in the thirteenth and fourteenth centuries (Souleles, 2013). Although teaching and learning through apprenticeship has proven its effectiveness in transferring skills from the instructor to the learner, it fails to be a realistic approach to apply along with current expectations of learners. The apprenticeship model requires a very small ratio between instructor and learners, where in-time feedback and knowledge can be easily facilitated (Collins & Kapur, 2014). However, with the increased number of students enrolling in higher education programs today, it becomes difficult to provide a customizable and personalized learning experience for every student in traditional face-to-face settings.

On the one hand, and more specific to design studios, using the master-apprentice model seems to encourage a sense of a *following* of the instructor (Glasser, 2000). If not careful enough, the educator could end up influencing students’ work and guiding them in a direction that

matches his/her design thinking and style. This would eventually result in a very homogenous group of students and place limits on students' individuality and personal development.

On the other hand, applying the master-apprentice model in a studio environment extensively can result in misinforming the educational process when instructors try to conceal the design procedure they go through to arrive at final solutions or products (Yurtkuran & Taneli, 2013). Students, in this manner, learn to focus merely on the final product and not on the skills developed through the process of arriving at that final solution (Moore, 2000).

**Ambiguity of assessment measures.** Since design disciplines require out-of-the-box style of thinking, creativity is at the core of the design studio pedagogy. However, it seems that creativity is overemphasized at the expense of other aspects of the learning experience in design studios (Gross & Do, 1997), which causes two intertwined sub-issues in the instruction of design studios: lack of rigor, and lack of clear evaluation criteria. The personal, subjective, illogical and not cumulative process of design (Groat, 2000; Wang, 2010) poses challenges to using clear evaluation criteria of student work (Groat, 2000; D. Smith & Lilly, 2016), which negatively affects levels of rigor in design studio instruction (Findeli, 2001). The subjectivity of the assessments conducted in design studios makes it difficult to translate instructor feedback into the traditional grading system (D. Smith & Lilly, 2016). According to Smith (2013, 2015), students in an undergraduate design program seemed to view their grades as the *only* reliable yet incomprehensive form of feedback. This results in an inaccurate personal view and estimation of students' abilities and skills (Micklethwaite, 2005).

In summary, design studios are physical and conceptual arenas for creativity. Despite the emergence of different discipline specific definitions, all design studios seem to focus on

harnessing student skills in communication, collaboration, creativity, and self-expression.

Despite the interactivity of the traditional design studio as a learning environment, it has been criticized for issues in student workload distribution, reliance on the master-apprentice model, and unclarity of assessment measures. The traditional design studio pedagogy dates to the French school of Fine Arts in the 19th century. Due to recent shifts in design pedagogy, design educators may benefit from incorporating innovative approaches to address instructional challenges as they arise.

### **Game-based Learning Definition and Affordances**

Game-based learning as a pedagogical approach has received great attention recently for purposes of enhancing the learning experience through increasing learning engagement and motivation (Prensky, 2001). The NMC Horizon Report states that games have moved from being exclusively used for recreational and entertainment purposes to areas of business, commerce, workforce training and education (Johnson, Becker, Estrada, & Freeman, 2014).

Game-based learning can be defined as the use of game-like elements and attributes in a meaningful manner within educational settings to promote learning and engagement (Kapp, 2012). A great amount of research has been conducted to understand affordances of games for learning and education. In his book *The Gamification of Learning and Instruction*, Kapp (2012) observes that games enticed better attitudes towards learning, increased student motivation, fostered higher-order thinking, changed personal real-life perceptions, impacted decision-making processes, and aided students achievement of better learning outcomes.

Using a game framework to design instruction requires a clear differentiation between game elements and game attributes. Game elements are tools that can be used to embody the

gaming experience. For example, rewards, levels/ quests, and badges maybe found in some games, but are not obligatory in all games (Deterding, Dixon, Khaled, & Nacke, 2011 & Nacke, 2011). Game attributes are structural aspects that are necessary for players engagement such as feedback, goals, and autonomy (Hull, Williams, & Griffiths, 2013 2013). It is worthy to note here that specific game attributes lend themselves well to specific game elements. Lambert, Gong, & Haarison (2015) have found that quests are “perceived as more valuable and useful for teaching and learning” and can increase student motivation to self-pace and make the most out of their learning experience.

### **The Game-based Studio: A Gamified System of Activity**

#### **The Design Studio as an Activity System**

To try and distinguish design from other fields, I take the apprenticeship perspective to clarify that learning and teaching in the design field adopt characteristics from both types of apprenticeship discussed in Collins and Kapur’s chapter *Cognitive Apprenticeship: Traditional and Cognitive*. Studio-based apprenticeship problems arise from the demands of the work/ experimentation space and are also “sequenced to reflect the changing demands of learning.” Additionally, studio-based apprenticeship teaches skills that are emphasized within the context of their use as well as generalizes these skills to be used in a wider variety of settings (Collins & Kapur, 2014). Therefore, design, as a field requires the acquisition of both physical and cognitive skills. In comparison with other fields, design falls somewhere in the middle on the spectrum requiring the development of physio-cognitive skills sets (Figure 2.1).



*Figure 2.1.* Design skills fall midst the spectrum of physical and cognitive skills.

According to Dewey (1915), interest in learning is constituent of four areas of skill: communication, inquiry, construction, and artistic expression. The first two skills fall under the cognitive aspect, while the second two fall under the physical aspect of the physical skill set required for studio-based learning. However, further research is still needed to study what this means in terms of designing a learning environment that affords for such physio- cognitive skills to be developed, implemented, and reflected upon. Game- based learning provides the structure that pulls the physical and cognitive required skills together as a comprehensive system.

Through adopting an activity system theory lens, the studio-based learning environment seem to constitute of a community of participants that are actively engaged in activities as part of an activity system developed by the instructor based on students' prior knowledge and culture. A sense of community is developed in the studio environment when participants (learners and instructors) work “along common lines, in a common spirit, and with reference to common aims” (J Dewey, 1915). In order for the studio community to function effectively, an activity system is needed to actively engage participants in actions and tasks that employ their prior knowledge and cultural experiences (J Dewey, 1915; Engeström, Rantavuori, & Kerosuo, 2013). A studio-based activity system is made of a set of activities with embedded tasks and actions (Engeström et al., 2013). The skills required for completing the tasks are of physio-cognitive nature and nurture the four areas of learning: communication, inquiry, construction and artistic expression (Collins & Kapur, 2014; J Dewey, 1915). In short, the studio-based learning environment (activity system)

incorporates a sense of community, actively engaged participants, and activities (tasks and actions that nurture skills for communication, inquiry, construction, and artistic expression).

According to Engestrom (2014), a learning activity allows students to examine and synthesize the tasks and actions required for skill nurturing. It also enables students to develop new comprehension of the problem and solution continuum, stimulates creative solutions, and allows for a holistic understanding. Learning within an activity systems theory perspective begins with individual and internalized cognition and grows into an expansive and externally demonstrated understanding. Learning in studio environments can be defined as a process of social-cultural practices and activities. Learners participate in this process by taking actions to complete the required macro and micro tasks continuously across a variety of contexts (Bricker & Bell, 2012; Engeström et al., 2013; Jackson, 2011). A learning task can be defined as a sequence of actions taken and skills acquired by the participants towards an individualized trajectory (Engeström et al., 2013; Halverson, 2013). Practices in studio environments take place between participants, activities and objects within a socio-material arrangement of contexts (Bricker & Bell, 2012). According to Driers' theory of persons (Bricker & Bell, 2012), participants in a studio environment are active contributors to their learning contexts and content. They are not only recipients of knowledge, but they are also creators of individualized knowledge, content, and perceptions. Thus, participants' identities are impacted by and have their impact on the learning experience in the studio environment.

Game-based learning approaches can establish a framework for the studio's activity system by increasing students' engagement, extending lines of communication beyond the studio space, and structuring the various studio tasks and actions that nurture skill acquisition (Figure 2.2). According to James Paul Gee (2004), effective game based learning manifests a large set of

learning principles. Several of them would address issues in the traditional design studio-learning environment, and fit the proposed game-based studio framework. Learning is more of a situated practice in both game-based and studio settings, where students tend to experience the learning process rather than observe it. The experiential aspect of learning in these environments allows for taking risks and lowers consequences for failure and increases engagement through authenticity. The adaptability of game-based learning allows learners to customize the design process to suit his/her learning preferences. Additionally, the ongoing learning process in game-based settings matches the iterative design process in studios and allows instructors to provide explicit and on demand feedback to students while fueling their progress through well-established goals and outcomes, and motivating rewards. The complexity of the design process also matches the multiple routes to problem solving that are inherent in game-based learning. Finally, meaning in both environments is created and distributed among three components of the learning structure: the learner, objects in the environment and other learners.

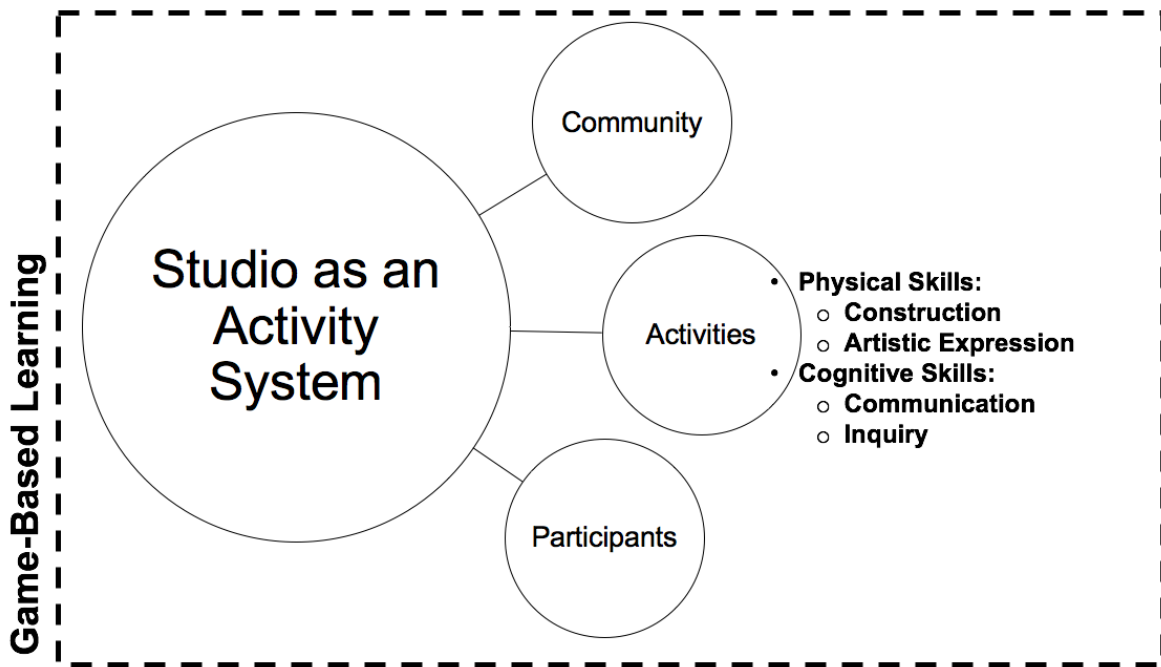


Figure 2.2. Game-based learning approaches as a framework for the studio's activity system.

## **Affordances of Game-based Learning in Design Studios**

According to Prensky (2001), game-based learning can help learners understand complex processes, conduct sophisticated analyses, and acquire skills for strategy development and communication. Using game-based learning in design studios can help students acquire skills to develop strategies for time management and workload distribution, understand the complex, and intertwined processes of a design project without the immediate need for the instructor's presence, and conduct sophisticated analyses to overcome issues of ambiguity in evaluation criteria and lack of rigor.

Based in literature and qualitative research, Smith and Lilly (2016) identified a list of strategies that can be followed to address the insufficiencies in the traditional design studio. In Table 2.1, I attempt to show how the strategies suggested by current design education literature can be easily incorporated within a game-based learning pedagogical approach.

### **Acquire skills to develop strategies for time management and workload distribution.**

An essential part of the design studio experience is the students' ability to manage their time throughout the semester and to distribute their workload properly and effectively in order to better serve their creativity (Zampetakis, Bouranta, & Moustakis, 2010). Students tend to fall behind and experience a less-than-pleasant learning process without such skills, which negatively affects their creativity and academic and career success (D. Smith & Lilly, 2016). Game-based learning can be employed to develop strategies that may address students time management issues through developing clear rules, setting achievable goals, and adapting to the iterative nature of the design process.



Table 2.1

*Instructional strategies in design studios and their matching elements and attributes of game-based learning (GBL).*

<b>Studio Strategies</b>	<b>GBL Elements and Attributes</b>	<b>Importance</b>
Establish clear expectations	Rules	<ul style="list-style-type: none"> <li>• Setting the expectations for game, and thus the studio.</li> </ul>
Provide scaffolding	Pre-announced outcomes	<ul style="list-style-type: none"> <li>• Track progress and identify problem areas</li> <li>• Provide needed information and support when necessary</li> </ul>
Develop complexity over time	Guided quests	<ul style="list-style-type: none"> <li>• Gradually advance student learning throughout the course</li> </ul>
Integrate self-reflection and choice	Levels	<ul style="list-style-type: none"> <li>• Customized learning</li> </ul>
Support student involvement and connectedness	Adaptability	<ul style="list-style-type: none"> <li>• Incorporates healthy competition and motivation</li> </ul>
Provide timely, constructive, formative feedback	Leaderboard	<ul style="list-style-type: none"> <li>• Connection among students.</li> </ul>
Establish clear goals for each milestone	Discussion Boards	<ul style="list-style-type: none"> <li>• A point system helps students know where they stand along the course</li> </ul>
	Badges and Rewards	<ul style="list-style-type: none"> <li>• Tackle tasks in a manageable manner</li> </ul>
	Goals and Learning Outcomes, Levels	

Game-based learning can be beneficial in incorporating rules, goals, and adaptability within the studio environment. Rules play an important role in setting the expectations for games, and thus the studio (Charsky, 2010; Erhel & Jamet, 2013; Wouters & Van Oostendorp, 2013). They provide a structure that makes clear to students what is acceptable, what is not, and how to use the game-based studio to achieve the learning objectives. Goals enable students to tackle tasks within the studio in a manageable manner. They mainly motivate students to devise strategies to accomplish these manageable tasks and thus achieve a bigger goal (Takatalo, Häkkinen, Kaistinen, & Nyman, 2010). It is important to distinguish between performance and mastery goals in game-based learning (Domínguez et al., 2013). Erhel & Jamet (2013) define performance goals as those concerned with demonstration of skill and success, while mastery

goals are those concerned with student's gaining a specific skill. Adaptability in game-based learning enables students to customize their learning by managing the tasks and the time required to finish each task in a fun and enjoyable manner.

Badges can be incorporated to manifest the strong relationship between goals, rules and adaptability in the game-based studio. A well-structured rewards system uses points to set up the rules for receiving a badge, identifies the specific goals or sub-goals (performance, mastery) correlated with the badge, and provides students with options for controlling the privacy for sharing collected badges (Codish & Ravid, 2014a; Hannak, Pilz, & Ebner, 2012).

**Understand the complex and intertwined processes of a design project without the immediate need for the instructor's presence.** The design process, as mentioned previously, is not of a strictly linear sequence (Findeli, 2001). It requires careful balance, on the instructor's end, between scaffolding students and not overwhelming them with support and representations (Blevis et al., 2007). Game-based learning in design studios can help students understand the complex and intertwined pieces within the design process through providing relevant and needed feedback, clarifying outcomes beforehand, and unleashing creativity.

Pre-announced outcomes inherent in game-based learning allow students to track their progress and identify their problem areas without the need for the instructor's physical presence (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012). Students take on a design task knowing what to aim for, while relevant and needed feedback scaffolds their learning by providing resources and guiding information when needed. Feedback also plays an important role in motivating students and sustaining their engagement, thus they won't feel frustrated or under-challenged (Erhel & Jamet, 2013; Wouters & Van Oostendorp, 2013). This scaffolding

mechanism enables students to tackle problem solving creatively by reducing the time they spend on being *stuck* in the design process, and increasing their productivity at arriving at creative solutions (Sachs, 1999; Sun, Wang, & Chan, 2011).

Game elements can be used to manifest feedback in a way that provides the balance needed for students' success. Guided quests can aid students by providing the needed information and support when necessary (Charsky, 2010; Howard, 2008). Students can access the quests on their own time and at the design phase that they are currently on. Each quest is built with the students' success in mind by providing clear information about the learning outcomes, the expected skills, required tools and technology, and needed artifacts to prepare for the following quests. These guided quests can help students throughout their problem solving process and allow them to tackle the design tasks while accessing relevant and needed information (Haskell & Mesler, 2013).

**Conduct sophisticated analyses to overcome issues of ambiguity in evaluation criteria and lack of rigor.** The open-ended nature of design studio problems requires students to think about and envision multiple solution scenarios at once. Design processes are experimental in nature for they require many iterations and *what ifs* along the way (Cennamo et al., 2011). The ambiguity of the evaluation criteria and lack of rigor in the traditional pedagogy of design studios does not make students jobs any easier, let alone enjoyable (Findeli, 2001; K. M. Smith, 2013). Game-based learning can be used to clarify the evaluation criteria through incorporating elaborate goals and achievable learning outcomes (Hainey, Connolly, Baxter, Boyle, & Beeby, 2012). It can also provide students with chances to experiment with different problem-solving scenarios due to its adaptability and flexibility (Gee, 2004). Thus, the focus of the design process shifts from self-expression to the ability of students to think creatively to solve the problem on

hand. Levels and guided quests can also help alleviate some of the ambiguity connoted with evaluation criteria. They help students have a better grip on smaller tasks within the design activity, gradually advance through the learning scenario and therefore be prepared for achieving the bigger goal of the game-based studio environment (Charsky, 2010; Howard, 2008).

Leaderboards can be used to help students track their progress while accomplishing multiple tasks throughout the different stages of the design process (Codish & Ravid, 2014b). They can see how their classmates are performing and realize if they are behind or not. Moreover, leaderboards can establish a sense of community (Seaborn, Pennefather, & Fels, 2013) and competition among students (Kiryakova, Angelova, & Yordanova, 2014), specifically within group projects. Students in one group can use their leaderboard score to act as a motivator for them to *win the quest*. The flexibility of game-based learning allows for lines of communication to extend beyond the time and space of the studio meeting (Pivec, 2007). Hence, a sense of community can be nourished within the studio sessions and outside the studio sessions using current technological tools such as blogs and discussion boards.

In summary, game-based learning as a pedagogical approach can be used in design studios to help address such instructional issues. GBL has been shown to enhance students learning experiences through improving engagement, motivation, thinking skills, and decision making processes. By viewing the studio as an activity system, game-based learning affordances can be brought into the studio structure. The framework discussed here built on the activity systems theory to explain the alignment between game-based learning and the studio environment. The elements and attributes of game-based learning can be mindfully used to align with studio strategies and address its instructional issues.

## **Conclusion and Future Directions**

The current, and traditional, status of pedagogy in design studios is raising multiple challenges for both instructors and students. The most critical issues can be summarized into three categories: workload distribution, dependency on master-apprentice model, and lack of clear evaluation criteria. In an attempt to address these issues, the paper explores specific game-based learning strategies and describes how their incorporation within the design studio environment maybe the shift called for by recent design pedagogy literature.

Game-based learning succeeds in creating enjoyable environments where students feel motivated to take on difficult tasks and accomplish them effectively. Framing the design studio as a system of activities allows for the implementation of specific game-based learning attributes to address each of the three instructional issues described previously. Rules, goals, and adaptability can be used to help students acquire skills to develop strategies for time management and workload distribution through providing structure, manageable tasks, and individual customization. Outcomes, feedback, and problem-solving mechanisms can be used to clarify the complex and intertwined processes of a design project without the immediate need for the instructor's presence through tracking students personal progress, scaffolding, and reducing time spent on problem areas. Goals, outcomes, and adaptability in game based learning can also be used to help students conduct sophisticated analyses through clarifying evaluation criteria, and by providing students with opportunities to experiment with multiple solution scenarios simultaneously. Incorporating gaming elements such as points, badges, leaderboards, and guided quests can manifest the attributes of game-based learning discussed in this paper.

Further investigation is still needed to practically apply such approach in a design studio environment. This would provide empirical data to aid in evaluating the effectiveness of such approaches in non-lecture format courses, specifically design studio courses.

### **CHAPTER 3. DESIGN AND EVALUATION OF A GAME-BASED INTERIOR DESIGN STUDIO**

Zina Alaswad

#### **Abstract**

Designing game-based environments can take several forms and approaches. This paper explains the complex task of designing a game-based learning (GBL) environment for an undergraduate level interior design studio course. Building upon the experiential learning theory and the activity system theory, the paper describes how game-based learning elements and attributes are employed to address the following instructional issues in design studios; time management, master-apprentice model, and assessment measures. The instructional approach taken to design the course aligns instructional design practices manifested in the Quality Matters Rubrics Standards, game-based learning elements and attributes, and interior design studio strategies. The paper sheds light on the evaluation of the course design through a professional instructional development specialist and by reporting on feedback collected from users. Expanding upon the course evaluation, the paper suggests improvements for the current course design and discusses areas for future research using this paper as a starting point. This paper can be of value to educators in different fields interested in incorporating game-based learning into their teaching due to the lack in current literature on the process of designing game-based learning environments.

## Introduction

The successful design of game-based learning environments requires the interdisciplinary integration of game design, instructional design, and learning theories. Game design establishes engagement factors that increase student interest in the learning environment using game attributes and elements. Instructional design principles provide guidance and structure for the design of the course that learners interact with. Learning theories justify and provide rationale for aligning gaming elements and attributes with traditional instructional design principles and learning objectives.

Interior design studios are spaces for hands-on learning where students learn new concepts and skills through “doing.” The topic of designing game-based learning environments, specifically game-based design studios, is still in its infancy. The use of game-based learning in a variety of educational and training fields makes it difficult to identify just one approach to designing game-based learning courses. This paper attempts to detail the process of designing a game-based learning environment using the learning management system Blackboard Learn for an interior design studio course. This studio was a 3-credit hour course that met twice a week for a total of 6 hours over a period of 16 weeks. It exposed undergraduate interior design students during their first semester of the 3<sup>rd</sup> year of the program to a variety of presentation media and techniques both digitally and manually.

The design of the course is based on integrating two learning theories, instructional design practices and game-based learning pedagogy. The activity systems theory and experiential learning theory are both studied to provide a theoretical framework for the learning processes that take place in the course. Instructional design practices are implemented through using the Quality Matters rubric, where the rubric’s standards and sub standards guide components of the



course's interface via the learning management system. Game-based learning pedagogy was adopted to structure the design studio course in a format that simulates a game. Therefore, the students did not play actual games to learn, but the course used gaming elements and attributes to introduce engaging factors and to increase students' interest in their learning experience.

The paper begins by discussing current findings and trends in designing game-based learning environments through the lens of activity systems theory and experiential learning theory. It later describes the intricacies of the course design, and how all the three disciplines discussed above come together to create an innovative learning experience for the students. The instructional design section delves deeper into how each aspect of the course is aligned with instructional design practices and design studios teaching strategies. The paper finally provides brief information about the Quality Matters rubric, the competency of the instructor to use it as a design and evaluation tool, and a general evaluation of the instructional design using Quality matters and student feedback.

### **Designing Game Based Learning Environments**

The design of educational environments to promote and enhance game-based learning builds on instructional design strategies and game design principles. Game-based learning environments employ gaming elements and attributes to achieve specific learning outcomes. Gaming elements and attributes are considered the most important factors in design game based learning environments (Y.-R. Shi & Shih, 2015). These attributes and elements align with instructional design practices, which ensures the effectiveness of the course design from a game-based learning perspective as well as an instructional design perspective (Alaswad & Nadolny, 2015).

The design of game-based learning environments has been a topic of great interest for the past 20 years (Jabbar & Felicia, 2015). Per recent reviews, most studies concerned with game-based learning focus on exploring students' perceptions, attitudes, and motivation toward using games for learning (Hwang & Wu, 2012). The focus on designing game-based learning environments for specific learning domains remains of less popularity (Hwang & Wu, 2012), mainly due to the interdisciplinary challenges it presents. Designing and building games that address specific educational purposes in specific learning domains requires the acquisition and implementation of game design theory, deep content knowledge, and strong foundation in relevant learning theories (Qian & Clark, 2016).

To ensure the success of game-based learning pedagogy, there must be alignment between gaming elements and attributes, content specific learning outcomes or strategies, and instructional design practices. Gaming elements and attributes transform the traditional learning environment and allow students to experience learning from a perspective they are not necessarily familiar with. This can result in sparking their interest in the learning process. Learning outcomes and strategies ensure that the content knowledge and skills embedded in the course are also being attended to. As indicated by the name itself, the larger goal of game-based learning is *learning*; content, skills, behaviors, etc. Finally, instructional design practices make up for the possible vagueness of game-based learning design. These practices provide the course with a way to evaluate instructional effectiveness due to the availability of rubrics, standards, design models, and theories that are still not well developed in the gaming realm. One format for designing game-based learning environments is to design a course imitating a game structure (Nadolny, Alaswad, Culver, & Wang). This format allows the integration of instructional design

practices with game design smoothly without negatively impacting the learning process in design studios.

**Theoretical Perspective:  
Experiential Learning and Activity System Theory**

Dewey's progressive approach towards education uncovered that some traditional methods of learning such as studio arts, field projects, and internship programs are more representative of experiential learning and are older than the formal education system itself (1986). In studio environments, for example, learners interact with the realities of the design problem. They don't just consider working with it or think about what would happen if they do face such a problem. They are in touch and in direct interaction with the phenomenon being studied. When students study residential design, they design a residence and not just read about what goes into designing a residence. They use the knowledge in real application. They experience the design process just as a professional architect or interior designer does.

David Kolb discusses three main models that detail the experiential learning process (Kolb, 2014). One of which is Dewey's model where he emphasizes the dialectic process of learning which integrates experience, concepts, observation, and action (1986). This model fits the design approach of the game-based studio effectively since it mimics the process learners go through during an interior design project.

Dewey's experiential learning model begins with the impulse or spark to solve a design problem. This stage represents the project introduction and definition of the problem statement which takes place at the beginning of any design project. The following stage is the observation of surrounding conditions which mimics site visits and watching demonstrations of specific design techniques that are relevant to the problem on hand. The third stage is knowledge building

which is usually accomplished through conducting research of what solutions to the design problem currently exist and what are some solutions that learners can recall from their own experience and memory. The fourth stage is judgement and it is when learners evaluate the research they have conducted and the observations they have made and see what their collective effort signifies. They also re-evaluate their design approach and may go back to any of stages one through four before moving on to the final stage, purpose. Purpose is the final product of the design. It translates the effort that has been collected through the previous four stages into a plan and a method of action. This collaboration of desire and informed decision making moves ideas along and brings them to life (John Dewey, 1986).

The activity system theory merges with experiential learning to support and emphasize the role of the participant and the community among which the learning activity is taking place and where the game-based studio happens. Dewey's experiential learning model explained above takes the categories of learning further and details how to achieve each; expression, construction, communication, and inquiry. The activity alone is not enough to define learning in a design studio environment. As I explained in Chapter 2, the individual and the community within which the activity takes place impacts the definition and nature of learning in a design studio.

### **Course Design**

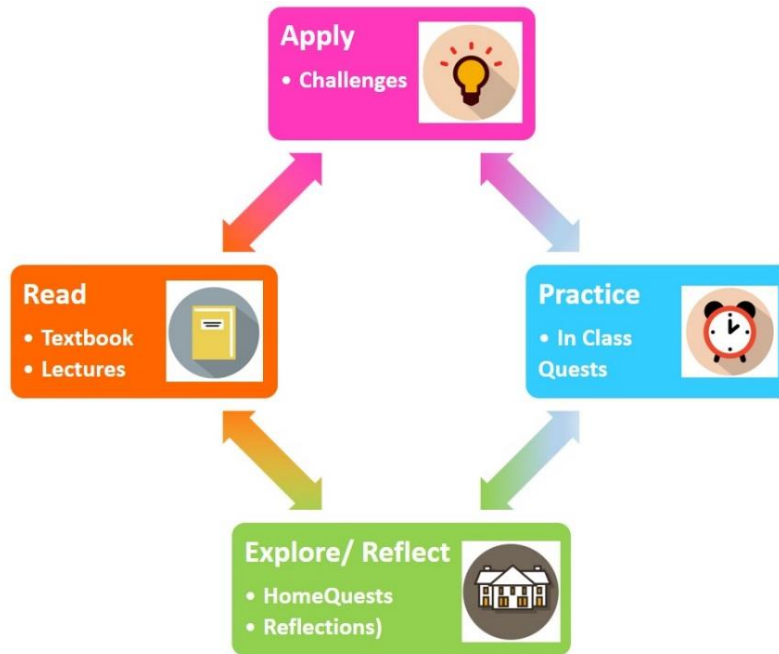
The course was a 3-credit hour studio which addressed the application of various media techniques for the presentation of interior design concepts. The course met twice a week for 3 hours, where 3<sup>rd</sup> year undergraduate interior design students learned about different media and presentation techniques and applied this knowledge through various weekly activities.

The course used a game-based learning pedagogy and was designed in a manner that is like a game structure. Therefore, the vocabulary used to describe the course activities and projects was slightly different than what ones sees in a traditional course or studio. The course included four main challenges. Each challenge had a list of in-class quests and Homequests that were connected to it. In-class quests were timed activities and needed to be completed during the studio's meeting time, while Homequests were activities that should be completed outside of the studio's meeting time. The aim of the quests was to help students move along the challenges in a systematic manner without leaving too much work to do outside of class time. Therefore, it was important to use the class time to complete the in-class quests effectively so they can be used as components within the main challenges.

### **Instructional Design**

The instructional design model adopted for this course built on the experiential learning theory (ELT) by David Kolb (2014). The adopted model focused on the importance of effective learning in the game-based interior design studio through the four main phases: (1) concrete experiences; (2) reflections; (3) conceptualization; and (4) active experimentation. These four phases align well with Dewey's physical and cognitive learning categories. I designed a weekly learning cycle (Figure 3.1) that explains and illustrates this alignment. Students began the week by (1) reading a chapter from their assigned text book or viewing other resources that I provide (video demonstration, tutorial, etc.). (2) They explored the topic of the week by completing Homequests, and reflected on their explorations through a one page visual and written reflection. They went through the cycle by (3) practicing the concepts they read about and explored during in-class quests. These were timed exercises that must be finished within the studio time. They

finished the learning cycle by (4) applying the knowledge that they have created onto the challenge that is on hand. Most weeks, students can use the artifacts that they developed in their in-class and home quests towards completing the challenges.



*Figure 3.1.* Weekly Learning Cycle: Illustrating the alignment between Kolb’s Experiential Learning Theory phases and Dewey’s physical and cognitive learning categories.

Game based learning factors were embedded within this adopted model. As discussed in chapter 2, GBL elements and attributes can be aligned with studio strategies. The institution where this course was offered uses Blackboard Learn as a learning management system. Therefore, the course was designed with keeping the online component of the learning management system in mind. Along with theoretical perspective I discussed previously, I used the Quality Matters Rubric for Higher Education to create a course that not only addresses game-based learning but also criteria for effective digital learning environments. Table 3.1 displays a matrix of interior design studio strategies, game-based learning factors and instructional design practices depicted through selected standards from the Quality Matters rubric.

Table 3.1

*Matrix aligning design studio strategies, game-based learning factors, and Quality Matters Rubric sub-standards*

<b>Studio Strategies</b>	<b>GBL Elements and Attributes</b>	<b>Instructional design practices (QM) Standard number and description</b>
Establish clear expectations	Rules	2.1 The course learning objectives describe outcomes that are measurable. 2.3 All learning objectives are stated clearly and written from the students' perspective. 2.4 Instructions to students on how to meet the learning objectives are adequate and stated clearly. 2.5 The learning objectives are appropriately designed for the level of the course.
Provide scaffolding	Pre-announced outcomes Guided quests	3.4 The assessment instruments selected are sequenced, varied, and appropriate to the student work being assessed. 4.1 The instructional materials contribute to the achievement of the stated course and module/unit learning objectives. 4.2 The purpose of instructional materials and how the materials are to be used for learning activities are clearly explained.
Develop complexity over time	Levels	5.1 The learning activities promote the achievement of the stated learning objectives.
Integrate self-reflection and choice	Adaptability	Not addressed by QM, but provided through weekly reflections and choice in multiples course aspects.
Support student involvement and connectedness	Leaderboard Discussion Boards	5.2 Learning activities provide opportunities for interaction that support active learning. 5.4 The requirements for student interaction are clearly articulated.
Provide timely, constructive, formative feedback	Badges and Rewards	3.2 The course grading policy is stated clearly. 3.3 Specific and descriptive criteria are provided for the evaluation of students' work and participation and are tied to the course grading policy. 3.5 Students have multiple opportunities to measure their own learning progress.
Establish clear goals for each milestone	Goals and Learning Outcomes, Levels	2.2 The module/unit learning objectives describe outcomes that are measurable and consistent with the course-level objectives.

The studio strategies displayed in the Table 3.1 and discussed in the following sections are adopted from a study conducted by Dianne Smith and Linda Lilly (2016). I will elaborate in the following sections on how game-based learning factors align with instructional design practices through applying the Quality Matters Rubric Standards (QM) (Matters, 2014). I will focus on Quality Matters as a course design and evaluation guideline towards the end of the paper.

### **Expectations**

Establishing clear expectations for the students in an interior design studio was an important strategy to ensure that students know what to expect throughout the studio. It was also necessary to establish objectives for smaller milestones during the studio timeline (16 weeks) to help students remain on track. Game-based learning can be used to incorporate rules and goals within the studio environment which addresses Standard 2 in the QM rubric.

The studio environment benefits from setting rules for the game-structure (Charsky, 2010; Erhel & Jamet, 2013; Wouters & Van Oostendorp, 2013). Rules provides students with a structure that distinguished between what was acceptable, what was not, and how to use the game-based studio to achieve the learning objectives. Important milestones that are inherent of any studio structure due to the influence of the design process can also be organized using the game goals. These goals enabled students to tackle tasks within the studio in a manageable manner by motivating them to device strategies to accomplish these manageable tasks and thus achieve the bigger challenges in the course (Takatalo et al., 2010). It is worthy to note here that the check point structure of the course can help students move easily from the shorter and smaller activities (Homequests, In class quests) to the larger goals of the studio (challenges).



### **Feedback, Scaffolding, and Complexity**


Providing students with constructive and timely feedback, scaffolding and progressing complexity are important strategies in the design studio environment. The game-based learning structure used guided quests, levels, and a virtual reward system to achieve these three strategies. Guided quests and advancing levels provided students with instructional materials and activities that help them achieve the course objectives.

The virtual reward system established within the course ensured alignment with QM standards as well. The reward system contained a weekly check point which allowed students to move in a systematic way towards completing the major challenges of the course and employed badges, a leaderboard and the “my grades” tool. Students had multiple opportunities to measure their learning progress individually without relying on the instructor’s verbal feedback or physical location. Students could receive feedback in times and formats other than those restricted to the studio space and period. Figure 3.2 shows how this system was explained to students in the course.

**Badges.** Student achievement was recognized in several ways. Digital badges were one way to symbolize student achievement during the path of fulfilling learning goals, provide personalized feedback and appreciation of their accomplishments throughout the course (Nah, Zeng, Telaprolu, Ayyappa, & Eschenbrenner, 2014). Earning badges could help students enhance their decision-making processes and provide them with extrinsic motivation. Learners who are high achieving appreciate receiving badges as positive reinforcement, while competitive learners enjoy badges to quantitatively symbolize rewards (Tu, Sujo-Montes, & Yen, 2015).

Additionally, supporting badges with points and leaderboards creates a sense of achievement, competitiveness, and status (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2015).


The course also offers you several ways to track your progress and levels of achievement:



Badges

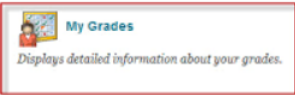
These virtual rewards are awarded to you depending on your performance in different activities in the course.

Each badge is not dependant on another. So if you miss one badge, that's Ok! You can always catch the following.



Leaderboard

Leaderboards is another way for you to track your progress in the course. You can click on the menu item on the left "Leaderboards" to know your ranking among the class and the points you have collected throughout the course.

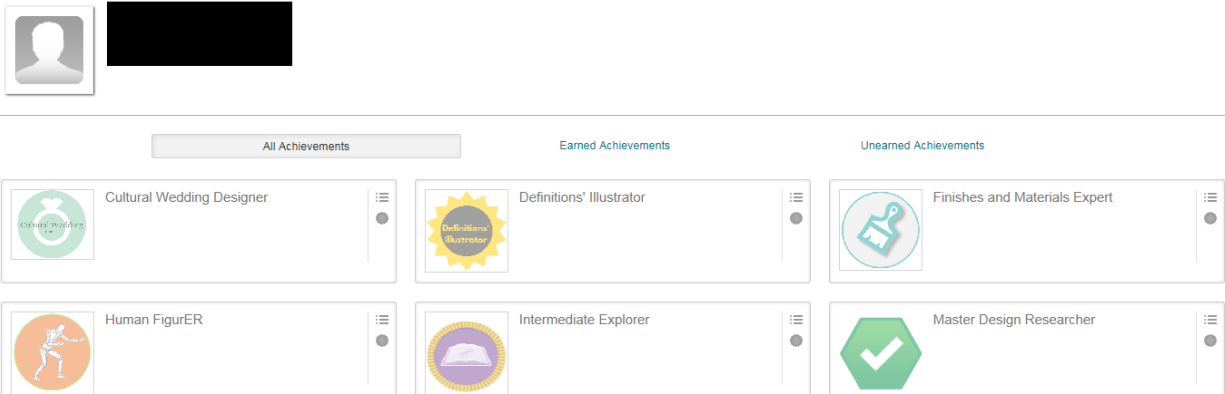


My Grades

"My Grades" is a tool provided via Blackboard. You can use it to see in detail how many points you have gained in each quest and/ or challenge.

*Figure 3.2.* Screenshot of the reward system explanation provided for students on the course page.

Within the game-based studio, badges were used for both providing students with timely feedback and as a tool for students to track their progress. Within the learning management system, the digital badges were created with descriptive criteria of how to achieve them including a written description, the activities they were aligned with, and the minimum points needed to collect the badges. Additionally, each badge was visually designed to represent the activity or milestone the student achieved along with a unique name to add to the game-based learning experience (Figure 3.3).



*Figure 3.3.* Digital badges available for students to earn in the game-based studio.

**Leaderboard.** The course also included a leaderboard that is based on students' weekly progress in the course. Although this tool is more common in traditional digital games and sports, research has shown its relevant use in educational settings (Cummings & Ross, 2013; Kuntz, Shukla, & Bensch, 2012; L. Shi, Cristea, Hadzidedic, & Dervishalidovic, 2014). A leaderboard can be defined as a visual tool to display ranking of members depending on their performance. This tool can promote competition, social interaction and cooperation among students when used appropriately in educational settings (L. Shi et al., 2014). It can also be used to provide an authentic context for achieving learning outcomes and receiving relative feedback (Kuntz et al., 2012).

Leaderboards can be used for several purposes and in many ways, such as matching learning goals, focus on small team effort, or display relative position of an individual's performance to the rest of the class (Alaswad & Nadolny, 2015). In this course, the leaderboard was used to reflect students' status and progressive achievement throughout the course. The leaderboard contained several columns displaying each student's performance in different

aspects of the course in detail (attendance, homequests, in-class quests, challenge 1, etc.) and collectively in a total points column.

Even though the learning management system (Blackboard Learn) provides a Gamification Leaderboard module, the specific services pack used at the institution where the course was offered did not allow for its use. Therefore, an Excel spread sheet was established and a single sheet was shared with the students where they could see their ranking details (Alexander, 2014). Students anonymity was kept through using university ID numbers instead of names to identify each student's performance. Also, the sheet was shared through the institutes One Drive requiring personal log in information for individual access (Figure 3.4).

The screenshot shows an Excel Online spreadsheet titled "Leaderboard". The spreadsheet has columns for ID, Total Points, Total Percentage, Rank/Place, Attendance, In Class Qests, HomeQests, Challenge 1, Challenge 2, Challenge 3, and Challenge 4. The data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L
	ID	Total Points	Total Percentage	Rank/ Place	Attendance	In Class Qests	HomeQests	Challenge 1	Challenge 2	Challenge 3	Challenge 4	
1												
2		613.5	61.35%	1	0	58.8	51.8	190.5	132	180.4		
3		412.7	41.27%	8	-10	41.8	27.5	91	141	121.4		
4		519.2	51.92%	7	-15	50.45	51.7	156.25	103	172.8		
5		602.4	60.24%	4	-10	57.6	47.8	180	134	193		
6		588.65	58.87%	5	-5	60.85	27.8	173	141	191		
7		611.75	61.18%	3	0	57.75	34.5	195.5	126	198		
8		612.3	61.23%	2	-15	58.7	59	191	136	182.6		
9		571.1	57.11%	6	-10	58.3	56	141	139	186.8		
10												

*Figure 3.4.* Leaderboard presented as an excel sheet for to review their total points in individual aspect of the course using their unique ID numbers.

**Grades.** The learning management system also provides students with a My Grades tab where they each can review feedback on their assignments, possible points, and total points in the course. This is a page available through the learning management system used for this course (Blackboard Learn). Students can click on this page within the course to view all the related course work and detailed points attained for each single activity. My Grades also shows students due dates of required activities, grading status, and displays comments and feedback left by the instructor (Blackboard, 2017). The course also used this tool to provide students with yet another

opportunity to track their progress in the course. The tool supplemented the leaderboard and the badges by providing detailed information about students' performance in every single activity, quest, and challenge completed (Figure 3.5).

ITEM	LAST ACTIVITY	GRADE
<b>Weighted Total</b> <a href="#">View Description</a> <a href="#">Grading Criteria</a>		-
<b>Total</b> <a href="#">View Description</a> <a href="#">Grading Criteria</a>		-
<b>HomeQuest 1</b> DUE: AUG 29, 2016 Assignment	UPCOMING	- /5
<b>HomeQuest 4</b> DUE: SEP 12, 2016 Assignment	UPCOMING	- /5
<b>HomeQuest 5</b> DUE: SEP 14, 2016 Assignment	UPCOMING	- /5

*Figure 3.5.* My Grades tool in Blackboard Learn displaying quests and respective points.

### Choice and Self-reflection

These were two important strategies to the studio environment that the Quality Matters rubric did not address in the list of standards, sub standards or annotations. The game-based learning structure provided for those strategies to be applied throughout the semester. Self-reflection is central aspect to both the activity system theory and the theory of experiential learning. It provides learners with a chance to internally transform experience which can operate critical thinking throughout a continuum between abstract symbolism and immersed experience (Kolb, 2014). Self-reflection was employed throughout the semester of the game-based studio. During the first eight weeks of the semester, students developed manual weekly visual reflections in a journal entry format. Entries were based on the techniques and information learned in class through lectures and application. During the second eight weeks of the semester students were asked to turn in digital weekly reflections. The topic of each reflection submission

was based on the activities performed during the week. The reflections contained both written and image components.

Students had autonomy and choice throughout the semester. The game-based studio employed strategies to provide students with structure to progress continuously in the course, but with enough leeway to practice their creativity and individuality. For example, within each challenge students had aspects that were unified (problem statement, list of requirements, etc.) and other aspects that were open for students' interpretation and choice (client needs, site location, themes, poster organization, etc.). Students had also choice in paths to complete challenges. In challenges one and four, students had autonomy over the sequence of completing the activities leading to completing the challenges. Structure was provided to students who wished to follow it but was not enforced. In challenges two and three, activities sequence and paths were part of the assigned challenge. Structure was provided to students and they were expected to follow it.

### **Course Design Evaluation and Improvements**

An essential element of the any instructional design endeavor is evaluation to identify weaknesses and plan for development and improvement. Using the Quality Matters rubric provided an automatic feedback loop, where following the rubric items guided the design of the instructional elements of the course. Quality Matters builds upon the significance of peer review as part of the continuous model of course design improvement. Therefore, it became important for the strength of this paper to have a professional instructional development specialist review the course design to provide feedback and recommendation. Additionally, the opinions and feedback of the students using the course is just as important. Although this specific paper did

not initially plan for user-centered data collection, I managed to collect some feedback from students who used the course through interviews and a focus group session designed as part of a separate case-study. The following sections of the paper discuss using the Quality matters rubric as an evaluation tool, summarizes feedback collected from the instructional development specialist and student users, and incorporates ways to improve course design based on the collected feedback.

### **Quality Matters Rubric and Standards**

Quality Matters is a research based, and faculty based program that provides tools and means to measure, evaluate, and improve quality of courses through focusing on the design aspects of the course. Quality matters does not evaluate quality of content, delivery, or the learning management system. It merely focuses on the instructional design of the course. The program includes various opportunities and materials for educators' continuous professional development. One of the materials developed mainly for purposes of improving course quality is the Higher Education Rubric. The rubric contains eight general standards that branch into 43 specific review standards that are developed specifically "to evaluate the design of online and blended courses." To be able to use the rubric, an educator is encouraged to attend two-week workshops via the Quality Matters organization. These workshops are available through a membership and individual or institute level subscription. I have completed two courses with Quality Matters: (1) Apply the Quality Matters Rubric and (2) Designing Your Blended Course, and have also had the opportunity to perform informal course reviews for game-based learning courses as a member of a teaching and learning center at a public university in the United States.

This has given me knowledge and experience in interpreting the rubric, applying its principles while designing the course, and referring to it as an evaluation tool of the course design.

### **Course Peer Review**

A professional instructional development specialist at Iowa State University, Lesya Hassall, reviewed the course using the self-review tool available via Quality Matters Organization website. Quality Matters uses a very prescriptive rubric for evaluating course design. Hassall operated with the understanding that very specific evidence that points to the fulfillment of a standard should be in the course before deciding if a standard was met at 85 percent. This means that the design must be conducted to the standard or else risk omitting important design aspects. Secondly, she makes it a point to notice every bit of evidence, so instructors can prioritize course improvements. Therefore, the QM vision of the peer review process is closely followed in which the essential and very important standards drive the evaluation to produce constructive feedback for course improvement.

Keeping in mind that the focus of this course design was to meet items of the QM rubric that align with design studio strategies and game-based learning elements and attributes, the review showed that the course did not meet the 85% required to be considered for an official quality matters review. Hassall's evaluation can be summarized in two main points; improving the articulation of learning objectives, and provide better explanation to how the course elements are aligned.

The learning objectives wording must use measurable verbs to reduce ambiguity and confusion. The objectives must be worded using specific and measurable statements to address skills, attributes, habits, and behaviors that can be explicitly seen in learners' work as a result of



immersion in the learning experience. In the current learning objectives, using the verb "understand" does not measure student learning because understanding is not quantifiable.

Hassall explains:

“If the learners understand a concept/process/tool functionality, they should be able to describe, explain, identify, match, construct, apply, plan, develop, etc. or, in other words, they should be able to explicate their understanding via an action that the instructor can observe and measure against a set of criteria.”

The second point to address in Hassall’s review is the structure of alignment within the course. More specifically, the alignment between learning objectives and different activities throughout the course. This is also connected to the verbiage used to articulate learning objectives. Hassall suggests that a stronger and more explicit connection be made between activities and projects within the course, and with the corresponding learning objectives. She explains that accomplishing this “will reinforce the idea that your learners will achieve stated learning outcomes via a scaffolding system in which all course components are interconnected and reinforced by learning objectives.”

### **Student Feedback**

As part of a separate case study designed to understand students’ perceptions in regards to using game-based learning within an interior design studio, I managed to collect feedback about the course design during individual interviews and a focus group session. The details of data collection and analysis methods used in the case study can be found in Chapter 4. In this section, I summarize the main points students discussed during the interviews and focus group as

relevant to the instructional design of the course into two categories; the learning management system used (Blackboard Learn), and course delivery and format.

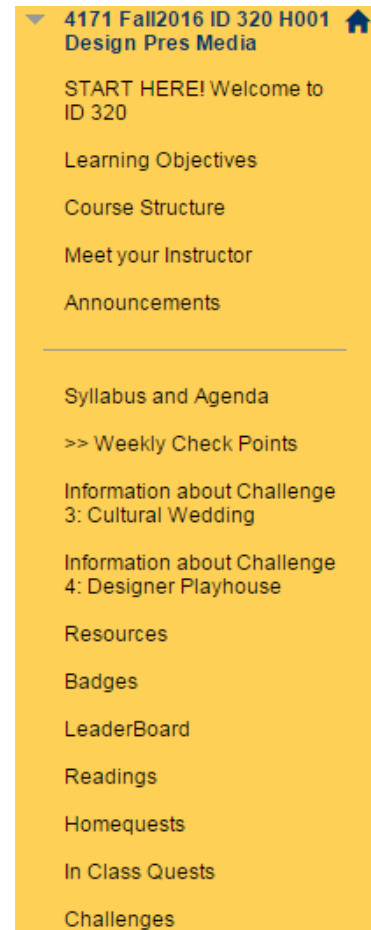
**Blackboard learn.** Students described the learning management used as difficult and not user friendly. The limitations of Blackboard impact students’ ability to customize their learning experience:

“I think Blackboard is awful. It is not a decent enough platform for the game-based learning to be successful.”

“Blackboard is pretty like cut and dry, to most of us and so when we got into this, we were like where do we find all this stuff?”

Students suggested using a different learning management program or even designing a complete separate game platform. The setup of the course was also described as “confusing” at the beginning of the semester and difficult to navigate. Students commented on the organization of the main menu of the course. They did not prefer the wording used in the different menu items and how elements of the course are separated into different categories (Figure 3.6). They suggested that the setup of the course is more cohesive, where all course elements are in one place and not separated:

“I think at first, yes. I was kind of lost, but then as the semester progressed I figured it out.”



*Figure 3.6.* Main Menu of course page on Blackboard.

“I think I would like all of it if it was more cohesive and things are built in together and not to have all those separate stuff.”

“this side there are so many different categories and then once you click the category there are so many other categories.”

**Course delivery and format.** The introduction of Blackboard as a parallel platform for the studio course delivery provoked some ideas and suggestions from students. Students suggested using a flipped or hybrid delivery format where the course content is provided through Blackboard, and the application part of the projects takes place during the studio time. Additionally, this delivery format allows the class to meet once a week instead of twice and therefore allow for additional “work days”:

“we could have used a hybrid delivery format. We had work days, so I felt like we could meet once a week and use the other day to work on our projects without meeting”

“maybe if we were able to like receive the power points before hand, to kind of like read the chapter then tag that into the power points. If we had both [the PowerPoint slides and readings] before class, it would kind of give us more of what we were going to accomplish.”

Students also had ideas for improving the relation between studio projects and software used to deliver these projects. The course exposed students to four individual projects, and each project introduced students to using a specific design related software or manual rendering media. Students suggested merging the two manual projects along with their corresponding tools, and the two digital projects and the two-corresponding software. This would reduce the projects

load and due dates within the course, but still achieve the experience required in the course and allow students more time to produce quality work:

“I think we could have merged 2 projects in one bigger project and have learned the same techniques and skills. With one project, we would have had longer time to perfect it.”

“I would prefer to work on fewer projects that I am happier with than getting frustrated with smaller projects.”

“I think just combining the programs into one project would have been a better idea.”

### **Course Improvements**

The evaluation provided by Lesya Hassall and the feedback elicited from student interviews and the focus group session can be used to further improve the course design and structure both in its online and face-to-face portions. The improvements in this section may not address every part of the feedback and evaluation discussed in the previous section. I focus here on ideas and suggests that I found applicable and not contradicting with game-based learning or design studio pedagogies.

**Learning objectives and course alignment.** The Council of Interior Design Accreditation (CIDA) and the program coordinator at the institute mandate the course and learning objectives. While changing the wording is not an option, I can add short descriptions or elaborations on each of the learning objectives of the course. The table I have provided in the course establishes general relations between learning objectives and course elements (Table 3.2). However, a more detailed and elaborated description is needed in a variety of locations within the course such as the syllabus, individual project descriptions, activities, and resources.

Table 3.2

*Alignment of learning objectives and a variety of course elements.*

<b>Learning Objectives</b>	<b>Course Elements</b>
1) Further develop and apply visual communication skills, such as scaled drawing, free hand drawing and concept drawing	Challenge 1-4
2) Understand and apply graphic thinking relevant to problem solving and design	Challenge 3
3) Further develop an ability to visualize three dimensional forms	Challenge 4
4) Develop competency in drawing estimated perspectives	In Class Quest 1
5) Develop a drawing and rendering proficiency suitable for professional application	In Class Quests, HomeQuests, Challenges 2-4
6) Understand and apply technical drawing knowledge to a quick sketch presentation technique	Readings, Challenge 2, In Class Quests 9.1,9.2
7) Develop an appreciation and understanding of the design potential of a variety of graphic media techniques	Readings, Challenge 2
8) Develop proficiency in oral presentation	Challenge 3, Challenge 4
9) Develop proficiency in visual and verbal communication between student (designer) and the instructor (client).	Challenge 1, Challenge 3, Challenge 4
10) Develop competency in the application of elements and principles of design composition	Challenge 4 (Board layouts)
11) Research other methods of design presentation techniques suitable for professional design presentations	Challenge 1, 2, 3, 4
12) Further develop computer presentation competency	Challenge 3, 4, In class Quests 9-10, HomeQuests 8,9

**Learning management system issues.** The currently used learning management system, Blackboard Learn, is not the best fit for accommodating the variety, complexity, and adaptive nature of game-based learning. Other learning management systems available for educators and students maybe a more suiting alternative. However, to comply with IRB requirements and FERPA regulations, using Blackboard Learn was the only acceptable option as an instructor at the institution where the course was offered. To address the inflexibility of Blackboard, perhaps a simpler format of course design could be used. An infographic or a video tutorial can be created to guide students through using Blackboard to navigate through the game-based studio. This can reduce confusion and navigation issues. Additionally, instructor generated reminders and notifications can increase the cohesiveness and continuity of the game-based learning experience. However, this might increase the effort required on the instructor's part especially with a larger class or studio size.

**Alternative course delivery and format.** While I understand the students desire to reduce class meeting time to half what is designated by the program, moving into a hybrid format for a design studio takes away from the intended studio pedagogy. However, a flipped format would be beneficial to increase the time allocated within the studio for application of knowledge, while time outside of the studio is dedicated for collecting more theoretical knowledge. The experiential learning cycle would still be a feasible model given that students complete the requirements of each class prior to the physical studio meeting.

The students' suggestions to reduce the number of projects assigned throughout the course would impact the learning experience intended through the game-based format and the studio format. The learning experience would become lacking in aspects such as chances for multiple feedback opportunities, variety of options to gain points throughout the course, and the

opportunities to engage in the course's achievement reward system. Reducing the number of projects also includes enlarging the scale and increasing the requirements for each project, which would reduce the chance to explore different aspects of presentation media and design process.

### **Conclusion and Future Directions**

The question of how to design game-based learning environments is of wide popularity. However, different disciplines may consider different approaches that are relevant to the content area, course structure and format, and the type of learning experience. This paper explained the process of designing a game-based learning environment within an interior design studio course over a period of 16 weeks to answer the research question: How can a game-based learning environment be designed to address instructional issues in design studios?

The paper builds on instructional design best practices, game-based learning strategies, and how they fit into interior design education. The interdisciplinary nature of this paper is necessary to employ the relevancy of each of the three described areas to address issues that are prevailing in traditional design studios. The paper adopted the experiential learning theory model to align instructional design practices with game-based learning elements and attributes, while keeping with the spirit of the design studio structure. The course is designed upon a 4-level learning cycle that incorporates concrete experiences through reading, self-reflection through exploring and documenting explorations, conceptualization through in class practice exercises, and finally active experimentation by applying knowledge to authentic projects.

Game-based learning structures goal and objective setting for students which enables them to know and meet expectations of the studio environment and the design process. Game-

based learning also allows for setting smaller milestones which keeps students on track and may reduce their tendency to procrastinate and fall short of appropriate time management.

Scaffolding and feedback built into the game-based learning environment also play a role in clearing the ambiguity of the design process and the subjective nature of design studios. A reward system that employs multiple progress tracking and feedback opportunities allows students to truly evaluate their performance in the course in different occasions and on their own time. Student autonomy was also provided for using multiple learning paths for each project, along with opportunities for following a standardized detailed structure as well as a individually customized progress path.

The evaluation of the course design along with student elicited feedback provided opportunities for future improvements and perhaps related studies. Offering the course in a blended format, where online components compensate for lecturing during in class meetings, can be an idea for a follow up paper or study. This would address the suggested improvements in multiple ways. The blended format would allow students to have more in class working hours when they can complete the assigned lectures and demonstrations outside of class time. Using a fully blended course delivery would also allow for following the Quality Matters Rubric more closely and effectively achieve more of its standards. This would improve the quality of the course design and solve issues of navigation via the learning management system. The challenge would remain to effectively incorporate the game-based learning strategies discussed in this paper. Usability testing could also be implemented to ensure smooth navigation throughout the digital course environment, as well as student achievement measures to study impact of such an approach on their performance.



**CHAPTER 4. GAME-BASED LEARNING  
in INTERIOR DESIGN STUDIOS: A CASE STUDY**

Zina Alaswad

**Abstract**

The purpose of this paper is to understand perceptions of interior design students after using game-based learning (GBL) as an approach to address workload distribution, lack of clear assessment criteria, and deficiencies of the master-apprentice model during the process of solving several small-scale design problems along the course of a semester. A literature review of the instructional issues in design studios is presented along with an overview of the activity systems theory as an underpinning theoretical perspective. This research paper explains the research design behind the case study methodology used to perform data collection, analysis measures and organize coding schemes. Findings from the study conclude that game-based learning fits into the iterative and experimental nature of the design process, helps students focus on the design process through trial and error without a great risk, changes the studio's feedback structure, allows students to track their progress while having creative freedom. This paper provides empirical evidence supporting the existence of instructional issues in traditional design studios, provides considerations for using game-based learning to address these issues, and suggests directions for future research studies in fields of instructional technology, design pedagogy and higher education policy.

## Introduction

Interior design studios are environments for active learning and experimentation. However, design studios have been generally criticized for shortcomings in their basic pedagogy. Building on chapters 2 and 3, this case study attempts to understand the perceptions of six undergraduate interior design students about using game-based learning approaches in a 16-week long media presentation studio. The course design is fully explained in chapter 3 of this dissertation. This paper focuses on explaining the design of the research methods, data collection, analysis methods and coding procedures. It additionally discusses matters of trustworthiness, data triangulation, and the studies limitations. It finally delves into the study findings through referring to participant quotes. This case study attempts to answer the following research questions:

1. How do interior design students perceive GBL as an approach to address the following issues during the process of solving several small-scale design problems:
  - Workload distribution
  - Lack of clear assessment criteria
  - Deficiencies of the master-apprentice model
2. How do the perceptions of these students confirm general affordances of GBL within interior design studios?

The paper concludes with how these perceptions inform considerations of implementing game-based learning in interior design studios. These considerations are important since game-based learning is a highly iterative and adaptable approach that can be molded to fit a variety of

disciplines and content areas. Also, these considerations are evidence-based on students' feedback through individual interviews, weekly reflection writings, in class observations, and a focus group session.

## **Literature Review**

### **Issues in Traditional Studios**

The design process manifested within the design studio dictates the sequence traditionally practiced by design educators (Broadfoot & Bennett, 2003; Kuhn, 2001). Students tackle open-ended and ill-structured problems usually presented as project descriptions. The number of projects students complete within each studio differs greatly depending on their academic year and studio topic. Students in entry level and drawing media studios are usually required to complete 2-4 short projects, 2-4 weeks long each. Students in advanced level studios are usually required to complete 1-2 large projects, 6-8 weeks long each. For each project students work on developing alternative solutions for the problem suggested by the project description. The solutions are evaluated through desk critiques and class pin up presentations using multiple media and communication tools, where student receive feedback from the instructor, visiting jurors, possible clients, and peer students (Hokanson, 2012). Due to this feedback, students narrow down to one main solution and delve deeper into its full development and detail. Thus, students work increases in complexity and accuracy as they advance throughout the semester (Kuhn, 2001).

However, this traditional format of the design studio pedagogy has been criticized for issues with student workload distribution, deficiencies with the master-apprentice model, and the unclarity of assessment measures used to evaluate student work. Student workload distribution

has been questioned in design studios due to amount of time allocated for the studio sessions within the curriculum (K. M. Smith, 2013, 2015; Yurtkuran & Taneli, 2013). Confining students to perform their design thinking and acts of creativity within the studio's space and time forces students to often waste time during studio sessions (Kuhn, 2001; Moore, 2000). The lack of using reflective activities, and the high demand for producing solutions, in studio environments often contribute to a not highly effective learning experience (Schön, 1984). The misalignment between the time allotted for studio sessions and the workload distribution expected from students is obvious according to a study performed by Kennon Smith (2013). He found that most interior design students interviewed for the study complained of the project timelines being unrealistic and adding to the difficulty of completing their course requirements.

Despite the recent studies to explore innovative pedagogical applications in design studios (Dorta, Kinayoglu, & Boudhraâ, 2016; Kanaani, Kopec, & Thomas-Mobley, 2014; Peterson & Tober, 2014), the master-apprentice model seems to be the most dominant approach since the 1920s in formal design education (Ghassan et al., 2014 2014). Using apprenticeship for teaching and learning may be an effective tool in skill transfer from instructor to learner. However, current learning expectations of learners exceed the capabilities of the apprenticeship model since it requires one-on-one, face-to-face interaction between the instructor and the learner (Collins & Kapur, 2014). The short attention spans of students and the pressure on instructors to attend to all students equally adds to the difficulty of applying the master-apprentice model effectively.

Other unexpected results of using the master-apprenticeship model in design studios include encouraging a sense of following of the instructor which limits individuality (Glasser, 2000); and misinforming the educational process when instructors try to conceal the design

procedure to arrive at final solutions or products (Yurtkuran & Taneli, 2013). This shifts students' focus on the final product instead of the design process (Moore, 2000).

Creativity in the design studio is of paramount importance for it nurtures innovation and individuality among students. However, traditional design studios view creativity as the only important skills to cultivate and gains exaggerated emphasis compared to other aspects of the learning experience in design studios (Gross & Do, 1997). Design educators have found that the subjective, and highly personal process of design challenges their ability to implement clear criteria to evaluate student work (Groat, 2000; Wang, 2010). The level of subjectivity employed in evaluating student work produced as part of design studios affects the rigor of instruction and hampers the translation of instructor feedback to the traditional grading system (Findeli, 2001). Studies conducted in interior design studios show that undergraduate students viewed their grades as an incomprehensive and subjective measure of their work quality, yet they were the *only* indicators they could rely on to assess themselves (K. M. Smith, 2013, 2015).

### **Theoretical Perspective: Activity System Theory**

The design studio, as a learning environment, can adapt to several theoretical perspectives. For this study, I used the activity systems theory developed by Yrjo Engestrom (2000) to analyze the studio environment into identified yet integrating entities; participants, a sense of community among said participants, and a set of engaging activities that are part of the larger activity system exemplified by the studio structure. The community among participants in the design studio is mainly developed when they work simultaneously towards a common goal (J Dewey, 1915). The activity system comes to life within the studio environment when participants are involved in tasks that facilitate prior knowledge and experiences (J Dewey, 1915;

Engeström et al., 2013). Therefore, we can see that the design studio is a learning environment (activity system) composed of participants (learners and instructors) working together as a community on activities (tasks and actions) that require and foster skills for communication, inquiry, construction, and artistic expression. These different skills enable the development of new comprehension strategies and stimulate creative problem-solving (Engeström, 2014).

Participants in the design studio are active contributors to and creators of the knowledge, content, context, and perceptions. They are not solely dependent on the instructor as a source of learning, but participate in developing their own learning as they progress through the different projects.

### **Affordances of GBL**

Several definitions of game-based learning have come about from the great amount of research that has been dedicated to the topic for the past 20 years (Perrotta, Featherstone, Aston, & Houghton, 2013). For this case study, I have adopted Karl Kapp's definition of game-based learning where game-like elements and attributes are used in a meaningful manner to design a course in game-like structure to promote learning and engagement (2012). The impact of game-based learning has been also a topic of interest to researchers and academics in different fields where it is found to; cultivate better learning attitudes, increase student motivation, nurture higher-order thinking and decision-making processes, situate and authenticate the learning experience, and aid the achievement of better learning outcomes (Barzilai & Blau, 2014; Kapp, 2012; Nelson & Annetta, 2016; Perrotta et al., 2013).

In this study, game-based learning approaches were used to establish a structure for the activity system within the design studio. Elements and attributes of game-based learning were used to increase student engagement and nurture skills acquisition through structuring the studios

tasks and actions. James Paul Gee (2004), suggested that game-based learning is built upon several learning principles, and some of which can be used to address the instructional issues pertaining to traditional design studio environments. In both game-based learning and traditional studio settings, learning is situated in practicing knowledge. The experiential nature of learning in these environments reduces stress associated with risk taking, or fear of failure when trying new approaches.

The iterative and ongoing learning process that takes place in game-based learning environments is like the learning cycle in design studios. The complexity and nonlinearity of the design process is like the multiple problem-solving routes available for learners in game-based learning. Finally, the learning experience in both environments is based in the learner him or herself, the learning environment, and the community of other learners.

### **Overview of Research Design**

The study used a case study methodology to study how six undergraduate interior design students use and perceive game-based learning as a supplemental approach to solve design problems in a studio environment. The students used a game-based learning approach I designed to navigate the different phases of the design process in several small projects. I observed participants while they were working through the design problem. Observation notes were jotted down during the work sessions. During the semester, each participant was interviewed individually to reflect upon and clarify his or her experiences during the use of the game-based learning approach in the design studios. More specifically, the interview questions focused on understanding how students perceive GBL as an approach to address workload distribution, assessment ambiguity, and master-apprentice model deficiencies. The students were also

debriefed in a focus group session to provide insight on what improvements needed to enhance the proposed game-based learning studio and how their perception confirm general affordances of GBL within interior design studios.

### Sample and Demographics

The study used criterion and convenience sampling (Bloomberg & Volpe, 2015) to recruit six undergraduate interior design students at a public University enrolled in an interior design studio instructed by the principle investigator. Students were introduced into the study using brief explanatory leaflets (Appendix D) and I also provided a detailed description, and answered their questions about their participation prior to them joining the study. I distributed consent forms (Appendix E) to all students in the class, and those willing and interested in participation signed and returned the forms. The study lasted for the duration of the fall semester where students and the instructor met 3 hours twice a week at a dedicated studio space within the university campus. The demographics of the participants can be summarized in Table 4.1:

Table 4.1

#### *Sample Demographics*

Demographic	Category and Percentage			
Age	20 16.66%	21 16.66%	22 50%	23 16.66%
Race	White 67%		African American 33%	
Program Year	Junior 83%		Senior 17%	
Gender	Female 83%		Male 17%	



## **Data collection**

I collected data in the study via multiple sources. The unit of analysis of the study is the activity of design within the studio space and the specified projects timeline. There were multiple units because the study included six participants that engage in the design activity. Observations were used to collect data on how the participants progress through the various stages of the design activity. During the working sessions, I collected observation notes in a digital format and reflect on each session as soon as it ended. I also took note of student's comments, feedback and nuances that occurred during the weekly studio sessions. The observation notes were documented in a word document that was prepared with area for inserting the session's number, date, and time at which specific events took place. The word document was also structured into a tabular form where I can insert descriptive observations and corresponding reflective notes. The observation form can be found in Appendix B. I also collected weekly reflections from students and used them to inform interview questions. During the semester, I conducted individual in-depth interviews with the participants to illuminate the notes made during the observations by allowing the participants to explain their decision-making procedures. I used a semi-structured interview protocol that allowed me to document demographic information from each participant (Appendix C). I recorded interviews with participants using two electronic devices to ensure that I have multiple recordings of the interviews. This helped me be prepared in case of facing technical issues with one of the devices. I took minimal notes while conducting the interview to ensure that I maintained rapport with the participants.

A focus group was used to collectively discuss participants' artifacts and collect feedback about their perceptions during the different design stages. I used a semi-structured protocol that was like the one used in the individual interviews, with a few additional prompts and questions

added (Appendix C). The focus group protocol also allowed me to visually document the location of each participant and their assigned number for easier identification during transcriptions. The focus group helped participants brainstorm about ways to improve the game-based learning pedagogy for further expansion and use in other design studios. The final focus group session was recorded and transcribed. Student artifacts were also collected so they can be used during the focus group session.

### **Data Analysis**

The analysis of the data took a formative approach. The observation notes and weekly student reflections were continuously analyzed to inform the questions that need to be asked during the individual in-depth interviews. The in-depth interviews were then transcribed and analyzed to inform the questions or topics that guide the focus group session. Therefore, the structure of the method was open to change and enhancement as the study continued. I personally transcribe all audio recordings to immerse myself in the data. Notes and memos were also documented during transcription.

I used attribute coding to help organize the data. Using an excel spreadsheet, I organized these attributes and connected them to the data formats. I coded the data per participant and identified their corresponding interview session number and date, focus group comments, and weekly reflective writing document. I then used structural coding to organize participant responses for each interview question, and then relate them to answering the main research questions. This coding method allowed me “to quickly access data that was relevant to a particular analysis from the larger data set” (Namey, Guest, Thairu, & Johnson, 2008). I finally used in vivo coding initially for interview and focus group transcriptions (Saldaña, 2015).

Finally, the data was comprehensively reviewed again using pattern and focused coding to produce themes and assertions that inform and address the research questions. Making sense and meaning of data took place during the theming stage, where codes were synthesized to formulate categories, then themes that were later used to create assertions. These assertions eventually helped answer the main research questions of the study. The results of data analysis lead to a broad interpretation about what I learned from each of the participants to illuminate the unique case of game-based learning in interior design studios. Also, the findings discussed lessons learned to inform the development and enhancement of the proposed game-based learning pedagogical approach.

### **Rational**

According to Creswell et al (2007), the characteristics of my study elements fit the case study research design. The problem that my study tried to address was bound by place and time. The design process under research took place in an interior design studio space for a finite amount of time. More specifically, the design process was divided into three stages: conceptual design, preliminary design, and final design. The time of the problem under investigation was aligned with the completion of these three stages. The research questions posed by the study were of in-depth descriptive nature. The questions encouraged an in depth understanding of how six undergraduate students in an interior design program perceive the use of game-based learning as an instructional and learning pedagogy. The study attempted to provide an understanding about how the experiences of these students provide insight into the unique pedagogy of game-based learning in interior design studios.

## **Trustworthiness**

Bloomberg and Volpe (2015) discuss several issues of trustworthiness. Credibility refers to my ability as a researcher to portray that the participants' perceptions match my interpretations of these perceptions. A first step is to disclose my biases as a researcher, an interior designer, and as an interior design educator that I bring into the study. As a researcher, I have my biases in terms of the findings I expect from the study and I need to be clear in differentiating what I would like the data to convey versus what it truly does convey. As an interior designer, I have biases in terms of my design style and approach. I tend to use inductive logic when thinking about design solutions, where I start from the specifics of the problem statement and progress systematically to the general and overall solution. And as an interior design educator, I have biases in terms of what I view as appropriate or correct design processes. This relates back to my inductive design thinking approach. Controlling this cognitive procedure can become difficult at times specially when one is immersed within problem-solving with students. Therefore, I develop evaluation rubrics and descriptive problem statements that are built upon credible design education resources such as the Interior Design Educators Council teaching resources library (IDEC, 2017).

The second step is to use a triangulation of data collection methods to validate the consistency of participants' perceptions. I used observations of participants during their exploration of the project. I supported these observations by interviewing the participants individually to develop a deeper understanding of their experiences during the design process. Finally, I used a focus group to create a collective understanding of the participants' experiences. These three methods allow me to confirm any agreements or disagreements among the experiences of the different participants. As a final step to ensure credibility, I used member

checking after the stages of data analysis and initial findings write up to ensure that my interpretations and synthesis were still consistent with the participants' interpretations.

Dependability refers to whether my processes and steps in data collection and interpretation are traceable. In my study, I used an audit trail of detailed and thorough explanations of the processes and procedures that took place during data collection and analysis. To systematically keep track of these processes, I used a journal to document my notes and memos after each data collection session. I also used the journal to document my thinking processes during data analysis and interpretation.

Transferability refers to the ability of the study to be built upon or made use of in similar contexts and disciplines. Transferability is important in this study because the design studio context is not specific to the discipline of interior design. It is a common environment for artistic exploration and elongated problem solving processes in a variety of disciplines such as architecture, graphic design, industrial design, fine arts, landscape architecture, community, and urban planning. I used thick and rich descriptions to portray a realistic and holistic image of the participants' experiences and reactions during the study, which may be useful for scholars and educators in similar fields. I also used detailed and specific information about the environment of the study; the studio. The detailed information about the context can help scholars and educators in design and art fields to make use of the pedagogical approaches employed in the study and mold them to their own contexts and environments.

## **Ethical Issues**

Procedural ethics are addressed through completing the IRB forms and process (Guillemin & Gillam, 2004). The IRB forms can be found in Appendix A. Some practical ethical issues that I faced were when participants shared information about their professors or personal experiences that were not specifically relevant to the study's topic and focus. Additionally, ethical issues were raised when participants asked me to provide additional input about their design decisions and processes, which was not just to the rest of the students in the class who have are not participating in the study. When such issue took place, I reassured the student that I can address his/her question after the interview, during my office hours, or during the studio time.

## **Limitations**

The restricted sample size and sampling method contributed to narrowing the focus of the study and reducing its transferability. In terms of methods of data collection, observations may hinder participants from going about their design process naturally. When students noticed me taking notes during the classes during the first portion of the semester, they seemed more careful and less natural in their interactions. Therefore, I modified my note-taking approach during the studio time. Instead of taking my notebook around the classroom with me, I left it at the instructor's podium and took mental notes. When I did return to the podium, I wrote down short notes to document what I observed. This reduced students' anxiety about why I was taking notes while I am reviewing their work. Also, focus groups brought on several limitations. Some participants' opinions were slightly over powering others or alter the path of discussion. I intentionally made sure that I address all participants for each question I ask, and to prompt each

participant's response when I noticed changes in body language (i.e. Nodding, raising eyebrows, head shaking, etc). Additionally, I anticipated that I may face challenges with transcribing the focus group session since it might be difficult to know which participant is talking at one point of time. Therefore, I asked participants to identify themselves with a number and to say the number out loud before answering any questions. When a participant forgot to mention their number, I made a note next to the question with that participant's number. The identification numbers helped immensely with accurate transcription.

### **Findings and Discussion**

After analyzing the data collected through observations, interviews, the focus group session, and students' weekly reflection papers, I organized the resulting codes to develop five major themes. The first three inform answers to the first research questions guiding this study. The last two themes address the second research question, provide supporting evidence of the affordances game-based learning can provide in interior design studios, and a reiteration of student reported issues in traditional design studios. In this section I identify each of the five themes and elaborate on supporting quotes and explanations. I also discuss how these themes inform the study's assertions and research questions.

#### **Theme 1: GBL Addressing Workload Distribution**

This theme condensed information provided from five code categories addressing the students' design thinking and process, their progress and motivation throughout the studio, and how incorporating game-based learning impacted their time management.

During the interviews and the focus group session, students noted how they see the design process during the game-based studio as iterative and based on trial and error. In their reflection papers, they described their design thinking in a continuum between trying and struggling, to rearranging their solutions and drawing from external inspirational resources. This allowed them to develop “too many” ideas, consolidate them, and change their thinking direction to arrive at more suitable solutions:

“I have been struggling trying to figure out what all to put on my board. I have literally rearranged my board layout at least ten times and I am still not happy with it.”

“I am still struggling with using filters and finding out which effects work best with my design.”

“I’m still trying to get a vision of how I want my spaces to look because right now I have too many ideas and can’t figure out how to consolidate all these ideas.”

“I started with sketches related to that and draw on some inspiration ... change my direction and go with a theme that suited my project better.”

Students also noted that within the game-based studio, they had the chance to think deeper and earlier about their projects. They could do more preparatory work, explore ideas, and visualize their thought processes through sketching before getting into the details of the project. One student focused on how the game-based learning approach allowed her to focus on the design process and take risks with her creativity because she was “not trying to do it to get it correct, like I’m just doing it to like experiment, [to] see what works.”

Students also discussed how the game-based learning approach impacted their progress and motivation to stay on track throughout the semester. The game-based learning elements employed in the course, badges specifically, kept students motivated to work hard to get more advanced in the course. They enjoyed the not-so-traditional approach despite the lack of physical reward. The badges became their proof of accomplishment and progress:



“it gives us a different way of learning other than you know just stuck in like you all have assignments due then blah, blah. Then it actually gives you, you know if you see you achieved a badge, okay I did something good, I did something right.”

The in class and home quests kept students flowing through the projects. They knew that each class meeting they had an activity that is either due or to be completed in class. Therefore, they stayed on task working on one activity at a time. Students also noted that using the game-based learning approach reduced their tendency to procrastinate. The continuous, and consistent, weekly checkpoints obligated students to complete their activities on time and not get behind. They shared that they did not “cram” as much work as they usually do towards the end of the project or the weekend to “catch up”:

“just because I know that each class period like I have something that’s either doing on a blackboard or like you’re going to come by and check it. So I know I have to get that done I can’t just be like I am going to use the weekend to catch up”

“I found myself doing, staying on task a lot more and not like just waiting to the weekend to do it.”

“It [GBL] keeps you motivated then keeps you on, you know, like tasks, what you’re supposed to be doing so, you don’t end up getting behind.”

“I liked how you had different aspects due one at a time, that way we could stay on track and work on one and that way it’s not cramming it all at the end trying to finish. We had to stay on top of it.”

The game-based learning approach also influenced the structure of the design process. Students commented on how they found the defined structure of each project useful along with

the corresponding due dates to individual activities within. They also enjoyed having creative freedom, despite the structured nature of the course:

“My favorite part about this course compared to other classes is that you did not force us to do anything we didn’t like. I liked having creative freedom to do what I wanted for a change.”

“I did like that our projects had structures and due dates, and I felt they were more open ended.... with this course I was able to see my own design develop”

Students found that the timeline used for the course aligned well with the design process. All the course activities and elements such as checkpoints and quests worked together to guide students throughout the different projects in a gradual manner. Using tutorial demonstrations or a short lecture before working on activities each class introduced students to what was expected. The in-class quests allowed students to practice the gained knowledge while being able to ask questions. The home quests connected the class meetings between different weeks and gave students the chance to apply knowledge on their own time. This structure allowed students to see their progress, visualize their design process from the very initial stages of exploration to the final stages of application:

“we go like step by step instead of just saying like design is a whole time thing”

“it was really good like the way that we always start off with like a tutorial, I had to do it and then like go on from there in a good order”

“I think like the way you had the time, I’d say what we had to do our research first and we had that week to get that in. Then do our selections next and that first week was focused on the research it wasn’t focused on doing selections”

When students were asked if the game-based learning approach impacted their time management during the studio, two did not see it as impactful. One viewed the checkpoints as regular due dates, the quests as traditional assignments, and the rewards as their traditional grades:

“because when you are in college you are just like, you are like okay that’s a due date got to do it then. I didn’t necessarily look at it like any other way if that makes. I just did it, that didn’t affect it I don’t think. I don’t think it affected my time management. Because versus a normal thing, it would have just been like basically the same thing just not worded that way”

The second student focused on how the approach was not efficient for him as a full-time employee, where his busy work and school schedule kept him from keeping up with the required checkpoints, quests, and achieving the rewards:

“The approach maybe didn’t work so much for me personally. If I was more a traditional college student who didn’t really have to work because I had help from my parents to pay for all my bills and everything, then yeah, I’d be. As a less traditional college student, it was a little more challenging to keep up with.”

The other four students thought that the game-based learning approach made the studio easy going and not as stressful. It allowed them to stay ahead of schedule by becoming more conscious of how they spend their time on different aspects of the course. They became more patient with their design thinking, managed their effort and time, and could gradually perfect the design process and product which reduced the “rushed” feeling to check items of a to-do list.

“I have been able to kind of be ahead of schedule. I have worked almost every day at work on my Moroccan board and it has allowed to me to be pretty stress free throughout this whole project.”

“I just became more conscious of my time and what I needed to spend my time doing to finish the project.”

“With patience and time, I think this project will come out neat. I don’t want it to look like chicken scratch and rushed so I want to perfect during the time provided and do my best in the given time.”

“I don’t feel as rushed, and I think a lot of that has to do with there been like check points, and incentives for meeting those check points. It’s helping me to be more disciplined and like get myself done, and not push it off to the weekend, because there’s only so much I can fit in on the weekend.”

## **Theme 2: Achievements and Rewards**

Students were provided with multiple ways to track their achievement throughout the course, and multiple ways to receive feedback on their work. This theme focuses on how students used different mechanisms to track their progress, and how these mechanisms were beneficial to each of them. Students used a variety of mechanisms to track their performance and achievement throughout the studio. They also used these tools to receive feedback about their performance without needing to meet face-to-face with the instructor or waiting till midterms to know how well they are doing. Students used a combination of tools related to game-based learning, and inherent within the learning management system used to facilitate the course. Per

their comments during the focus group session, they appreciated having several options to track their performance continuously throughout the course.

**Leaderboard.** Students used the Leaderboard tool to view their ranking among the rest of the class. They found the leaderboard useful because it provided anonymous and indirect feedback on their performance in the class relevant to other students. They also found it motivating for them to try and improve their performance within individual areas of the course. The leaderboard showed percentages of how well a student was doing in projects, in-class quests, homequests, and attendance. Each category was in a separate column. Therefore, it provided another view of the performance in addition to the overall course score available via the learning management system.

“the leaderboard it kind of show you where you are compared to other people. You can see I need stuff that, if I’m not doing too good or like good or bad. Shows you how other people are doing”

“I definitely look at the leaderboard. I think the leaderboard, but I think it’s very helpful. So, I definitely, like it’s not, you can’t compare yourself to others. But you don’t know whose ideas were those, but you know, okay, well, I mean their place. So, I’m doing good, so I should keep well with it. Or if I’m in 5th place, I need to put a little fire and get it together. I think it’s, that’s how I track. I look at that before I actually look at like the grades, in the black board. So, I look at that bit at first, I think it’s very helpful. Yeah, I actually like that better than the black board system.”

“my favorite is the Excel sheet [Leaderboard], so I can see where I am, like in relation to other people.”

“I like the leaderboard best. Because for instance in the system, the way the blackboard system is set up, you just see it like this is your point. This is how many points you were able to get, and this is how many you got. But more of the leaderboard more, it kind of breaks down more to me. Like we have the in-class quest, this is like your overall percentage of that”

**Badges.** Students had mixed feedback about the use of badges in the course. Although they thought the badges added an enjoyable element to the course, they could not see the necessity or value behind them in terms of evaluating students’ performance in the course. They also noted that although badges were a symbol of achievement, they did not find them motivating to improve performance, and not an accurate reflection of a high score. The badges were set up to be released to students if they achieve an 85% or higher on a specific task. This criterion was not a “good grade” to some of the students. Using the badges as merely virtual rewards was not a strong enough reason for employing them as an achievement tracking mechanism:

“I think since we have the leaderboard which shows where you are compared to the class, maybe the badges aren’t necessary. I like them though! I am a very competitive person and I want to win at everything. But I really like the leaderboard. I made a point to check it all the time.”

“badges were least useful, it was fun but I don’t really like check the badges all the time but I love. The badges, I mean they kind of showed you where you were but they weren’t like necessarily, I feel it’s not worth the effort that you have to go through to do it.”

“I think the badges they are fun. They don’t necessarily make me work more, like I’m just trying to get my assignments done so I’ll get a good grade in the class. But, they are fun to see them.”

“I feel like the badges were just there. Because most of the time, I did not know that I achieved a badge. Or I don’t take the time out to go check it on Blackboard.”

“I want to achieve this badge but you can still achieve a badge and not do so good”

**Rubrics.** Students used the rubrics to have a clear idea of the criteria used to evaluate their work. They mentioned using the rubrics to identify how many points each activity was worth, what areas to focus in the project, to understand project expectations, and to provide self-review on what they are accomplishing or not accomplishing:

“The rubric [was] definitely useful, because it’s you know like for instance if something is worth 20 points, and then something is worth 5 point, you know what to focus on more. So, if it comes down to time, not having the time you will know, “Okay, well I need to focus on this, because it’s worth more points.”

“Instead of trying to focus on something that’s worth 5 points, and spending all the time on that. Then put more focus on something is worth more points, because the more value is going to affect your grade more. So, I feel like the assessments definitely help.”

“I love rubrics because I can know before I start what you’re looking for. Where my points are coming from, you know, within their there is a lot of points and you know I really focus on that.”

“The rubrics were definitely useful because you can go like is a list of things that you should have in your project and that way can go check off like, okay, I had that, I had that. So, yeah, I like that one”

**My Grades.** This is a tool is inherent within the learning management system used for the course. Students used “My Grades” to know how many points they achieved or missed for each individual course activity. It also allows them to view all their graded activities in one page, and displays the status of grading for each item (in progress, graded). It finally allows them to view comments and feedback the instructor documented on their work:

“I checked “My Grades” in Blackboard just because I am the kind of person who likes to look at a list all in one place.”

“I go directly to “my grades” in blackboard and look at my grades.”

“I just always check my grades, because I’ll be like why do I have a zero in this grade? What did I not do? Or, just kind of keeps you updated.”

“I check my grades on blackboard because you’ve just seen exactly what you made.”



**Calendar and timeline.** Although this is not a tool that was intentionally designed or used to provide students with ways to track their achievement in the course, some students mentioned using the calendar to track weekly studio activities and their corresponding due dates. One student explained how using both the calendar and the timeline helped her plan:

“The tool that I use to keep up with stuff in class is “Calendar” in Blackboard. I go to calendar and it shows what’s due that day. I have my planner and like I’ll write on each day like what’s due that day and then like at the bottom write what I should work on that day to like be where I am supposed to be. So like every day I’ll get done what I have on there and look at it. As long as I stick to that, like I’ll plan it for like the whole week and if I stick to that like I’ll be done with everything on time and that way I don’t stress myself.”

### **Theme 3: Learning Roles**

Within the game-based studio environment, the roles adopted by students and instructors change to better suit the learning experience on hand. The learners’ role developed and adapted through several phases during the 16-week period of the semester. At the beginning of the semester, students discussed how they felt skeptical about the game-based learning approach, hesitant and reserved towards trying to immerse themselves into the experience, and resistant to leaving their comfort zone:

“At the beginning of the semester when we were using photoshop I was more like how do I do this? I don’t want to do this, I don’t want to figure this out.”

“At first my role was like a deer in headlights. I felt lost and like I don’t know where I am going with this.”

“a lot of us at first were hesitant on how we felt about it because it was just kind of a new structure.”

“I was still a little bit hesitant and so because of that, I feel like I was like skeptical, and I didn’t like push myself at the beginning .... So, I was just reserved”

Towards the end of the semester, students found themselves more encouraged to take initiative in their learning. They felt that they can be responsible for searching for answers to their questions, encouraged to leave the comfort zone to try new ways of learning, and be less critical of their unfamiliarity with the new knowledge they are gaining:

“when we got to Sketch Up towards the end of the semester I see that I am more encouraged to try and figure things out on my own. I think I have progressed in that way in taking it upon myself more.”

“once we actually started putting our foot in I felt like I need to change my role and be responsible for figuring out how things work. I was like when in doubt, google it or YouTube it. It was like I felt my role was to take initiative and search for answers to my questions. I am not going to always have someone beside me to answer my questions so let me take initiative to figure it out on my own.”

“I have even ventured out a little bit and done stuff that I didn’t even know about yet.”

When reflecting on how their roles changes as students during the focus group session and the individual interviews, students shared some ways that they could have done things

differently during the course to improve their learning experience. One student mentioned that she should have taken more notes, or recorded the lectures and demonstrations in class. Another student discussed how she would have liked to increase her effort and improve her work quality. Finally, one other student wished she was more open and embracing of the different way of learning introduced in the class:

“I actually wish I would have taken more notes than I did to utilize it, or at least maybe I should have, I felt like I should have recorded the lectures and stuff, especially for Photoshop.”

“I feel like maybe I should have maybe recorded the lectures more with my phone, or something or took more notes. Or made like visual pictures with something to help me, that’s what I wish I would have done more.”

“I wish I would have paid attention from the beginning of what the overall project was going to be several time.”

“I wish I would do more premium work, put more effort into like sketching and ideas and stuff.”

“Be a little more open minded to it because even though it was new and I was trying to learn it .... I didn’t like push myself at the beginning”

Students also shared how they viewed the instructor’s role during the game-based studio, and how it changed depending on the nature of the project on hand. The role of the instructor was within a continuum between being hands-on and hand-off. Students explained that when they needed step-by-step and detailed guidance through their projects, they found the instructor involved within their learning experience. They focused on how the instructor goes around the

studio space, shows them techniques through in class demonstration, checks on their work, and keeps students on track by reminding of important due dates, checkpoints, and explaining intricacies of the game-based learning approach:

“in the beginning I felt like it was more, more hands on step by step”

“I feel if you’re really involved ... like whenever we’re doing rendering like showing those techniques and working around and making sure we understand what we’re doing.”

“to help explain the game process and keep us updated and on track on everything. I like how before we go, we always go over it like, “okay, this is what is due next class.” That’s so helpful because we’ve got other classes, you are a college student you are just like, you are everywhere so, that’s very helpful.”

“when we watched you on the computer and just followed along with you. That is probably just the best way for us when we are going through the learning process. It's just doing there, hands on where we can ask questions and be able to work things out while we are there in class.”

“When we were doing the rendering we sat there and we rendered and if we had a question you came and like walked around and checked on us and saw what we were doing and made sure that we were doing things correctly, yeah.”

On the other end of the continuum, students found the instructor to be more hands off. They explained that they appreciated having time and space to think through problems in class while the instructor is there for them when needed. One student discussed how she found the instructor to be “not the traditional teacher... not just talking at us all the time.” She referred to the instructor as a “tool” that students can employ to facilitate their learning.

“You [the instructor] was hands off for the most part so we can have work days in class which I really do appreciate because if I am working on something at home and I get stuck, I put it away and procrastinate and then I am behind. But in class I liked having you there to help us along the way.”

“I guess like it’s a more hands-off approach for me, like I like that you’re to help others, I just like that you’re around to definitely give us instructions like I don’t feel like I’m doing this blindly, but at the same time, it’s not so like I don’t feel like you’re hovering over me and been like oh! You know, do this, do that it’s more open ended learning I guess. So, you’re just there like as a tool but not necessarily. I feel like you’re not like the traditional teacher and that you’re just like talking at us.”

#### **Theme 4: Affordances of Game-based Learning in Design Studios**

This theme summarizes categories of codes that represent the affordances of using game-based learning within interior design studios. Per the data collected from students, game-based learning helped provide opportunities for authentic learning, prior knowledge facilitation, and social interactions. Students found that game-based learning immerses them in an environment of experiential learning; where they learn through experimenting with a variety of design strategies and communication methods. They also noted that game-based learning helped them activates skills and perform tasks that are applicable to other design courses, world experiences, and realistic applications of the design process:

“it’s actually refreshing that we actually learn something this semester that we can actually apply in our field”

“even though this is a game. I feel like I could apply it more to like a different world of experience because it’s more like there’s deadlines and like checkpoints to get through like them like when we have to create our client like we have to think about their, like even though we were creating the goals we were kind of like with our client in mind. So I think that gets more applicable to like the real world.”

“It's is like, “Well, look class helps me.” So, I mean the course has definitely helped me and I think the game based learning thinking about design process like putting these little deadlines in the retail world of interior design I think the game base learning matches with your timelines and things.”

“[The course is] structured on how it's going to be in real life when you have couple of days to put materials together when you have a client walk in. I think it helped to give it more structure a better structure that is more realistic and how to get it out in the field. Based on my experience while working at furniture marketing.”

Within their weekly reflections, students discussed how the challenges within the studio facilitated prior knowledge from previous semesters. In class quests and home quests helped familiarize students with several skills they had forgotten. The quests within each challenge also helped them overcome their fear of previous failing attempts, and guided them to complete the activities of the studio:

“Doing this project has helped me a lot with remembering how to do things in that we did last year in another class”

“I learned a little bit last year when we were doing it for our residential class but it has been so long that I already forgot so much. I’m glad we worked through some of the exercises in class together because I would have been so lost.”

Students in this cohort have described themselves as being called the “quiet group” among other students in the program. Their social interactions were minimal at the beginning of the semester, and almost not interactions took place that are related to their work in the studio:

“Our class is kind of call that class the quiet ones because we like, up until this.... I mean ours it's been more, it's take longer for us to get to where we are at now.”

During the interviews and the within their weekly reflections, students discussed how they see their social group dynamics changing in the class. The main event that changed how this group of students interacted with each other was when they attended a presentation delivered by the seniors’ cohort in the program. Their attendance at the presentation was built into the game-based learning studio as an opportunity for authentic learning. My observations of the class showed that the participants started talking more amongst themselves, and discussed as a group their thoughts for their project’s final presentation. They even started asking each other for feedback and help with software related issues. The students’ in class collaboration helped address their questions faster than waiting in turn for a one-to-one consultation with the instructor:

“After seeing the seniors’ presentations for the hotel concepts, I started thinking about how I wanted my own presentation to look. While I don’t plan to be quite as elaborate, I want my display to definitely make you feel a small immersion within the Greek culture”

“I feel better about our project after seeing the senior students work.”

“I’m also glad that we got take a break from all the classwork one day and see what the seniors were up to. Seeing their projects also got me to thinking about my wedding project and how I wanted it to turn out. I noticed some people’s pictures didn’t really go with what they said they were going for.”

During the focus group session, students also discussed how they have started to feel like a family within the class. They mentioned feeling responsible towards keeping each other updated about classes, and becoming more comfortable about asking each other for help outside and inside the class:

“We are like a family. We stick together and help each other.”

“I think because we are a small group, we stick together and are very close to each other. We remind each other of things due and ask for each other’s help. We use GROUPME to keep each other updated.”

“I think this semester we got more comfortable with each other and our social interaction increased significantly compared to prior semesters.”

“I think that over this course we’ve become more social. Because at first, it was almost like an awkward silence in the room and nobody talked and now I feel like we’re a lot more vocal, than the first day of class.”

Interestingly, one student explained that the social bond that has been developed among her cohort is of more importance to her than the quality of the education she receives at the



program. She further discussed that the social collaboration and interaction among students in her cohort makes up for what is missed in class:

“the social aspect of the program is more important than the gaps that have been in some of the courses, because of newer instructors. Yeah, because I feel like even if you don’t get it from the teachers, whereas this classmate might understand it better, and can teach you like helped you. So, I feel like when you have that, when the program is small, everyone knows everyone, everyone is willing to help. So, this person may know Photoshop better than this person, and they can help you. Then this person may know in design better and they can help you.”

Students also focused during their interviews on how game-based learning has been part of student conversations outside and inside of class. Game-based learning became another way for students to update each other on important due dates, and collaborate to help one another compete in a friendly manner without compromising their relationship as individuals or their quality of work:

“I think there’s something to talk about, I mean we were all intrigued about it, first like how is this going to go? Because I mean it's different, like you said, it hadn’t been done in interior design before. So it was intriguing to see how it was going to go and how people talk about it in the group so I was like, their badges and stuff, they get like whenever somebody goes on and checks a badge it's like, “Oh! I got a little badge.” I mean it's kind of, it's more, it's kind of not such a serious thing I mean we are in college but, still it's fun and I don’t want to call it immature but luck of a better word, it's a little immature like, oh! We get to be silly over this little badge we’ve gotten and it's a little fun.”

“even though the projects are individual like we’re all doing the same thing and so, it like kind of promotes collaboration to an extent or like a discretion of our ideas, and I think that that has something to do with game based learning. Because we’re all like, I don’t think, I mean so we’re all directly competing against one another but like in a friendly manner.”

“you can ask other people like how are you doing like comparing like am I where I am supposed to be, I’m I falling behind or am I doing good, or am I like where everybody else is. I feel like we all do a pretty good job, we act like a family like helping each other out and stuff.”

### **Theme 5: Traditional Studios**

This theme discusses two categories of codes related to traditional design studios including affordances and issues. The affordances of design studios in general are concerned with the unique educational setting when compared to traditional lecture format classes. Students explained how they prefer the studio format over traditional lecture format classes for a variety of reasons; the nature of hands-on work that is usually required in a studio setting, the small size of classes, the lack of formality in the program, and the strong relationship between students and instructors:

“I kind of like design studios better than the extra courses because it’s hands on”

“a positive difference would be how laid back it is here. I love that so much, you can come and go as you need it’s like a little, your own little house. You are close to the teachers because you have such a small group too, I love it so much.”

“you don’t feel uneasy about anything. You don’t feel weird about asking the questions, or calling or texting you, emailing you at any time trying to figure stuff out. I feel like other majors that’s not the case”

Students also discussed their experiences with previous studios and the type of issues they usually face. The first issue that seemed to receive consensus among the participants was lack of creative freedom. Students shared that in design studios, they do not usually have the freedom to change thinking direction or design theme as the project progresses. They are also obliged to include very specific and standardizing details within the project to a degree where they feel detached from their own designs:

“I feel in other classes we are obliged to include specific things. It can be our design, if we add blah blah blah element which makes me feel the design is not really mine.”

A second issue that students face in design studios is the lack of clear instructions on how to move through projects. Students mentioned that they usually get told what to do, without any guidance on how to arrive at suitable solutions, and without consistent feedback for them to know if the solutions they arrived at are correct or acceptable:

“other times we had projects... So, it was like, “Okay this what our project is, start thinking about your materials and then we’ll work on a project as we go along.”

“In other courses I feel like design is a whole time thing, and not really a process”

“some of our courses they just, they [say] do this and don’t necessarily help you or check on your progress.”

Another issue that students discussed, and is more specific to their program, is the frequency of changing instructors. Due to the small size of the program, students are not provided with several full-time faculty. Instead, the program depends on part-time or adjunct faculty that deliver courses based on availability and need. This has impacted the participants view and experience of their design education journey. The lack of permanent faculty members made students feel less of a priority, shook their confidence in the educational foundation they receive, and caused them to question their ability to learn:

“we would like just thrown in the middle of all of that and it just was hard for us because we didn’t get the foundation that the previous students got.”

“Like we’ve always had like, we were so scared even when a new teacher came kids were like “oh God! Another new teacher,” they are like .... we’ve had random people come that aren’t even teachers, like architects trying to become teachers. They don’t know what they are doing and we end up getting kind of screwed over in the sense. I don’t see that really happening in other majors. We are kind of in our own world over here you know. It’s very different over here like, I tell my friends about it they don’t understand.”

The last issue students discussed with regards to design studios is time management and workload distribution. Students shared that although the studio session are long, they see it as a chance for instructors to ask and expect more work, and therefore increase the expected homework hours. Students tend to feel rushed in studios with majority of the work to be done outside studios hours. Hence, the learning process remains not very detailed and causes students to focus on just completing the assignment regardless of the quality or thinking processes behind the activities:

“because honestly our program, the homework hours are exponentially greater than college of business, journalism any of those.”

“at the studio, the time period is long, it’s almost like a 3-hour class, I still feel like there’s so much to learn in that time.”

“So, I’m always just touching the surface, I feel like I’m just kind of having to go back on my own and improvise. Or just to get a project done by the deadline, I feel like I’m, I don’t really understand the concept or how to do it, I’m just like googling just to get it done it on paper.”

### **Conclusions: Considerations for Using GBL in Interior Design Studios**

The experiential aspect of game-based learning matches the iterative and experimental nature of the design process. Game-based learning helps student focus on the design process (versus product) by allowing them time and room to think, explore, fail, and succeed without a great risk of penalty. This impacts the feedback nature adopted within the studio environment. Clear expectations for the multiple formative feedback sessions throughout the semester allows students to remain on track with the projects, while having creative freedom to explore ideas without fear of failure.

The GBL approach did not only impact how students thought about their projects, but also how they progressed throughout the different stages of the design process. Using quests allowed them to stay motivated, complete tasks on time, and procrastinate less.

The balance between a well-defined timeline and structure, and opportunity for creative freedom is one of the important aspects of using game-based learning within design studios. This

balance allows students to progress through the course collectively, while still capable of carving their individual learning experiences.

Time management is a shared responsibility between the instructor and the student in a game-based studio. Providing students with tools to succeed is only one part of the equation. Students should also invest time and effort into using these tools to achieve the expected learning outcomes by the specified checkpoints and be immersed in the learning experience.

To adhere to different learning styles and preferences, it is important to consider using multiple ways for students to track their performance throughout the studio course and to be able to review feedback when they need it. This is particularly important when implementing game-based learning in higher level studios, where students work on one large project during the semester. Game-based learning can be used to establish continuous performance feedback loops to ensure that students are aware of how well, or not so well, they are performing in a course. This way they can have a chance to improve their performance instead of waiting for major project critiques where risk and fear of failure is higher.

When implementing game-based learning in interior design studios, it is important for both the instructor and the students to understand how their roles impact the learning experience. The adaptive nature of game-based learning, along with the variety of tasks accomplished within a design studio requires the students to take a role of responsibility by not just receiving knowledge but also actively participating and contributing to their learning experience. It also requires the instructor to be able to wear several different hats in the classroom depending on nature of the task, student learning styles, and the learning goals of the course. While this may put both the instructor and the students outside of their comfort zone, it encourages them to adapt to rapidly changing situations which is a skill highly recognized in professional careers.

Game-based learning in interior design studios can be implemented to enhance several aspects of the studio community and instruction. The data collected within the study showed that game-based learning helped students see beyond the theoretical aspects of the design process towards the realistic application of interior design. GBL mimicked the schedules and deadlines of projects expected within a real design firm. GBL also activated knowledge that students gained in previous courses and built upon it, while increasing chances for student interaction during and outside of the class time.

Finally, students confirmed the instructional problems in design studios that are the focus of the study, including the imbalance between workload distribution and time management the high dependency on the master apprentice model, and the lack of clear guidance on expectations and progress of the design process. The long hours of studio classes do not seem to compensate for the longer homework hours causing students to feel rushed and not invested in the learning essences of the studio projects. The master-apprentice model followed in design studios proves even more problematic when instructors are temporary and/or lacking teaching experience. The lack of clear assessment criteria causes students to go through their studios without gaining confidence in their abilities to learn or effectively solve design problems.

### **Future Directions and Implications**

Several future research studies could be followed based on this case study. The limitations that the learning management system used in the study caused can be addressed in several ways. Future studies might delve into exploring student perceptions about game-based learning in design studios using a different management system or creating an independent game structure using Web 2.0 tools.

This case study managed to shed light on a small number of participants without the focus on comparing their attitudes between traditional and game-based studios. It would be interesting to collect evidence on both learning environments by conducting a comparative case study, where student perceptions about game-based learning in one design studio can be compared to their perceptions in a simultaneous but traditional design studio.

Finally, on a less relevant note, this study shed light on how the status of design instructors impact students learning experiences. Although the phenomenon of higher education recent tendency to highly depend on adjunct faculty is not “news”, there is currently minimum evidence on how such practices impact student learning outcomes in interior design programs. Another direction of research could focus on high education policies impact on the quality and status of interior design education.



## CHAPTER 5. CONCLUSION

The current design studio pedagogy has proved challenging for both instructors and students. The most critical issues that were the focus of this dissertation can be summarized into three categories: workload distribution, dependency on master-apprentice model, and lack of clear evaluation criteria. The first paper defined the design studio, summarized literature identifying its instructional issues, explored game-based learning strategies, and described how incorporating specific game attributes and elements into design studios may address these issues. The framework developed within the first paper can be valuable for educators interested in implementing game-based learning in studios and other project-based courses.

Due to the variety of approaches available for designing game-based environments, the second paper of the dissertation explained the process of designing a game-based learning environment within an interior design studio course. This paper employed an interdisciplinary approach to align instructional design practices with game-based learning elements and attributes, while keeping with the spirit of the design studio structure. The course was based upon a 4-level experiential learning cycle that incorporates concrete, self-reflection, conceptualization, and finally active experimentation. Game-based learning was found to provide structure for students which enabled them to know and meet expectations of the studio environment and the design process. Game-based learning also allowed students to keep track of course requirements which reduced their tendency to procrastinate and fall behind. A reward system with multiple progress tracking and feedback opportunities allowed students to truly evaluate their performance in the course in different occasions and on their own time. The professional evaluation of the course design and collected student feedback suggested offering the course in a blended format allowing students to have more in class working hours.

Additionally, future studies can implement usability testing to ensure the navigation problems are addressed prior to launching the course, as well as employing student achievement comparison measures to study impact of such an approach on their performance.

The empirical research conducted in this dissertation, in article 3, sheds light on instructional and pedagogical considerations that educators need to keep in mind when using game-based learning in non-lecture format courses such as studios. Game-based learning is a very iterative and experiential approach. It adapts highly to the different learning tasks and project types in studio environments. This aspect of GBL can be used to help students focus on the design process and engage more deeply in their design thinking with less fear of failure or risk associated with trial and error. However, the feedback nature needs to adapt to this changing pedagogy too. Setting clear expectations, along with multiple formative feedback sessions during the project timeline allows for the design process to be the priority of the learning experience. Additionally, instructors can employ GBL strategies to reduce student procrastination. Guided quests allowed students to stay motivated, complete tasks on time, and leave less work to complete over the weekend.

Another consideration is related to students' creative freedom. If not careful, instructors can confuse the highly-structured environment of game-based learning with the need for providing students with autonomy and ability to customize and individualize their design projects. Student autonomy can also be provided for using multiple ways to track their performance throughout the studio course. Game-based learning can establish multiple feedback opportunities for students to be aware their performing in a course. Therefore, they can have multiple chances to improve their performance instead of waiting for major project critiques.

Game-based learning changes the roles of the instructor and the student in the studio environment. Instructors should consider the probability of needing to move away from the traditional master-apprentice model in design studios towards a more *guide-on-the-side* approach. The instructors should also introduce the students to a learning approach they might be not used to in their traditional classes. When implementing game-based learning in studios, students need to take responsibility in actively participating and contributing to the learning experience.

The design studio learning environment provides several affordances, but suffers from deficiencies as well that impact students' learning experience. The research conducted throughout this dissertation confirmed the instructional issues identified in the literature. It also suggested opportunities for supporting the design studios available in fields of education, instructional technology, and innovative pedagogies. As was shown, the benefits of using game-based learning in studios extends the theoretical aspects of the design process towards realistic and situated applications of interior design.

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## APPENDIX A

### Institutional Review Board Application Approval Letter



THE UNIVERSITY OF  
SOUTHERN MISSISSIPPI

#### INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | [www.usm.edu/research/institutional.review.board](http://www.usm.edu/research/institutional.review.board)

#### NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.  
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16090601

PROJECT TITLE: A Case Study of a Game-Based Interior Design Studio

PROJECT TYPE: New Project

RESEARCHER(S): Zina Alaswad

COLLEGE/DIVISION: College of Science and Technology

DEPARTMENT: Interior Design

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 09/07/2016 to 09/06/2017

**Lawrence A. Hosman, Ph.D.**

**Institutional Review Board**

**APPENDIX B****Observation Protocol**

Session Number:		Date:	
Descriptive Notes	Reflective Notes	Time	Participants

## APPENDIX C

### Interview/ Focus Group Protocol

*Interview Protocol for Project: Game-Based Learning in Design Studios*

Time of interview:                      Date:                      Place:

The following interview questions are related to your experience with the instructional materials and approach used in your Design Presentation Media Studio. I will refer to the instructional approach as Game-based Learning. Should you have any questions please do not hesitate to interrupt me or ask for any clarifications.

**Demographics**

Age:                      Gender:                      Program:                      Year in Program:                      Race/  
Ethnicity:

Research Qs	GBL Strategy	Interview Question	Notes
1. How do interior design students perceive GBL as an approach to address issues during the process of solving design problems? 1.1. Workload distribution	Weekly units	1. How would you describe the flow or progress of your design projects in this studio? How would you compare that to your personal achievement in traditional studios? 2. Was there any impact? What do you think is the impact of the game-based learning approach on how you managed the time spent on working on the different activities of the studio? 3. Did the game-based learning approach influence your design thinking process? If so, how?	
1.2. Assessment Criteria	Quests, Rubrics, Leaderboard, Badges	4. How would you describe the assessment/ evaluation measures used in the game-based learning approach? What aspects did you find most/ least useful? Why? (use words such as quests/ rubrics) 5. How were you able to track your progress and achievement in the course? What elements of the course did you use most to track your progress and achievement in the course? (For the focus group: Do you like to have more than one way to see how you are progressing in the course?)	
1.3. Master Apprentice Model		6. How would you describe the instructor's role in this approach? 7. Did the instructor's role influence your learning in the course? How?	

		8. How would you describe your role in the process of the design projects within this approach? Why?	
2. How do the perceptions of these students inform the expansion of GBL to address these issues in semester long interior design studios?		9. How would you describe your education journey in the design field so far? Please describe your experience with traditional design studios and interior design specifically. Any issues that are pertinent to design studios? 10. What is your experience with game-based learning? (have ever heard of it before this course? What do you think it is?) 11. How would you describe your overall experience with the Game-based learning approach used in this studio? How would define Game Based Learning through your experience in this course? 12. What aspects worked in the course for you? What did not? Why? 13. What aspects of the game-based learning approach did you find most/least useful? Why? 14. What parts of the studio seemed most/least challenging? Why? What difficulties did you face during the studio sessions, if any? Why? 15. What was the level of social interaction among the students in the studio space? Did it meet your expectations? What do you see as the role of game-based learning in these interactions? 16. What improvements would you suggest to better enhance the course design? 17. Do you have any questions? Is there anything else that you would like to address?	



**APPENDIX D****Study Leaflet****Research Study: Game-based Learning in Interior Design Studios****Purpose**

Explore interior design students' experiences while using a game-based approach to the interior design studio.

**Time commitment**

Around 3 hours between interviews and the focus group.

**Procedure**

The researcher will conduct observations, interviews, and one focus group over the fall semester.

**Benefits**

- Projects to add to portfolio
- A chance to contribute positively to interior design education.
- Learn time management skills.
- Gain experience in innovative instructional methods.

## APPENDIX E

### Consent Form



#### INSTITUTIONAL REVIEW BOARD LONG FORM CONSENT

##### LONG FORM CONSENT PROCEDURES

This completed document must be signed by each consenting research participant.

- The Project Information and Research Description sections of this form should be completed by the Principal Investigator before submitting this form for IRB approval.
- Signed copies of the long form consent should be provided to all participants.

Last Edited August 28<sup>th</sup>, 2014

Today's date:

##### PROJECT INFORMATION

Project Title: A case study of a game-based interior design studio

Principal Investigator: Zina Alaswad

Phone: 601-266-4430

Email: zalaswad@usm.edu

College: Science and Technology

Department: School of Construction/ Interior Design

##### RESEARCH DESCRIPTION

#### 1. Purpose:

The purpose of this study is to explore students' experiences while using a game-based approach in an interior design studio. You are being invited to participate in this study because you are a student enrolled in a junior level interior design studio. It is hoped that the information gained in this study will benefit society by advancing knowledge in learning and teaching methods in interior design education.

#### 2. Description of Study:

If you agree to participate, the researcher will conduct observations, interviews, and one focus group session. Your participation will last for the duration of the studio course. Each week you will use Blackboard to access course material, submit assignments, and complete readings. The researcher will conduct multiple interviews throughout the semester. The interviews last 40-60 minutes and address questions that are related to your experience with using the game-based learning approach via Blackboard. The focus group session will last for 45 – 60 minutes and will address questions related to the collective experience of all the participants. The interviews and the focus group will be audio recorded. The researcher will take notes during observations, interviews and focus group session.

#### 3. Benefits:

If you decide to participate in this study, there may be no direct benefit to you. It is hoped that the information gained in this study will benefit society by advancing knowledge in learning and teaching methods in interior design education.

#### 4. Risks:

This study has no known risks/ discomforts.

#### 5. Confidentiality:

To ensure confidentiality to the extent permitted by law, the following measures will be taken:

- Identifiers will be removed before analyzing data.

- All names will be removed and only pseudonyms will be used when writing the findings.
- The computer that includes all recorded audio files is protected by a password. Also, the accounts used for logging into the recording software are password protected as well.

The participant identities will remain anonymous. The name of the university, college or affiliation will not be included when disseminating data.

**6. Alternative Procedures:**

You will not have any costs from participating in this study. You will not be compensated for participating in this study. Your participation can count as bonus credit towards your grade in the course.

**7. Participant's Assurance:**

This project has been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations.

Any questions or concerns about rights as a research participant should be directed to the Chair of the IRB at 601-266-5997. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits.

Any questions about the research should be directed to the Principal Investigator using the contact information provided in Project Information Section above.

**CONSENT TO PARTICIPATE IN RESEARCH**

Participant's Name: \_\_\_\_\_

Consent is hereby given to participate in this research project. All procedures and/or investigations to be followed and their purpose, including any experimental procedures, were explained to me. Information was given about all benefits, risks, inconveniences, or discomforts that might be expected.

The opportunity to ask questions regarding the research and procedures was given. Participation in the project is completely voluntary, and participants may withdraw at any time without penalty, prejudice, or loss of benefits. All personal information is strictly confidential, and no names will be disclosed. Any new information that develops during the project will be provided if that information may affect the willingness to continue participation in the project.

Questions concerning the research, at any time during or after the project, should be directed to the Principal Investigator with the contact information provided above. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-5997.

\_\_\_\_\_  
**Research Participant**

\_\_\_\_\_  
**Person Explaining the Study**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Date**