AN EXAMINATION OF CAD USE IN TWO INTERIOR DESIGN PROGRAMS
FROM THE PERSPECTIVES OF CURRICULUM AND INSTRUCTORS

by

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Abstract

The overall purpose of this study was to examine the nature of curriculum in college-level interior design programs, explore computer-aided design’s (CAD) place in these curricula, and examine pedagogy used to teach CAD in these programs. Specifically, the objectives of this study were to better understand (a) the nature of college-level interior design programs with regard to curricular conceptions, (b) how interior design programs integrate CAD into the curriculum, and (c) how interior design instructors adopt and integrate CAD into their teaching practices. A qualitative research methodology using case study design was used. Data at two college-level interior design programs were collected using document analysis and interviews with six interior design instructors, three from each institution.

Previous studies (Hill & Anning, 2001b) examined and identified how other design fields such as graphic, engineering, architectural, and apparel design practice the design process. However, there is little research found on how interior designers practice design and their profession, or how they use CAD in design. Therefore, this research contributes to the literature on how interior design professionals design using CAD programs and more specifically how they incorporate AutoCAD software in their professional design practice and in their teaching of interior design curriculum. Findings revealed that participants referred to their own professional practice to conceptualize and teach the design process. The phases of the design process described by each instructor were context-specific to a design project and their use of CAD in the design process depended on their preferences, skills, abilities, and the context of their professional practice.

Findings also revealed that CAD is an important tool in the field of interior design. Even though CAD may inhibit an interior design students’ creativity, it can save time, document
drawings, and assist in better coordination with other professionals in the workforce. To enhance interior design students’ skills, it is recommended that CAD courses be placed at the early courses of an interior design curriculum concurrently with manual drafting courses. This research provides useful information for future interior design instructors and CAD curriculum planning.
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Dedications

I dedicate my work to the memory of my father.

Even though you are far away, yet you are still very close.

You will always be my hero.

I love you Dad
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CHAPTER ONE

INTRODUCTION

Creativity is a passion for me. Even though I spent most of my education in the scientific realm, I was a young artist at heart. I was always good with numbers and solving problems, but also I was very interested in arts and design. For that reason, I chose to pursue studies in Interior Design at the postsecondary level. I believe that the interior design profession is a creative profession. Studying interior design provided me with tools and perspectives to redefine myself and evolve into a person capable of creation and thinking outside of the scientific realm. My skills as an artist and as a researcher have been influenced by studying and researching information in the interior design world. In this design field, computer-aided design (CAD) is a key tool, and a designer’s ability to use this tool is important. Unfortunately, by the end of my postsecondary studies, I felt that I was not sufficiently proficient in the use of CAD software to communicate design ideas. As a result, I had to learn CAD in more detail on my own and further explore the latest technological trends used in the profession. This self-directed learning sparked my interest in the teaching and learning of CAD. Consequently, I pursued a career in teaching, where I spent four years teaching CAD to college students in Kuwait.

Teaching has taught me the importance of mastering the transfer of knowledge to students, and staying current with the technology world. However, as a new teacher without prior teaching experience, I faced challenges and experienced uncertainties about teaching material and assessment. I found that the teaching material of the former instructor lacked detail, students’ assignments were easy, and past CAD courses did not challenge students’ aptitudes and capabilities. When I questioned the approach to assessment and evaluation, I was informed that previous instructors were not experts in CAD and therefore they taught only the basics to
students. I reformulated the course available syllabi and designed new course notes, new assignments, and new tests that were more challenging, and incorporated creative projects into the curriculum. I then became very curious about effective teaching strategies for practices of CAD in adult learning environments. In my own educational experience in an Interior Design program, students were left to learn CAD and related software programs on their own. Even as a student, I felt this teaching, or non-teaching approach, could be improved.

Teaching has become my passion. It has given me the privilege to share my knowledge, and to inspire and help students achieve their best. Teaching has also led me to a new passion: exploring the potential of CAD software used in the interior design profession. Now, as an interior designer, a CAD instructor, and a researcher, I want to pursue my curiosity about effective teaching practices to teach CAD and the way interior design educators use CAD to teach design. I am also interested in knowing the types of CAD software programs used by interior design instructors in their teaching. Different design fields approach the design process differently. Though they may all use the same tools, CAD among them, this tool is also used differently in different design fields. This study focuses on the field of interior design and college-level programs that educate professionals for that field.

Context of the Study

Computer-aided design (CAD) has become the standard drafting tool used in the design industry, especially in the field of interior design (Lu, 2008). In fact, “employers are expecting new hires to have more than basic skills of CAD programs” (Lyon, Ownbey, & Kang, 2009, p. 69). Interior designers are generally required to know more than one CAD program and are expected to possess the skill to integrate CAD into the design process (Lyon et al., 2009). However, in postsecondary programs that educate future interior designers, instructors seem
reluctant or perhaps lack proficiency in computer technology; instructor attitudes and lack of skill sets may act as a main barrier to integrating CAD into their teaching practices (Basa & Şenyapili, 2004). The postsecondary curriculum in CAD has continued to struggle to keep up with the ongoing development of CAD (Ibrahim, 2007). Design educators seem to focus merely on the conceptual stage of a design process. They also view the existing CAD tool as a drafting tool rather than a design tool (Hanna & Barber, 2001; Pektaş & Erkip, 2006). According to Hanna and Barber (2001), sketching by hand is what develops design notions and forms ideas at the preliminary design stage (Hanna & Barber, 2001). For that reason, CAD software has been used only to transfer the preliminary hand sketches into digital images. However, CAD now better meets the needs of various stages of design in the design process, and as such can be used as a design tool at the preliminary phase of design (Hanna & Barber, 2001). Therefore, instructors need “to realize that our past and present teaching styles and methods aren’t necessarily incorrect but need to adapt and grow” (Machnaik, 2002, p. 3).

**Purpose**

The current literature shows “a tension between traditional design tools and CAD in schools” (Pektaş & Erkip, 2006, p. 90). This tension forms the purpose of this study, which leads to three objectives. The objectives of this study were to better understand:

a. The nature of college-level interior design programs with regard to curricular conceptions.

b. How interior design programs integrate CAD into the curriculum.

c. How interior design instructors adopt and integrate CAD into their teaching practices.
Research Questions

To answer the three objectives of this study, the research was guided by five research questions:

1. What is the nature of the curriculum in college-level interior design programs?
2. What are instructors’ perceptions for the need to incorporate CAD in interior design programs?
3. What are instructors’ perceptions about the placement of learning CAD in the program? For example, what year and what semester should the learning of CAD begin?
4. How do interior design instructors, who use CAD, conceptualize the design process?
5. How do interior design instructors, who teach CAD, teach the design process?

The first research question was addressed by examining the interior design program curriculum at two colleges. The curricula were analyzed according to conceptions of curriculum. It was first necessary to analyze the interior design curriculum to be able to understand the nature of curriculum and how the curriculum has been developed. The remaining research questions examined interior design instructors’ perceptions about CAD in interior design curriculum and its growing importance in design conceptualization and process.

Significance of the Study

CAD is an important tool used in the profession of interior design. Today, employers seek interior design graduates who have skills in past traditions of CAD, but also more recent three-dimensional modeling and rendering software (Lyon et al., 2009). Therefore, interior design educators’ previous and current teaching of CAD are still relevant, however, they need
also to adjust their teaching to industry practice. Both the ongoing development of computer software technology and industry’s changing needs should influence how instructors teach CAD in interior design programs.

Designers approach design in different ways depending on design field, abilities, preferences, tools, and resources used (Hill & Anning, 2001b; McGlashan, 2011). Hill and Anning (2001b) examined and identified how design fields such as graphic, engineering, architectural, and apparel practice the design process. There is no common design process across design fields; therefore, the application of CAD in the design process varies by field. In addition, studies have examined varying approaches in design education, specifically whether to use hand-based techniques, or computer-based techniques, or the latest trend of hybrid design approaches (Chaszar, 2006; Şenyapili & Basa, 2006; Zuo & MaloneBeach, 2010). However, little research is found on the best ways to teach CAD in interior design programs and how interior design instructors incorporate CAD in their teaching of design. Therefore, this study will contribute to the literature of design by examining how interior design instructors, who are professional designers, use CAD professionally and how they incorporate CAD into their teaching.

Definition of Terms

There are certain terms frequently used in design education. Thus, this section consists of several terms that are used in this study; CAD, design, design process, drafting, hand drawing, interior design education program, Photoshop, and 3D modelling program.

**CAD.** SAGE publications defined CAD as:

Computer-assisted (or aided) drafting systems [that are] used to produce maps, diagrams, drawings, plans, and charts. . . . [It is] an easier, digital method for creating and editing documents, which were once drafted by hand. CAD systems are used extensively [in]
architecture plans and renderings, mechanical designs, and drawings used in civil and industrial design. (Foote, 2010, p. 319)

**AutoCAD.** AutoCAD is a type of computer-aided design (CAD) program “used for 2-D and 3-D design and drafting. AutoCAD is developed and marketed by Autodesk Inc. and was one of the initial CAD programs that could be executed on personal computers” (Janssen, 2013). “It is built to help people design buildings, products, or public spaces, without having to draw up plans by hand” (McGuigan, 2013).

**Design.** The term design is the essence of the interior design field. Hill’s (1999) study defined the term design as “the inception of an idea (ideation) or the realization of a need, to the completion of a prototype and reflection on it in order to verify if it functions as intended” (p. 285). The term design or ‘designing’ also means to think “of something you need or want” or of “improving something you’ve already got” (Hill & Anning, 2001a, p. 122).

**Design process.** The design process is a series of steps or actions that aim at reaching a particular goal (Blossom & Thompson, 2005), or it may be seen as a means “to [devise] courses of action aimed at changing existing situations into preferred ones” (Simon, 1982, p. 129).

**Drafting.** An effective way to present the design process ideas is through drafting. Drafting is a way of “[communicating] ideas through drawings, sketches, charts, graphs, and maps according to mathematical rules of projection [through] geometric construction, orthographic and pictorial drawings, working drawings, etc.” (Education Resources Information Center [ERIC]). Currently, the production of technical drawings is completed using various CAD software.

**Manual drafting/hand drafting.** I used my professional experience to define the term manual drafting/hand drafting as follows:
Manual drafting or hand drafting consists of using manual drafting tools (i.e. drafting table or drawing board, T-square, compass, triangles, protractors, drawing templates, erasing shields, and scale rulers) to create technical drawings by hand. Technical drawings may include plans, elevations, and sections of objects, buildings, and furniture. Nowadays, the design and building industry ceased producing technical drawings by hand; instead, they complete those drawings on computer using CAD programs.

**Hand drawing/Freehand drawing.** In this thesis, I define the term hand drawing or freehand drawing as an illustration that is drawn or executed by hand without using any measuring tools.

**Hand sketch.** A hand sketch or the act of hand sketching is executing a freehand drawing; however, interior designers commonly use this term to refer to drawings completed at the initial stages of the design process.

**Interior design education program.** All terms defined above are common within any interior design education program. Interior Designers of Canada (IDC) asserts that interior design education can be acquired through a college (two to three-year program) or university level (three to four-year program) (IDC, 2010). The purpose of these programs is to prepare students to become leaders in the profession of interior design. In these programs, they are taught theoretical and practical concepts of design and the design process. This includes learning about the history of interior design, free hand drawing, CAD, construction, fitment detailing, material finishes, lighting, etc. (Ryerson University, Ryerson School of Interior Design [RSID], 2009).

**Photoshop.** Photoshop is graphic editor software developed by Adobe Systems. It has filters and plugins that enable the manipulation, creation, and editing of images. Used mainly by graphic designers, Photoshop can “create artwork conveniently and aesthetically. For example,
design studios can use Photoshop in order to visualize their take on an initial concept and then move onto different media to complete the concept” (Wikipedia, 2013).

**3D modelling program/software.** “3-D software is a type of computer graphics software that enables the design, development and production of 3-D graphics and animations” (Janssen, 2013). 3-D modelling software include 3ds Max, SketchUp, Revit, and Maya. “3-D software allows users to visualize, design and control an object, environment or any graphical element within a three-dimensional scope. 3-D software includes [computer-aided design] (CAD) programs and animation packages” (Janssen, 2013).

**3ds Max.** Autodesk Inc. described 3ds Max software as:

Design software provid[ing] powerful, integrated 3D modeling, animation, and rendering tools that enable artists and designers to focus more energy on creative, rather than technical challenges. The products share core technology, but offer specialized toolsets for game developers, visual effects artists, and motion graphics artists along with other creative professionals working in the media design industry on one hand; and architects, designers, engineers, and visualization specialists on the other. (Autodesk Inc., 2013)

**SketchUp.** SketchUp is free 3D modelling software developed by Trimble Navigation available for anyone to use. SketchUp is an intuitive and easy-to-use software that can “redecorate your living room”, “invent a new piece of furniture”, and “model [cities] for Google Earth” (Trimble, 2013).

**Revit.** Autodesk Inc. indicated that Revit software is “specifically built for Building Information Modeling (BIM), helping building professionals design, build, and maintain higher-quality, more energy-efficient buildings”. In addition, it “helps [architects] capture and analyze concepts and maintain consistency through design, documentation, and construction”. It also
helps “construction professionals better predict and communicate project constructability” and help structural engineers “accurately design and build efficient building structures” (Autodesk Inc., 2013).

*Maya.* Autodesk Inc. described Maya software as:

3D animation software [that] delivers a comprehensive creative feature set with tools for animation, modeling, simulation, rendering, matchmoving, and compositing on a highly extensible production platform. For visual effects, game development, post production, or other 3D animation projects, Maya offers toolsets to help meet demanding production requirements. (Autodesk Inc., 2013)

**Overview of the Methodology and Methods**

A qualitative case study approach was used in this study. Further, two methods were used to collect data: (1) document analysis of two interior design programs curricula and (2) interviews with interior design instructors. The study took place in two different colleges that offer an interior design program with a CAD component; both colleges were located in Eastern Canada. Interior design program documents were analyzed using conceptions of curriculum. Six interior design instructors, three from each college, participated in interviews. The selected participants were instructors who (1) currently taught in the selected college-level interior design programs, (2) have worked as practitioners in the design field, and (3) have used CAD, whether teaching it or not at the time of the study. Interview data were analyzed using a coding-theme process, which means themes and codes emerge from the data rather than being decided prior to data collection and analysis. The study had planned to enhance data by the method of member checking and by the use of data triangulation to establish trustworthiness and reliability.
However, during the course of the research, none of the participants were interested in checking the transcriptions of their interviews. As a result, data triangulation alone was used.

**Limitations of the Study**

Two limitations are considered for this study. The first limitation is that participants’ perceptions and views through interviews limit the study by self-reported data. However, I triangulated interview data with document analysis to obtain more trustworthy data. The study could, however, be enhanced by performing on-site class classroom observations to further triangulate data.

Another limitation of the study is that it examined only two interior design programs within Canada. Further studies are needed to examine instructors’ perceptions and teaching practices with CAD in all Canadian interior design programs and in different countries.

**Autobiographical Signature**

My academic experiences in the field of interior design have formed my own perceptions about design and the use of CAD in the interior design field and educational programs for that field. In this study, I put my own perceptions aside and listened to participants’ perceptions. I did not mention to the participants that I am an interior designer and a CAD instructor, unless they asked me about my background. I held the role of the researcher during the research; I collected and analyzed the data provided by the six interior design instructors. Interviews were conducted in a semi-formal environment where the participants and I engaged in a discussion about their views and perceptions of the nature of CAD in the interior design field and the college curriculum, and their teaching practices with regard to CAD. I tried not to let my experiences and biases to be noticeable in the interviews. If I did not probe during the interviews, I would respond to the participants’ with an ‘okay’ or a smile. At times, it was very difficult not to react
to the participants’ responses, particularly when I could relate my own experiences to theirs. By asking general to more focused questions in the interviews, I tried to encourage the instructors to express their views and thoughts and to provide detailed responses as much as possible.

**Outline of Thesis**

This thesis consists of five chapters. Chapter 1 introduced the research context, purpose, research questions, significance of the study, definitions of terms, an overview of the methodology and methods, limitations of the study, and my autobiographical signature. Chapter 2 presents the literature related to CAD in the field, and then explains conceptions of the curriculum. Chapter 3 outlines the methodology, methods, and data collection used for the research. It describes the site and the participants involved in the study. It also explains the document analysis, the interviewing process, and the data analysis procedures. Chapter 4 presents the results of this study that emerged from the document analysis and the interviews with the interior design instructors. It also compares the findings between the two groups of participants, the instructors from each college. Chapter 5 discusses the findings, provides conclusions, identifies this study’s contribution to the literature, and makes suggestions for future research.
CHAPTER TWO

REVIEW OF THE LITERATURE

There is a growing body of literature on computer technology in design education in general. Many studies focus on the alternation between hand-based techniques and computer-based techniques, and how students and their instructors perceive the use of CAD in design. However, studies that examine the use of CAD in the design process in the interior design profession and college-level interior design programs have received minimal attention in the literature. No studies about the nature of college-level interior design programs with regard to curricular conceptions can be found. To report current and relevant research, I divide the review of literature into four sections: (1) CAD in the interior design field, (2) reluctance of design instructors to embrace CAD, (3) current design practice and the curriculum of interior design programs, and (4) conceptions of curriculum.

CAD in the Interior Design Field

Although interior design’s pedagogical influences are derived from diverse creative disciplines (Vischer & Poldma, 2003) such as architecture and industrial design, it should be noted that “the approach to teaching design skills has been generic . . . rather than contextualised to a task from a particular design domain” (Hill & Anning, 2001a, p. 118). Mawson (2007) claimed that the lack of knowledge about the nature of design consistently produced an on-going attempt to create a linear and generic model of the design process to guide the work of novice designers. However, linear models do not take into consideration the complex nature of design and have caused “teachers and students to structure designing activities as a sequential rather than an iterative process” (Mawson, 2001, p. 2). In a study of six designers, Mawson (2007) noted that professional designers from different design fields had difficulties in transferring
knowledge from practical work settings to educational settings (Mawson, 2007). This finding provides insight into why some design instructors, who are generally professional designers, do not fully understand the nature of design process, and that a deeper understanding of it needs to be developed in order to teach it to students (Mawson, 2007). There is no guidance and little is known about how to teach the design process (Mawson, 2007; Williams, 2000). To be able to teach the design process, instructors must be knowledgeable about design practice and be experienced designers themselves (Mawson, 2007).

Mawson (2007) affirmed Hill and Anning’s study (2001b) that the design process cannot be generalized to all design fields. Every design field approaches the design process differently, taking into account the different technologies of their fields as well as the different materials, processes, and practical skills (Hill & Anning, 2001b). The design process is understood as a creative procedure that designers undertake to innovate and introduce something new. However, it is considered risky to define the task of designing (Findeli, 1995). Findeli (1995) said that the definition of design really “depends on whether design is considered to be an idea, a knowledge, a project, a product, or even a way of being” (p. 29). Designing is “both contentious and context specific” (McGlashan, 2011, p. 237). Early theorists suggested that the design process is the same in most design fields; each field follows a similar set of sequential activities, without considering the intrinsic nature or purpose of each task (as cited in McGlashan, 2011, p. 237). Nevertheless, when McGlashan (2011) interviewed three New Zealand designers, she concluded that “design is an individually negotiated process of reflexive practice” (p. 259). Even though she identified mutual elements within the practice of each designer in their study, she affirmed findings of Hill and Anning’s (2001b) study and Mawson’s (2007) study that there is no common design process that can be used at all times and that not every new project is based on a
Today, considerations of the use of computer technology is important in discussion about design process. CAD is now an integral component of the design process and is not merely used as a drafting tool but also as a conceptual design tool (Johnson, 2005). Fowles (1979) explained that a design tool is a tool used in the process of conceptualization or design ideation to create or innovate. Design ideation is the process of “generating, developing and communicating ideas, where ‘idea’ is understood as a basic element of thought that can be either visual, concrete or abstract. As such it is an essential part of the design process, both in education and practice” (as cited in Johnson, 2005, p. 613). Johnson (2005) studied five undergraduate design students and five design practitioners in the domains of fashion, architecture, graphic, product, and general design to examine their use of conceptual tools in both education and professional practice. He asked the participants to record the conceptual design tools they used in the design process and they were given the freedom to use their own tools without restrictions. He then analyzed the tool usage by designers’ status, whether student or practitioner, and by design domain. The ideas themselves were not evaluated. Johnson (2005) found that no single tool was used; rather, a combination of tools supported the development of design concepts. Johnson (2005) concluded that the popular view that CAD is inappropriate for conceptualising and a barrier to creativity is not based on empirical evidence. He found that CAD is not only a drafting tool but also a conceptual tool capable of assisting designers to develop new means of visualizing and conceiving design ideas (Johnson, 2005).

Currently, CAD software is used extensively in the field of design, including the interior design industry (Lyon et al., 2009). This has resulted in the introduction of CAD in interior design education where CAD now shapes “new working practices” (Anning, 1997, p. 221) of
future designers. CAD’s capacity to produce two-dimensional (2D) drafting and three-dimensional (3D) modeling facilitates design processing and visual presentation (McConnell & Waxman, 1999). CAD drawings also facilitates idea communication, especially by using generated 3D models to visualize three-dimensional spaces (Ding, 2008). The advantages of 3D visualizations are that they allow the envisaging of different finishes, materials, lights, and colors during the design process, as well as rotating and scaling objects when required (Ding, 2008).

There is consensus that using CAD in the design process can save time and provide alternative solutions simultaneously (Yazıcıoğlu, 2011). Also, it can document the design progress and allow questioning of the design process stages independently (Yazıcıoğlu, 2011). Ding (2008) affirmed that using CAD is an “effective method to shape design creation because it can generate shapes and forms beyond the designer’s ability” (p. 5). CAD has the potential to illustrate how a design will appear and can clearly communicate the design objective (Ding, 2008). It is now understood that CAD can foster creativity (Johnson, 2005) and that the design process is an evolving process where CAD is used to implement computer simulations and virtual reality tours (Ding, 2008).

The positive influence of CAD on production, ease of communication, and speed to perform tasks is highly appreciated by interior design professionals (McLaren, 2008). McLaren’s (2008) study affirmed that 80% of design companies now use computer-based technical drawings and no longer use drawing boards. Nevertheless, Meneely’s (2007) study showed that 40% of design students “did not have a clear [understanding of how to go about] integrating CAD tools in their design processes” (p. 81). Instead, interior design students focused on improving their technical skills, as they felt pressured by the new computer technology (Meneely, 2007). A design student in Meneely’s (2007) study confirmed that professional usage
of computers in the design process is now very common; therefore, students need to be comfortable with computer technology. Meneely (2007) also explained that CAD teaching should not focus on developing technical skills alone, but rather, it must focus on how CAD should be synthesized with the design process to vividly and realistically bring design ideas to life. McLaren (2008) also argued that CAD teaching requires a re-think, and that an emphasis should be placed on the teaching of design strategies using CAD, rather than commands and features.

**Reluctance of Design Instructors to Embrace CAD**

Despite the benefits of CAD in design education, educators are careful when integrating it into their curriculum. Design educators say it is unwise to become dependent on computers and some designers think CAD obstructs creativity (Johnson, 2005; McLaren, 2008). Previous research has pointed out that educators lack proficiency in computer use, which can act as a main barrier to their adoption of computers into their teaching (Basa & Şenyapili, 2004). In their study, Basa and Şenyapili (2004) stated that a majority of educators “have their backgrounds in a period of design education where computers were not dominant” (p. 269), which potentially explains why educators worry when they have to introduce innovation using CAD into their teaching (Pektaş & Erkip, 2006). As a result, some design educators focus “only on the ‘conceptual’ phase of [the] design process and [see] the existing CAD tools as merely drafting rather than design tools” (Pektaş & Erkip, 2006, p. 91). Yazıcıoğlu (2011) stated that instructors do not encourage the use of computer programs in the design process and presentation of projects, and they prefer courses like Presentation Techniques, Freehand Drawing, and Perspective that lead students to use paper and pencil skills and techniques. Educators fear that incorporating CAD in design education will eliminate the hand drawing skills (Pektaş & Erkip,
2006). They insist that manual drafting is essential and should still be taught in the design curriculum (McLaren, 2008).

According to Pektaş and Erkip (2006), “there seems to be a tension between traditional design tools and [using] CAD in schools” (p. 90). Şenyapili and Basa (2006) found that 83% of students thought drawing by computer was easier to execute than drawing by hand, as it was more practical and time saving, and required less physical effort. Findings also revealed that drawing by computer is easier to learn and use; students can correct mistakes and adjust the light, color, and shade instantly, unlike in hand drawings (Şenyapili & Basa, 2006). The study (Basa & Şenyapili, 2004) presented clear advantages as well as the importance of computers in design practice and education, yet educators believe it is essential to continue using the hand drawing skill in design. Hand drawings are deemed to be more successful than computers in terms of reflecting one’s ability to draw, authorship, and warmth in terms of artistic expression (Şenyapili & Basa, 2006). Sketches can also convey design competence in a client discussion, as hand rendered-drawings are more appealing to clients (Wilson & Parrott, 2011). However, hand drawings show less details, incorrect scaling, and inconsistency of line quality (Basa & Şenyapili, 2004). Although hand drawings have major weaknesses, Şenyapili and Basa (2006) affirmed “that neither computers nor hand can/should sweep the other away totally” (p. 281).

An exploratory study by Brandon and McLain-Kark (2001) supported both hand drawing and CAD use in design. They compared between two groups of interior design students who completed the same project. One group used hand-drawing techniques and the other group used CAD in the design process. Brandon and McLain-Kark examined differences between both techniques by using seven elements of design merit when evaluating the projects’ final design solutions. The seven elements of design merits were based on a previously developed instrument.
They are: appropriateness, complexity, creativity, liking, novelty, originality, and thematic expression. Findings indicated no significant difference between the two groups, which means there is no difference between the two techniques on any of the seven design criteria when tested independently or as combined effect. Brandon and McLain-Kark (2001) also stated that regardless of the design technique used, creative students would create creative design solutions whether they use hand-based techniques or CAD.

Çil and Pakdil’s (2007) research focused on instructors rather than students or students’ work. Their study explored instructors’ perceptions and evaluations of computers in architectural education. They conducted their research by interviewing faculty members who taught in design studios. Çil and Pakdil (2007) found that the majority of instructors believed that the use of computers limited creativity. Basa and Şenyapili’s study (2004) can be used to understand such instructors’ beliefs. Basa and Şenyapili (2004) deemed that the issue here is not with CAD, but with designers’ skills in using the software. Meneely (2007) affirmed that using CAD effectively relies on a designer’s skills and techniques in both hand-based and computer-based skills. A major finding of Çil and Pakdil’s (2007) study revealed that instructors think computers are the reason for students’ failure in manual drafting. They concluded that this is perhaps the main reason for instructors’ reluctance to incorporate computer technology in the design process. But findings from Johnson’s (2005) study indicated that CAD can foster creativity if one knows how to use it effectively. Design educators need to acquire skills and techniques in CAD. They need to change their teaching practices in order to prepare students to effectively use the new developments of CAD and integrate CAD into their teaching alongside traditional design tools (Keengwe, Onchwari, & Wachira, 2008; McLaren 2008). Even if design educators have no expertise in using CAD software, Pektaş and Erkip (2006) pointed out that they must understand
the advantages and potentials of computer technology in design and be aware of its growing importance in the industry.

The ongoing development of CAD features requires designers to increase their knowledge in the use of computer technology in order to be competent in their profession. CAD is now viewed as commonplace in design: “the ease of creating, copying and changing cannot be beat by anyone on drafting board” (McLaren, 2008, p. 178). Manual drafting takes longer to execute and requires a lot of concentration (McLaren, 2008). But, professionals such as architects, designers, and CAD drafters believe that students must receive basic training in manual drafting before learning CAD because it helps them develop skills in spatial awareness, visualization, and planning. Receiving training in manual drafting first can also help the students learn how to use CAD faster (McLaren, 2008).

**Current Design Practice and the Curriculum of Interior Design Programs**

Watson, Guerin, and Ginthner (2003) studied current design practice by interviewing interior design professionals and observing their activities and processes in a design firm. Based on the results of their study, they were able to write a manual to inform design educators about the latest changes and practices in interior design practice. The manual has been officially published by the Foundation for Interior Design Education Research (FIDER, 2000). Interior design educators use the manual to integrate new developments into their courses and adjust their curriculum delivery accordingly. Watson et al.’s findings (2003) provided information that led to suggestions for revision of curriculum content in interior design education. For example, their study found that CAD courses should not be limited to AutoCAD alone; they should include other software such as Photoshop, Page Maker, PowerPoint, and Excel. Such software are needed by designers to perform tasks and activities required throughout different stages of the
design process (e.g. schematic/conceptual design, prepare design documents and presentation material, cost projections, contract documents, etc.). Design programs and courses have now been revised to integrate “software programs required in many of the entry-level design positions” (Watson et al., 2003, p. 101). In earlier versions of interior design programs, these software programs were only included in the upper-level courses. Recently, researchers have revealed the importance of including this content in beginner level coursework. Design educators now focus on CAD teaching early in interior design programs (McLaren, 2008; Stinson 1998). This approach would favor the design industry’s requirements, where the emphasis is now on the use of CAD (McLaren, 2008). On the other hand, Stinson (1998) stated that the majority of design schools do not devote enough lessons to computer instruction to meet the level of competence expected by industry. According to Brandon and McLain-Kark (2001), devoting more time to CAD instruction is essential in the interior design curriculum so that students can competently use CAD to develop design ideas and be able to use it effectively in the design process. In their study, García, Santos, Quirós, and Peñín (2003) stated that the amount of time dedicated to teaching design through the use of CAD has been significantly reduced; crowded syllabi and limited timetable allocations have been identified as reasons for this situation (McLaren, 2008; Stinson 1998). However, the demand for the use of CAD continues to grow. Interior design graduates who are knowledgeable in using design software have more chances of being hired (Wilson & Parrott, 2011).

There are always competing demands in the curriculum of any educational program. In design, devoting more time to computer instruction means less time to teach other essential subjects that a designer needs to know, such as building codes and environmental awareness (Stinson, 1998). “From a teaching point of view, it is not a good idea to adjust teaching to the
time, the time should be adapted to a given teaching requirement” (García et al., 2003, p. 205). Educators are responsible for keeping interior design curriculum up-to-date with current professional practice (Watson et al., 2003). Interior design practice is based on objectives, skills, and standards. Instructors need to be ongoing learners to keep up-to-date in their own professional practice, to revise curriculum accordingly, and to be articulate about the purpose of the curriculum. They have a foot in two worlds: the world of interior design and that of education. In the field of education, conceptions of curriculum are used to articulate purposes of the curriculum. Hence, this study also sought to examine and understand interior design curriculum at the post-secondary level and how conceptions of curriculum can be used to articulate the purpose of postsecondary interior design curriculum.

Conceptions of Curriculum

The term curriculum is derived from the Latin word currere, which means racecourse. Marsh and Willis (2007) agreed that curriculum is, for most students, a race in which they must surpass several obstacles, which are the subjects. However, there is no clear definition of the curriculum. It is often perceived as the essence of any subject taught in an educational setting; it guides the work of teachers and educators, work that aims at nurturing the development and growth of learners (Marsh & Willis, 2007). The curriculum is considered a formal course of study that focuses on content and learners’ experiences (Tyler, 1949). However, Pratt (1994) indicated that a curriculum is never a final draft; revisions are always ongoing for purposes of improvement. Curriculum development and changes are based on understanding the foundations of the desired curriculum. Different conceptions and approaches of curriculum are perceived as different ways of thinking about curriculum. Some orientations continue to be used and others have been modified or have been eliminated over time. The following section examines different
conceptions of curriculum. I use these conceptions of curriculum in Chapter 4 to conduct document analysis in order to understand the nature and purpose of postsecondary interior design programs.

**Conceptions of curriculum.** According to McNeil (1996), conceptions of curriculum are based upon questions investigating “what should be taught? To whom? When and How? ” (p. 1). Some authors have classified conceptions of curriculum into several orientations; some orientations overlap across authors and others are unique to individual authors (Eisner & Vallance, 1974; Marsh & Willis, 2007; McNeil, 2009; Pratt, 1994; Sowell, 2005).

**Conceptions of curriculum—Eisner and Vallance.** Eisner and Vallance (1974) identified five conceptions of curriculum: development of cognitive processes, curriculum as technology, self-actualization, social reconstruction-relevance, and academic rationalism. These conceptions emerged from the study of numerous curricula by asking questions about content, goals, and organization. The answers to the questions in their work showed curricular patterns. These patterns were grounded in assumptions and formed the conceptions of curriculum which are described below.

**Development of cognitive processes.** The development of cognitive processes conception of curriculum focuses on the refinement of intellectual skills (Eisner & Vallance, 1974; Sowell, 2005). It “refers only rarely to curriculum content, [by] focusing instead on the how rather than the what of education” (Eisner & Vallance, 1974, p. 5). This approach is concerned with sharpening the intellectual processes and developing cognitive skills. A curriculum grounded in this conception aims to give the learner intellectual autonomy to be able to select and interpret situations outside of the school context.
Curriculum as technology. The technological curriculum conception of curriculum focuses on process and with the how rather than the what of education, similar to the development of cognitive processes (Eisner & Vallance, 1974; McNeil, 2009; Sowell, 2005). However, it aims to use technology to communicate knowledge and facilitate learning by focusing on the presentation of material to the learner rather than on the learner. Eisner and Vallance (1974) stated that the language of the curriculum technologist is efficient, concise, logical, and to the point.

Self-actualization. The self-actualizing conception of curriculum refers to autonomy and personal growth. “It is the need for personal integration, [where] the curriculum [provides] personally satisfying consummatory experiences for each individual learner” (Eisner & Vallance, 1974, p. 9). Self-actualization helps individuals to discover things on their own. This conception concerns what is taught in school; therefore, content is important. Self-actualizers insist that schooling should fully enter the learner’s life through the curriculum. Because of changing political priorities in schools, and her personal growing view of curriculum, Vallance (1986) reviewed the five conceptions of curriculum originally authored by both Eisner and Vallance (1974). She decided to drop the self-actualizing orientation and to replace it with two other new conceptions: personal success and personal commitment to learning. Curriculum for personal success and commitment to learning reflects a concern about students’ individual futures and their ability to control their futures, which was overlooked by the original five conceptions of curriculum.

Social reconstruction-relevance. Curriculum for social reconstruction-relevance stresses societal needs over individual needs (Eisner & Vallance, 1974; McNeil, 2009; Pratt, 1994; Sowell, 2005). It has “a strong emphasis on the role of education and curriculum content within
the larger social context” (Eisner & Vallance, 1974, p. 10). This conception of curriculum focuses on social change and where “social values and often political positions are clearly stated” (Eisner & Vallance, 1974, p. 11). This approach also requires schools to “recognize and respond to their role as a bridge between what is and what might be, between the real and the ideal” (Eisner & Vallance, 1974, p. 11). The approach of social reconstruction-relevance emphasizes that the curriculum provide the tools to enable the individual to survive and function effectively in an unstable and changing world. It holds two different branches: a present and a future approach, which are “both adaptive and a reformist interpretation of social relevance” (Eisner & Vallance, 1974, p. 11). The adaptive branch includes the educational technologists that changes curriculum to conform to technological changes and the reformist branch would reflect real-life situations in the curriculum.

**Academic rationalism.** Eisner and Vallance (1974) affirmed that the academic rationalism conception of curriculum is the most “traditional-bound” (p. 12) of their five conceptions. According to Vallance (1986), the curricular conception of academic rationalism “remains and seems likely to endure” (p. 26). It is mainly concerned with allowing young individuals to acquire the tools to participate in the Western culture tradition, and giving them access to the greatest ideas and objects that humans have created (Eisner & Vallance, 1974; Marsh & Willis, 2007; McNeil, 2009; Pratt, 1994; Sowell, 2005). This approach states that classic disciplines should be taught in the curriculum since they enable individuals to learn concepts “through which thought acquires precision, generality, and power; such disciplines exemplify intellectual activity at its best” (Eisner & Vallance, 1974, p. 12). Eisner and Vallance declared that the structure of this conception is preferred by many educators and therefore is alive and well.
Conceptions of curriculum-McNeil. McNeil (2009) defined four curricular conceptions. They were proposed to understand what should be taught in schools and how content should be taught. The four orientations are: humanistic curriculum, social reconstruction curriculum, technological curriculum, and academic rationalism curriculum.

Humanistic curriculum. The humanistic curriculum favors the concept of individualism (Eisner & Vallance, 1974; Marsh & Willis, 2007; McNeil, 1996; Pratt, 1994; Sowell; 2005). Its purpose is to help learners know and discover who they are. This is accomplished by providing them a satisfying experience that contributes to personal liberation, development, and growth. The humanistic curriculum promotes learner autonomy and aesthetic and moral qualities in learners. In other words, here learners develop good character and demonstrate good work qualities. McNeil (2009) explained how the role of teacher is important in the humanistic curriculum. In this curricular conception, teachers have a dual role to provide “warmth and nurture emotions” and to be a “resource center” to students (p. 9). They must build a relationship with their students. These relationships should inspire students to innovate and progress in their learning. Teachers also require students to assess themselves and their work in terms of accomplishments and knowledge gained in a class. This can help students to acquire “new personal goals and form new attitudes about learning” (p. 11) by identifying their successes and failures. Failure is regarded as progress leading to success. The humanistic curriculum evaluates the process of learning rather than its end product. It sees that classroom activities are valuable and allow students to discover their own abilities.

Social reconstruction curriculum. While the humanistic curriculum’s goal is individualism, the aim of the social reconstruction curriculum is social change (Eisner & Vallance, 1974; McNeil, 1996; Pratt, 1994; Sowell; 2005). It focuses on social reform and on
generating “a better future for society” (McNeil, 1996, p. 1) by focusing on social needs over individual needs. This conception of the curriculum requires that schools help individuals to develop socially and encourages them to plan social events. Social reconstructionists consider values that are cherished by the majority, and not by the individual. Essentially, the social reconstruction curriculum intends to help students live in and change a society in which they typically do not have control. It introduces the individual to problems that society is confronting. Teachers tend to associate reconstructionism with “national, world, and local purposes to the students’ goals” (p. 35). Students are encouraged to employ their interests and skills to find solutions to the problems of society by cooperating with the community and using its resources. Teachers who use the social reconstruction curriculum select real-life experiences for their students. Those experiences must focus on the community, an issue that is of a public concern, and an experience that is valuable where students can develop a sense of purpose for the self and the community. This type of curriculum evaluates students’ abilities by assessing their “articulation of issues, generation of possible solutions, redefinition of their world views, [and their] willingness to take action toward an ideal” (McNeil, 1996, p. 38). Social reconstruction is all about changing society to form a “perfect world” (p. 52).

*Technological curriculum.* According to McNeil (1996), the technological or systemic curriculum “focuses on the effectiveness of programs, methods, and materials in the achievement of specified ends or purposes” (p. 57). McNeil (1996) explained that this approach influences the curriculum by using technology to learn theory. This approach is concerned with how to teach rather than what to teach, which results in knowing the best methods to maximize students’ achievement by specifying clear objectives. Outcome-based education resulted from the technological curriculum, which aligns instruction with outcomes. It involves “teaching to the
test” (p. 61), where tests may be created before designing the actual curriculum. According to McNeil, this conception improves the curriculum because it has led developers to emphasize objectives and specify outcomes that are most valuable to learning. However, not being able to give attention to the individual and the community is one major weakness of the systemic conception; its focus is mainly on the achievement of desired outcomes and expectations.

**Academic rationalism curriculum.** The academic rationalism conception sees the curriculum “as the vehicle by which learners are introduced to subject matter disciplines and to organized fields of study” (McNeil, 1996, p. 1). It focuses on developing rational minds by “[training] students to do research” and establishing “a residual, societal meaning or tradition” (p. 95). The purpose of academic rationalism curriculum is to make the students thinkers; thinkers that can question, hypothesize, synthesize, and draw conclusions in any academic discipline. However, the academic rationalism curriculum fails to integrate disciplines and it imposes adult views of the subject matter on younger students. Academic rationalists want to prepare the student for life, and not only for tests in a given course. To be able to do this, academic rationalists need to engage students in “problem solving, inventing, and critical appraisals” (p. 105).

**Conceptions of curriculum-Pratt.** Pratt (1994) attributed the concept of human well-being as a point of reference for determining priorities for curriculum. He outlined four curricular conceptions and emphasized how they are not mutually exclusive. They are: cultural transmission, social transformation, individual fulfillment, and feminist pedagogy. All four orientations are “motivated by the desire for the well-being of the student and of society” (p. 21).

**Cultural transmission.** Those who practice the curricular conception of cultural transmission perceive the function of curriculum mainly as the intellectual of traditional
academic disciplines (Eisner & Vallance, 1974; McNeil, 1996; Pratt, 1994; Sowell; 2005). They also see the sources of education to be literary, meaning in words and symbols. Education here is conceptualized as the transmission of information to students either verbally or by the written word. This approach views school as the means to “repair deficits or gaps in people’s understanding” (Pratt, 1994, p. 10). Cultural transmission focuses exclusively on cognition and Pratt indicated that some individuals think that it is the only legitimate content of curriculum.

Social transformation. The curricular conception of social transformation focuses on political and social change (Pratt, 1994). It is similar to the concept of social reconstruction curriculum of other theorists where school is viewed as a potential agent for the reform of society (Eisner & Vallance, 1974; McNeil, 1996; Sowell; 2005). The main goal of this curriculum is to give students liberation and the maximum capacity of choice.

Individual fulfillment. Individual fulfillment, according to Pratt (1994), is when people are motivated by their own needs for growth, relationships, and self-actualization. This curricular conception aligns with other curricular theorists (Eisner & Vallance, 1974; Marsh & Willis, 2007; McNeil, 1996; Pratt, 1994; Sowell; 2005). Pratt explained that human relations must be present for an individual to grow and that learning is expressed through personal experience. The personal life experiences, whether pleasant or unpleasant, give personal meanings to each unique individual. Pratt (1994) posited that making new friendships is more “significant to an individual’s future well-being than most of the cognitions we teach in school” (p. 16). He emphasized that cognitive teaching cannot develop personal meanings and relations.

Feminist pedagogy. Lastly, a feminist pedagogy curricular conception focuses on a more equitable balance among gender-related characteristics and interests. It also emphasizes human experience and its connection with the world. Pratt (1994) explained that women’s thoughts and
actions are different from those of men; women are more process-oriented than goal-oriented. Women are intuitive, related, collaborative, supportive, and personal. Men, on the other hand, are rational, discrete, solitary, challenging, and impersonal. Pratt (1994) affirmed that feminist pedagogy does not only offer “a curriculum that meets more justly the needs of women, but a curriculum that reflects more fully the nature of humanity” (p. 21).

According to Pratt (1994), in an ideal world, teachers would not adhere to only one perspective of curriculum; they adopt concepts from the different curricular conceptions to fulfill commitment to human well-being. He explained that curricula needs to be planned not only for the past and for present, but also for the future to make sense of the world in which we attempt to forecast.

**Conceptions of curriculum-Sowell.** Sowell (2005) outlined five conceptions of the curriculum where “each source of curriculum content is emphasized in one conception” (p. 38). The five conceptions are: cumulative tradition of organized knowledge, social relevance-reconstruction, self-actualization, development of cognitive processes, and technology.

**Cumulative tradition of organized knowledge.** The conception of cumulative tradition of organized knowledge, or academic rationalism, emphasizes academic disciplines and subject matter. Its objective is to “cultivate cognitive achievement and the intellect by helping students understand knowledge” (Sowell, 2005, p. 39).

**Social relevance-reconstruction.** Social relevance-reconstruction focuses on the needs of society and culture. It aims to prepare people for living in an unstable, changing world, and to reform society (Eisner & Vallance, 1974; McNeil, 1996; Pratt, 1994; Sowell, 2005).

**Self-actualization.** Self-actualization focuses on the needs and interests of learners in discovering their fullest potential. It also seeks to give learners a satisfying experience (Eisner &
Vallance, 1974; Marsh & Willis, 2007; McNeil, 1996; Pratt, 1994; Sowell, 2005). This approach is student-centered and focuses on autonomy and growth by letting learners discover things for themselves.

**Development of cognitive processes and Technology.** According to Sowell (2005), there is a vast amount of content available for each subject discipline. Therefore, curriculum planners must be careful when selecting and organizing the content by considering the scope, continuity, sequence, and integration of each conception. Her remaining two conceptions—curriculum of development of cognitive processes and curriculum technology—do not underline a particular source of curriculum, but are usually associated with subject matter. Development of cognitive processes concentrates on developing intellectual processes by sharpening students’ intellectual and cognitive skills. This conception is open-ended and growth oriented. The conception of technology concentrates on making learning systematic and efficient. This approach sees life activities as curricular objectives with predictable outcomes (Eisner & Vallance, 1974; McNeil, 1996; Sowell, 2005).

**Conceptions of curriculum-Marsh and Willis.** Marsh and Willis (2007) preferred to understand the work of curriculum theorists as a process. As such, they used the term ‘curriculum theorizing’ instead of ‘curriculum theory’. Marsh and Willis (2007) identified three major orientations to curriculum theorizing. The prescriptive theorizers plan the curriculum for the students; descriptive theorizers focus on developing what is delivered to the students, and critical-exploratory theorizers aim at what students experience (Marsh & Willis, 2007).

**Prescriptive theorizers.** Prescriptive theorizers focus on creating models for “curriculum development that improve school practices” (Marsh & Willis, 2007, p. 103). Theorizers of this category try to find the best method to design and develop the best curricula possible. They are
mainly concerned with the ends, objectives, and outcomes, rather than the means of a curriculum (Tyler, 1949). This traditional approach selects the desired learning experiences. It is content-oriented and instructors teach to the test; therefore, the curriculum is pre-planned. This orientation encompasses theorizers from four different conceptions: social needs-child-centered (Dewey, 1900, 1902; Klipatrick, 1918), social-efficiency (Bobbitt, 1918, 1924; Tyler, 1949; Taba, 1962, Klein, 1992; Tanner & Tanner, 1995), social needs re-constructionist (Kelly, 2004; Reid & Thompson, 2003; Skilbeck, 1976), and philosophical-academic rational (Phenix, 1964; Hirst, 1965; Peters, 1966; Huntchins, 1968).

**Descriptive theorizers.** Descriptive theorizers “identify how curriculum development actually takes place, especially in school settings” (Marsh & Willis, 2007, p. 103). They describe and understand the situation or outcomes to be achieved that lead to steps in curriculum development; they want to represent what is happening around them by focusing on “how choices can be made well” (p. 114). This orientation views the curriculum as enacted. Technical procedures are less important than deliberative processes or practical reasoning. Popular theorizers that belong to this orientation are Schwab (1969, 1973, 1983), Walker (1971), and Reid (1978).

**Critical-exploratory theorizers.** Critical-exploratory theorizers “understand deficiencies in past practices of curriculum development and to replace them with more adequate practices, particularly by considering curriculum in the broadest possible intellectual and social contexts” (Marsh & Willis, 2007, p. 103). This orientation encompasses theorizers from two general approaches according to how they treat issues of curriculum. The first approach underlines “the connections between schooling and the existing social order” (p. 119). The second approach focuses on personal experiences and supports the idea that systematic learning can promote high-
quality experiences (Eisner & Vallance, 1974; McNeil, 1996; Pratt, 1994; Sowell, 2005). Here, theorizers value the experienced curriculum where knowledge is gained from individual experiences influenced by teachers that plan and enact the learning process. Critical-exploratory theorizers are spread in 11 different sub-categories: social and cultural control (Young, 1971), social reproduction (Althusser, 1971), cultural reproduction (Apple, 1979), literary artist (Eisner, 1979; Vallance, 1982), existential/psychoanalytic (Greene, 1975; McDonald, 1971; Pinar, 1980), phenomenological (Willis, 1979), autobiographical/biographical (Pinar, 1972; Miller, 1992), gender analysis and feminist pedagogy (Klein, 1986), gender analysis and male identity (Sears, 1992), race (Banks, 1993), and postmodern/post-structural (Doll, 1993).

In summary, curricular theorists have identified different curricular approaches, which they have classified into different conceptions. Many of these conceptions have several elements in common and have remained important to the field of curriculum over time. Other conceptions have not stood the test of time. Table 1 outlines the recurring conceptions of curriculum organized by curricular theorists. Table 2 presents the non-recurring conceptions that have either been withdrawn or modified over time. For this research, conceptions of curriculum were used as a tool to analyse the interior design college-level curriculum and instructors’ documents used to enact their curriculum.
Table 1

Recurring Conceptions of Curriculum

<table>
<thead>
<tr>
<th>Theorist(s)</th>
<th>Focus of Conception</th>
<th>Society</th>
<th>Technology/Cognitive processes</th>
<th>Academia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eisner and Vallance</td>
<td>Self-actualization</td>
<td>Social reconstruction-relevance</td>
<td>Technology/Cognitive processes</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>Marsh and Willis</td>
<td>Critical-exploratory (Experienced)</td>
<td>Descriptive/ Critical-exploratory (Enacted/Experienced)</td>
<td>—</td>
<td>Prescriptive (Planned)</td>
</tr>
<tr>
<td>McNeil</td>
<td>Humanistic</td>
<td>Social reconstruction</td>
<td>Systemic or technology</td>
<td>Academic</td>
</tr>
<tr>
<td>Pratt</td>
<td>Individual fulfilment</td>
<td>Social transformation</td>
<td>—</td>
<td>Cultural transmission</td>
</tr>
<tr>
<td>Sowell</td>
<td>Self-actualization</td>
<td>Social-relevance reconstruction</td>
<td>Technology</td>
<td>Cumulative tradition of organized knowledge</td>
</tr>
<tr>
<td>Vallance</td>
<td>Personal success and commitment</td>
<td>Social reconstruction</td>
<td>Technology</td>
<td>Academic rationalism</td>
</tr>
</tbody>
</table>
Table 2

Non-recurring Conceptions of Curriculum

<table>
<thead>
<tr>
<th>Theorist(s)</th>
<th>Dropped conception(s)</th>
<th>New conception(s) formed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pratt</td>
<td>Feminist pedagogy</td>
<td>—</td>
</tr>
<tr>
<td>Vallance</td>
<td>Self-actualization</td>
<td>Personal success and personal commitment</td>
</tr>
</tbody>
</table>

*Note.* Dropped or withdrawn conceptions imply that curricular theorists are no longer using these conceptions. New conceptions are based on existing conceptions that have been dropped and replaced to shed light on new ones; Vallance has dropped the self-actualization conception to form two other new conceptions: personal success and personal commitment.

**Summary**

This chapter, Chapter 2, reviewed literature on CAD in the interior design field, reluctance of design instructors to embrace CAD, current design practice and the curriculum of interior design programs, and conceptions of curriculum. Chapter 3 describes the research methodology and methods used in this study.
CHAPTER THREE

METHODOLOGY AND METHODS

This chapter presents the qualitative methodology of this study and outlines the specific methods used to collect and analyze the data. I begin by describing the research methodology. Then, I provide a detailed description of the research methods where site and participant selection processes are described. Subsequently, I discuss what data were collected and the process of data collection. Finally, I present data analysis procedures. In brief, this chapter includes five main sections: (a) research methodology and methods, (b) site selection, (c) participant selection, (d) data collection, and (e) data analysis.

Research Methodology and Methods

To begin, it is worth reminding the reader of the study’s objectives and research questions. The objectives of this study were to better understand (a) the nature of college-level interior design programs with regard to curricular conceptions, (b) how interior design programs integrate CAD into the curriculum, and (c) how interior design instructors adopt and integrate CAD into their teaching practices. To obtain these objectives, the research study was guided by five research questions:

1. What is the nature of the curriculum in college-level interior design programs?

2. What are instructors’ perceptions for the need to incorporate CAD in interior design programs?

3. What are instructors’ perceptions about the placement of learning CAD in the program? For example, what year and what semester should the learning of CAD begin?
4. How do interior design instructors, who use CAD, conceptualize the design process?

5. How do interior design instructors, who teach CAD, teach the design process?

**Research Methodology.** A qualitative research methodology was used for this study to address the research questions. Qualitative research is meant to *explore* and *describe* complex situations happening in natural settings, where the researcher does not attempt to manipulate the phenomenon. For that reason, it was appropriate to use qualitative research for this study; I did not manipulate phenomenon. In addition, the few design studies that do exist have used a qualitative approach to investigate issues in the use of technology and design education.

Research on instructors’ conceptualizations and perspectives of CAD integration in the design process was limited; I found one study by Çil and Pakdil (2007). The majority of studies found in the literature emphasized students’ perceptions towards hand-based or computer-based drawings, and how professionals used CAD in their workplace (Basa & Şenyapili, 2006; Mawson, 2007; McLaren, 2008; Stones & Cassidy, 2007). Little research was found on the placement of CAD in interior design curriculum, the best ways to teach CAD, and how instructors keep up-to-date with it given that it is constantly changing. The exploration of complex research area when little is found about the phenomenon falls within a qualitative research framework (Hoepfl, 1997).

For this qualitative research, a case study design was used to gain an in-depth understanding of the issue with regard to interior design curriculum and CAD teaching practices. According to Patton (1987), “a case study can be a person, an event, a program, a time period, a critical incident, or a community” (p. 19). A case study could also have “many smaller cases” (Patton, 2002, p. 297). For example, evaluating an educational program could be the object of a study and “within that overall evaluation case study individual case studies documenting
individual experiences and outcomes” (Patton, 2002, p. 298) can exist. In this study, the case was college-level interior design programs within the selected two colleges, and sub-cases, or units of analysis, were the instructors who teach in these programs. To collect data for this case study, two methods were used: (1) document analysis of interior design curricula and (2) interviews with instructors.

**Research Methods.** Firestone (1993) stated that qualitative research can focus on research methods such as collecting and analyzing documents and artifacts as well as interviewing people. The following section describes the two research methods used in this study; document analysis and interviews.

*Document analysis.* Document analysis is a procedure “for reviewing or evaluating documents—both printed and electronic (computer-based and Internet-transmitted) material” (Bowen, 2009, p. 27). It is often used in conjunction with other data collection methods, such as interviewing, as a means of triangulation. For this research, document analysis was carried out through the examination of two participating colleges’ interior design curricula. Patton (2002) affirmed that document analysis can provide “a behind-the-scenes look at the program that may not be directly observable and about which the interviewer might not ask appropriate questions without the leads provided through documents” (p. 307).

Analysis of the interior design programs’ curricula aided in understanding the nature of CAD in the curricula of interior design and how the curricula has been developed. The four recurring conceptions of curriculum were used as a tool to analyze the interior design program. The four recurring conceptions are: (1) self-actualization, (2) self reconstruction-relevance, (3) technology, and (4) academic rationalism. The analysis of the interior design programs’ curricula
was complemented with individual instructor interviews who taught in the interior design programs of the two participating colleges.

**Interviews.** The interviews served to understand individual instructors’ perspectives of their practices in the programs of interior design. The individual interviews provided an understanding of instructors’ perceptions and experiences and assisted me to construct clear interpretations about the phenomenon (Bodgan & Biklen, 1998). Stake (2010) affirmed that qualitative research can also provide rich descriptions and meaningful explanations of the phenomenon through participants’ point of views. This research sought to understand instructors’ teaching practices in interior design; therefore, quality is sought with the emphasis on interviews and judgements. For that reason, I used individual semi-structured interviews as the primary data collection method for instructors’ descriptions about how they adopt and integrate CAD into their teaching practices (Hoepfl, 1997; McMillan & Schumacher, 2010). Interviews allowed me “to enter the other person’s perspective” (Patton, 1987, p. 109). Individual interviews were used for purposes of confidentiality and so that interior design instructors were not influenced by other instructors’ perceptions and ideas; the focus was on individual instructors’ descriptions and meanings. In addition, I deemed that instructors who were not very proficient with CAD would be more at ease expressing their views and experiences without worrying about what other instructors might think of them.

Interviews can contribute to a conceptual and theoretical knowledge that is based on the meanings of life experiences of the interviewees (DiCicco-Bloom & Crabtree, 2006). Through interviews, I was able to collect detailed data and insights into participants’ experiences with the use of CAD. Hansen (1994) stated that interviews with open-ended questions allowed the participants to “express themselves in their own language” (p. 44) and for the development of
new questions during the interview. Participants are also comfortable to speak about their experiences in their own words and in their unique way.

An interview guideline (see Appendix-A) was prepared to enhance the collection of detailed data. Patton (1987) affirmed that interview guides can ensure that the same information is obtained from a number of people by covering the same material; the guide “serves as basic checklist during the interview to make sure that all relevant topics are covered” (p. 111). The guide also bounded the limited time and made the interview more systematic and comprehensive (Hoepfl, 1997). Themes that emerged from the literature review guided the development of the interview guidelines.

Site Selection

Originally, I intended to pursue my research in the Middle East and explore interior design curricula taught at the college-level, specifically in Kuwait. After doing some research, I found that only one private woman’s college offered a two-year diploma in interior design. I arranged a meeting with the head of the interior design department in winter 2011, where I explained the purpose of the research, the methods that would be taken, and the participation required for my study. Unfortunately, the head of department informed me that there was only one full-time CAD instructor currently teaching at the college. At that moment, I hesitated and I was uncertain if one participant would be sufficient to answer my study’s research questions. Therefore, I immediately started a new search for other potential colleges that offer interior design programs, and the most convenient setting was to recruit colleges within Canada.

Over the years, the interior design field has gain popularity in several regions of Canada. Many Canadian postsecondary institutions now offer programs in interior design that lead to certificates, diplomas, and bachelor degrees. Therefore, I needed to limit my site selection and
define criteria that fit the intentions of my research. The site selection criteria established for this study were that:

1. The college must offer an interior design program;
2. There must be CAD courses offered in the program;
3. The program would preferably be accredited by the Council for Interior Design Accreditation (CIDA); and
4. For researcher convenience, the program must be within affordable travel parameters.

Applying the above criteria, there were six potential colleges in Eastern Canada, more specifically in the central region of Canada. Specific provinces or cities will not be mentioned to keep the identities of the colleges confidential to the extent possible. I decided to select only two colleges for the study. I believe that collecting data from two colleges was sufficient to answer my research questions. I created a list of potential colleges that offered interior design programs. I ranked the list of colleges in order of colleges that were within close travel and affordable accommodation parameters. I stopped recruiting after I found two colleges that agreed to participate in the study. Throughout this thesis, the first college contacted is referred to as College A and the other college is referred to as College B. College A ranked first on my college list and College B ranked third.

**Description of the sites.** The participating colleges, College A and College B, varied in population, size, goals, and environment. The sections below describe each college and my own perception of the space as I entered the site.

**College A.** College A is a large institution situated in a bustling major city occupying an attractive historic building. The college offers more than 50 fields of study to approximately 10,000 full-time and part-time students. Its mission is to provide an excellent education by
providing a stimulating learning environment to students and enhance their development and potential for success in society. College A offers two types of programs; two-year pre-university programs that lead to university, and three-year technical career or professional programs designed for entry directly to the labour market. The interior design program, which is the main focus of this study, is a three-year career program that prepares students to work as professional interior designers. Graduates can work for interior design firms, any related businesses of the building trade, or establish their own design offices.

College A is known for its rich diversity of languages and cultures among the students, faculty, and staff. Its campus is large and busy. Its interiors do not reflect the building’s historic exteriors. College A’s interiors were modern but poorly kept. The hallways were crammed with students from various age groups, backgrounds, and ethnicities. When I first entered the college, the loud and noisy crowds of students slamming their locker doors immediately struck me. That specific moment reminded me of a high school setting, in which students reached their lockers to get their books for the next class. I headed to the information desk to ask the receptionist where I could find the interior design faculty offices. She guided me to this area by pointing straight ahead and then twirling her hand to the left. As I walked towards the interior design department, the loud noises ceased and students’ figurative artwork came into sight. The artwork was pinned to wide bulletin boards on both sides of the hall. The majority of drawings were freehand; some had noticeable vivid colors, while others were monochrome, drawn using charcoal.

In summary, College A offers a variety of programs to full-time and part-time students. The interior design program at College A is a skill-based three-year college diploma that prepares students for the workforce.
**College B.** College B is a large college that envisions itself to be a global leader in digitally-connected applied education and training. College B aims to provide students with an excellent education; training skills demanded by the marketplace by gathering the knowledge, experience, skills; and an experience that provides students with connections to launch a lifelong successful career. College B offers more than 150 programs, 21 apprenticeship programs, 31 co-op programs, 4 collaborative degree programs, and 3 bachelor degree program. The Bachelor of Applied Arts program in interior design is one of three bachelor degree programs offered at College B. The degree effectively combines theory and hands-on practice, which is considered the best way to prepare students for the workforce. It is one of the few interior design degrees offered in Canada, and is accredited by the CIDA.

College B has a big campus that consists of 20 buildings. Each building is designated to a specific program or function. It has an enrollment of over 14,000 full-time students, 36,000 part-time students, and 1,000 international students from various countries of the world. Unlike College A, College B astonished me with its size, design, and order. I was astounded when I first entered the campus, more specifically Building X, where the interior design department is located. Building X is a sustainable, contemporary, and sleek concrete structure. It also has a glass-covered opening in the lobby floor that allows people to see a part of the building’s foundation. The lobby and cafeteria’s walls were made of glass, which allowed a massive amount of sunlight to enter the building. College’s B Building X is new, neat, and captivating.

In summary, College B offers one of the few interior design bachelor degrees in Canada that is accredited by the CIDA. The Bachelor of Applied Arts program in interior design is a four-year bachelor degree that combines theory with practice and aims to train students for the marketplace.
Participants Selection

I began recruiting participants once I received ethical clearance from the Queen’s General Research Ethics Board in July 2012 (see Appendix-B). I also completed the required Course in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE) (see Appendix-C). There was no ethical protocols required at College A and College B. The names of all participants and instructors described within this study have been changed to pseudonyms to help maximize confidentiality to the extent possible.

The participants of the study are limited to interior design instructors currently teaching in the interior design program at the selected institutions. This study adopted a purposeful sampling selection process. For instructors to be eligible to take part in the study, they had to:

(1) Be currently teaching in the selected college-level interior design program;

(2) Have worked as a practitioner in the design field; and

(3) Have used CAD in their professional work, whether teaching it or not, at the time of this study.

Using the above selection criteria, I had initially planned to select six participants, three from each institution. An examination of colleges’ online information revealed that the majority of colleges that offer an interior design program typically have 9 to 11 instructors; specific citations are not provided for reasons of confidentiality. For the two colleges selected for my study, at College A, there were 11 instructors in the interior design program, and 8 at College B.

Recruitment process. Once I applied my selection criteria to the instructors at both colleges, it turned out that only three instructors at each college met the selection criteria. I was not in a situation where I had to choose between instructors if more than six agreed to participate. However, if more than six instructors had agreed to participate, I initially planned to select
instructors, three from each institution, with varied academic qualifications, professional experience, and teaching experience. Next, I describe the recruitment process of the three participants from each college.

**College A.** At College A, I first approached the coordinator of the interior design program in the spring of 2012 to discuss my study. We communicated via e-mail and informally talked during the formative stages of my research. Once the thesis study passed ethical clearance in July 2012, I called the coordinator and again discussed the intentions of my research but in more detail. I also explained the rights and time commitment needed of participants. The coordinator agreed that the department participate in the study and thought that my research could benefit the program by providing information to improve and offer insight into future curriculum development. In support of the study, the program coordinator requested to know the participant selection criteria to be able to quicken the recruitment process. I sent a copy of the recruitment letter to the program coordinator as requested. Immediately, the program coordinator sent the contact details for the three interior design instructors that met the selection criteria. I e-mailed all instructors one by one, inviting them to participate in my study. I again provided the recruitment letter that defined the selection criteria to make sure that they fit the selection criteria. I also attached the letter of information and the consent form (see Appendix-D).

The coordinator of the program was not involved in the consent process and the instructors who agreed to participate in the study contacted me directly by e-mail. In total, the three instructors who met the selection criteria and who were currently teaching at College A agreed to participate in my study. I informed them that I needed them to complete the training information questionnaire (see Appendix-D) and the signed consent form before interviews could be conducted. Therefore, I visited College A on September 4th 2012 to meet the instructors
individually, answer any questions they may have had concerning the study, collect the forms, and book an appointment with each instructor for the interview session. I also asked each instructor to prepare program documentations, such as course syllabi and assignment guidelines, that would allow me to analyze the interior design curriculum, more specifically the CAD courses. I collected the instructor documents on the day of the interview. The participants of College A were three male instructors: Stephan, Malcolm, and Kevin. The participants’ identities are kept confidential and their real names have been replaced with pseudonyms.

**College B.** At College B, I also approached the coordinator of the interior design program. This contact was made in the spring of 2012 via telephone where we discussed the intentions of my research. The coordinator expressed a strong interest in the study and requested that I send an e-mail reminder once I passed my ethical clearance at Queen’s University. In August 2012, I sent an e-mail to the program coordinator. In the e-mail, I explained the purpose of the study and the details of participation. I also explained the rights and time commitment needed of participants and requested instructors’ contact information since it was not provided on the college’s website. However, unlike the coordinator of College A, the program coordinator of College B refused to provide any instructors’ contact details for reasons of confidentiality. Instead, the coordinator requested to have an electronic copy of the recruitment letter (see Appendix-E). The coordinator then informed instructors of this study and asked if they would like to take part in the study. One week later, I received an e-mail from the program coordinator asking when I would like to have the interviews. I said as soon as possible and preferably on the second week of September. Unfortunately, the coordinator said that the interior design instructors were busy that week with the International Interior Design Exposition (IIDEX) event that took place in Toronto and asked if the interviews could be postponed to the last week of
September or perhaps the first week of October. Three weeks later, I received another e-mail from the coordinator that provided me with the three instructors e-mail addresses. The coordinator also asked me to contact the instructors directly to check their availability. This means that the coordinator of the program knew which instructors were to take part in the study. As I later found out once I met the instructors, they did not object or worry about the coordinator knowing that they participated in the study; the instructors were only concerned that their real names be known if the findings of the study were published. Therefore, instructors’ real names have been replaced with pseudonyms. The participants of College B were two-male instructors and one female instructor: Karl, Martin, and Carol respectively.

**Description of participants.** To be able to understand instructors’ views and perceptions, it is necessary to illustrate the background of the participating interior design instructors. Therefore, I commenced the interview process by asking the instructors to talk about their academic background, professional experience, and whether they were experienced with CAD or not. I also used the background and training information questionnaire that was attached to the Letter of Information (see Appendix-D) to be able to provide a broad description of the participants. Knowing the instructors’ backgrounds and qualifications helped me to revise a few interview questions during the actual interview process and helped me to later analyze interview data. The sections below provide general descriptions of each instructor’s background.

**College A.**

*Stephan.* Stephan completed a bachelor degree in Architecture. He had been practicing his profession as an architect since 1976. Stephan also has taught interior design at College A for 17 years; he started teaching part-time in 1995, but then became full-time in 1996. He decided to keep his architectural practice going while teaching at College A. He was very familiar with
CAD software programs and had been using them for the past 14 years in his professional career, and 12 years in his teaching career. He was also certified in one CAD software program, AutoCAD 2007, where he obtained training at Autodesk. He was not a CAD instructor; he taught mainly design and technical studio courses.

_Malcolm_. Malcolm also completed a bachelor degree in Architecture. He had worked for approximately eight years as a professional architect then worked as a senior designer in an interior design firm for four years. After that, he opened his own interior design firm in 1983. He worked as a self-employed designer for 23 years but he stopped doing full-time interior design work about five years ago. He still runs his business but takes on only few occasional contracts. Malcolm worked strictly in commercial design, retail store design, and office design. In parallel to his professional career, he started teaching at College A as a part-time teacher, where he first taught CAD courses utilizing only AutoCAD software. Then, as time went by, he started teaching a full course-teaching load of technical and design courses and became a full-time instructor. He has taught in the field of interior design education for the past 13 years. Malcolm used CAD professionally for over 20 years and has taught CAD for more than ten years in the interior design program.

_Kevin_. Kevin completed a bachelor degree in Interior Design. He then moved to Montreal to begin his career as a designer in the field of hospitality and residential design. He also designed offices, retail stores, and restaurants. Kevin worked in the design industry for approximately 12 years and often worked for small firms. Kevin began his teaching career in 2008 where he was offered a full-time position at College A. He has taught several design courses including CAD courses utilizing AutoCAD software. Kevin explained that he learned CAD outside of his studies. CAD courses were not part of the program back when he was a
student. CAD was a new technology that the university was only considering at the time of his studies. Therefore, after graduation, he enrolled in a community college course to get an introduction to CAD. He indicated that he really learned how to use CAD on the job. He often worked in small firms and had to work directly with CAD himself because he did not have support staff due to company size. He also mentioned that most of the time he had to be his own technician during his career time.

**College B.**

_Karl._ Karl is a graduate of College B where he completed a diploma in interior design. One year after he graduated, College B offered him a part-time teaching position to teach the CAD courses utilizing AutoCAD software, more precisely Technical Communications III and Technical Communications IV courses. Karl has now taught in College’s B interior design program for the past 17 years. He mentioned that when he was a student at College B, the college did not offer AutoCAD courses at the time. As a beginning instructor, when he asked for supporting material for the AutoCAD course, he was told that there were none. Karl had to create College B’s CAD curriculum and he had two months to write it. For 17 years, the same CAD curriculum has been taught to students, but over the years Karl has updated the curriculum according to software versions. In parallel with his teaching career, he practices his profession as an interior designer in the field of commercial and institutional design. It has been approximately 20 years now that Karl has been using CAD programs in his professional career and in his teaching career as well. He is certified in AutoCAD software.

_Carol._ Carol finished her bachelor degree in Interior Design in 1986. She has worked in various places. She worked in a health facility management firm for a year. Then, she was hired to do the facility display management for the exhibition department at the department of National
Defense. After that, she moved to Vancouver Island to open her residential and building design firm. Her firm specialized in customizing houses. Then, she moved to Ontario but still kept her design firm running. She stated that it was very difficult to move the business from one city to another. She eventually obtained a teaching position at College B. She has now been at College B for 13 years teaching part-time in the interior design department. She has several years of experience in using CAD programs; she used CAD programs for eight years in her professional career and she used AutoCAD for four years in her teaching career. In the year 2000, she received her certificate in AutoCAD LT.

*Martin.* Martin finished an advanced three-year diploma in Interior Design in 1992. He has worked in the field of hospitality, retail, and corporate design. Even though he is not certified with any CAD software, he has been using CAD programs for over 20 years. He began his teaching career as a part-time instructor, but then became a full-time interior design instructor in the year 2000. He spent two years teaching CAD courses only and ten years teaching other related design courses such as manual drafting, project management, environmental systems, working drawings and detailing, materials and products, etc. Currently, Martin is upgrading his academic qualifications and pursuing his bachelor degree in Interior Design because the interior design profession is now mandating a degree.

**Data Collection**

Data collection took approximately two weeks in September 2012. Data collection consists of collecting documents and conducting six face-to-face individual interviews.

**Documents.** The documents employed in this thesis were both program documents collected from program materials on web sites and documents obtained from the instructors themselves. Instructor documents consisted of course syllabi, course assignments, and/or course
assessments. They were collected on the day of the interview of each participant. However, two instructors from College B, Carol and Martin, did not provide any documents. Along with the program description provided online, these documents were analyzed to better understand the interior design curricula of the two colleges.

**Individual interviews.** One interview was conducted with each instructor. The shortest interview was 53 minutes in length and the longest interview was 86 minutes. The interview questions’ aimed to answer the research questions and reflected the issues discussed in the review of literature. Prior to the interviews, an interview guideline was prepared to ensure a good use of limited interview time and to make the interviewing process systematic and comprehensive. In addition, instructors of College A requested to have a copy of the interview guideline in advance to have a general idea of the topics that would be discussed in the interview. This allowed instructors of College A to provide richer and more focused data. The interviews were semi-structured so probing and additional interview questions were asked during the interviews.

Because college-level institutions commence their fall semester in the last week of August, instructors usually do not have a heavy work load at the beginning of a semester. Therefore, the interviewing process began on the third week of September 2012. According to instructors’ class timetables and availabilities, each participant was appointed a specific date and time for the interview. Instructors of College A were all interviewed in the same week; I interviewed Stephan on September 18th at 1:00 pm, Malcolm on September 18th at 2:30 pm, and Kevin on September 20th at 2:30 pm. Instructors of College B were all interviewed in the following week; Karl was interviewed on September 24th at 9:30 am, Carol on the same day at noon, and Martin was interviewed on September 25th at 10:00 am. Table 3 and Table 4 below
provide more detail about the data collected from College A and College B in relation to each research question. As can be seen in these two tables, documents were collected for research question 1 and interviews were conducted for research questions 2, 3, 4, and 5.

Table 3

*Summary of College A Data Collection in Relation to Research Questions*

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>College A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stephan</td>
</tr>
<tr>
<td>1- Nature of interior design curriculum</td>
<td>Program information, course list, and course syllabi of Construction Documents, Interior Design V, and Furniture Design and Construction.</td>
</tr>
<tr>
<td>2- Need to incorporate CAD into the curriculum</td>
<td>1 interview session of 53 minutes on Sep. 18th at 1:00 pm</td>
</tr>
<tr>
<td>3- Placement of learning CAD</td>
<td>26 pages of interview transcription</td>
</tr>
<tr>
<td>4- Conceptualizing the design process</td>
<td></td>
</tr>
<tr>
<td>5- Teaching the design process</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Keywords have been used to represent each research question*
Table 4

Summary of College B Data Collection in Relation to Research Questions

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>College B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Nature of interior design curriculum</td>
<td>Karl: Program information, course list, and course syllabus and course notes of Technical Communication III</td>
</tr>
<tr>
<td>2- Need to incorporate CAD into the curriculum</td>
<td>1 interview session of 57 minutes on Sep. 24th at 9:30 am</td>
</tr>
<tr>
<td>3- Placement of learning CAD</td>
<td>35 pages of interview transcription</td>
</tr>
<tr>
<td>4- Conceptualizing the design process</td>
<td></td>
</tr>
<tr>
<td>5- Teaching the design process</td>
<td></td>
</tr>
</tbody>
</table>

Note. Keywords have been used to represent each research question.

All participants were asked to keep information confidential and not share anything discussed in the interview with other instructors or any faculty member of the interior design department. However, the instructors of College B did not comply with this request and they did not mind if other instructors knew or heard what they have said during the interview. All participants were interviewed once. Follow-up interviews were not necessary to clarify participants’ responses. All interviews were audio-recorded using a digital device. This allowed me to be more attentive to the interviewees during the interviews. All interviews were transcribed verbatim. During the interview, I took notes to reformulate questions and probes when necessary and to record instructor reactions, or any other additional information that was
helpful to interpret the data analysis.

I began each interview session by introducing the topic and asking a general question about it. It was essential to be flexible in the interviews; I listened to the interviewees’ answers and produced follow-up questions when relevant. For instance, I asked Kevin from College A to explain further his preference for using SketchUp software instead of 3ds Max.

**Researcher:** . . . if I asked you to change the CAD curriculum at College A, what would you change and why?

**Kevin:** I would get rid of 3ds max [be]cause it’s way too bloated and complicated . . . 3ds Max is used by technicians or outside consultants in the design industry so it’s very unlikely that they’re gonna get out there and be doing 3ds Max. I would replace it with SketchUp, actual training in SketchUp, . . . and eventually I think we’re all gonna get completely thrown off . . . track with Revit. We’re terrified of Revit.

**Researcher:** Terrified?

**Kevin:** Well it’s a whole different beast . . . and I’ve talked to people in the industry that that use it and there is very mixed opinions about it where . . . it has its place and how integrated it is in the industry. We’re a little bit behind seeing it here . . . it’s mostly in architectural firms.

**Researcher:** But why SketchUp then?

**Kevin:** Hmmm SketchUp is . . . simple. [It is a] . . . good quick visualization tool . . . [and] quicker to master as a design tool . . . [whereas] Revit and 3ds Max are massive complicated production tools and neither of them are good design tools. Actually, . . . the feedback I’ve had from the industry is that Revit kills the design process or has that potential. (KEV: Sep 20: 275)

I used follow-up questions to encourage interviewees to elaborate on certain key terms he or she raised. I also used clarification probes when I wanted instructors to say more about something that was ambiguous or unclear and to give me more context. For example, during the interview with Malcolm from College A, I asked him to clarify what he meant about finalizing an interior design project presentation.

**Researcher:** . . . [If] I asked you to summarize . . . the steps of the design process, what would they be? . . .

**Malcolm:** Okay. Understanding the problem, learning about it, [and] researching the needs for that. [After that,] conceptualizing a possible solution to that by sketching . . . two-dimensional or three- dimensional [drawings]. [Then,] validating that approach by . . . finalizing planning drawings [and] validating those assumptions on the various plans . . .
. [Then] taking that information and returning to original assumptions and concept and fine-tuning and narrowing the directional focus of that and then finalizing the solution to presentation to your clients or to the teacher in this case.

**Researcher:** What do you mean by finalizing the presentation?

**Malcolm:** Putting everything down on paper in precise form . . . [in] precise presentation of materials, elements of design, furniture [and] all those types of things that would convey [a design concept] without anyone [having to say] a word [of] what was being presented . . . and the solutions required. (MAL: Sep 18: 234)

The interviews were conducted in a manner to ensure that questions were clearly understood by the instructors, for example, I repeated, or rephrased a question when necessary. The interviews were informal and carried out in a conversational style. Participants were encouraged to share their own unique ideas and experiences with CAD in design.

**Interview Sites.** The interviews were held in different locations. I asked the instructors to select the site for their interview. However, I insisted that it must be in a quiet environment and without too much outside interaction. Some instructors chose to have their interview in their office and others preferred to meet in another room available in the college to avoid any interruptions. It was very important to provide a comfortable environment for the interviewees in order for them to express their views and talk about their personal teaching experiences. If I felt instructors were uncomfortable, I reminded them that they had the right to withdraw from the study at any time. The following paragraphs describe the site chosen by each participant at College A and College B.

**College A.**

*Stephan.* The interview with Stephan took place in his office, which was located on the second floor of College A. The space of the interview was surrounded with piles of paper. It was small but it allowed me to interact easily with the interviewee.

*Malcolm.* The interview with Malcolm took place in a meeting room in College A. Malcolm shared an office with another instructor; therefore, he booked an available meeting
room in the college, for the interview session. The meeting room was equipped with an oval
table that could accommodate eight people, a projector, and an easel paper pad.

Kevin. Like Stephan, the interview with Kevin was held in his office. His office was
located on the third floor of College A. The office was spacious and had students’ work hung on
the walls.

College B.

Karl, Carol, and Martin. All three instructors had the choice to select the location of their
individual interview. They all selected a multi-purpose, small round table in a room within the
institution.

Data Analysis

Data analysis was guided by themes found in the literature and factors that emerged from
analysis as in grounded theory.

Document data. The interior design program documents were evaluated using four
recurring conceptions of curriculum, represented as four categories; self-actualization, self
reconstruction-relevance, technology, and academic rationalism. I evaluated the courses offered
in the interior design curricula and classified them in their respective category curricular
conception. In other words, I defined whether the course taught was based on specified
objectives and outcomes, real-life community projects, or solving individual tasks. Some courses
belonged to one conception and other courses overlapped and conformed to more than one
conception of curriculum. This also allowed me to evaluate the nature of the interior design
programs, and the importance of CAD in the curricula.

Interview data. Interview data concepts emerged from both the literature and interview
data. Interview data were evaluated using an inductive analysis, which means that “patterns,
themes, and categories of analysis come from the data; they emerge out of the data rather than being decided prior to data collection and analysis” (Patton, 1987, p. 150). The interviews were transcribed verbatim by myself using Microsoft Word. I duplicated the original Microsoft Word document to maintain a copy of the raw data as backup. Then, I edited the duplicated copy by giving pseudonyms to the colleges' names and interior design instructors. In an initial analysis, paper copies of the interview transcriptions were read and re-read to identify the recurring regularities and the main codes on themes. Then, the data was re-read again to confirm the themes found. New themes were added and others modified. The same process was repeated for all interview transcriptions. Then, I looked for consistencies and similarities, as well as contradictions and differences of themes found across the different interview transcriptions.

**NVivo.** Next, all data, documents, and interview transcriptions were entered into the software program NVivo for purposes of further analysis. This provided me with the opportunity to check my initial analysis. NVivo saved time in refining codes and grouping them into themes. Emergent themes were interpreted to understand the interior design curricula and instructors’ perceptions for the need to incorporate CAD in interior design programs. Other themes were interpreted to give meaning to instructors’ teaching practices, investigate how they approach the design process using CAD, and understand why they chose this approach. An example of data analysis, code, and themes is found in Appendix-F.

**Trustworthiness.** When reporting data, I tried to the best of my ability to be neutral and nonjudgmental to avoid subjectivity. To increase the objectivity and validity of my study, I controlled bias by achieving consistent findings through examination of raw data, data reduction products, and process notes (Golafshani, 2003). To improve accuracy and trustworthiness, I had planned to use the method of member checking (Stake, 2010). However, none of the instructors
wanted to review their transcribed interviews. While this method cannot be used to enhance validity, trustworthiness was enhanced by data triangulation. I triangulated data to improve the credibility of the study by analyzing program documents and by checking if the interior design instructors were consistent in what they said, for example, re-asking the same questions to clarify responses if there was confusion. Also, I checked the interview transcriptions against the interior design program documents to confirm interview respondents’ perceptions where applicable.

**Summary**

In this chapter, I presented the research methodology and methods, site selection, participant selection, data collection, and data analysis procedures. Next, Chapter 4, presents findings from the data collected in this study.
CHAPTER FOUR

RESULTS

This chapter presents findings from the document analysis and interviews conducted for this study. Documents from two college programs, College A and College B, were examined using recurring conceptions of curriculum to describe the nature of the interior design curriculum. Interviews with six interior design instructors, three from each college, complemented the document analysis. It is through the instructors’ experiences and perceptions that I examined the need to incorporate CAD programs in the interior design curriculum, its placement in the interior design curriculum, and its use in the design process. Content of interview data were analyzed using a coding-theme process as discussed in Chapter 3. In Chapter 4, I present the themes for each research question and further delineate the data across the two different colleges to compare and contrast instructors’ perceptions.

Direct quotations from interview sessions are referenced with a three-code notation. For example (KEV: Sep y: z), where KEV represents the first three letters of an instructor’s first name, Sep y represents the date of interview session, and z represents the line number in the interview transcript (See Appendix-G for additional clarification).

Document Analysis

In Chapter 2, different curricular theorists’ conceptions of curriculum were described. Since my research interest is the curriculum of interior design, in this section, I explore how conceptions of curriculum relate to the interior design programs found at College A and College B. One research question guided this part of the study.
Research Question 1: What is the nature of the curriculum in college-level interior design programs?

As discussed in Chapter 2, four conceptions of curriculum recur with time: self-actualization, self reconstruction-relevance, technology, and academic rationalism. A curriculum “does not have to be either one conception or another” (Klein, 1986, p. 35). Many schools and educational programs tend to interconnect more than one conception simultaneously to create a more interesting and attractive learning environment (Klein, 1986). However, more commonly subject matter is the most popular basis for curriculum organization in schools. This approach to content organization is traditional, recognizable, and resource materials are readily available. In the interior design programs of College A and College B, document analysis identified a subject-matter curricular design as the primary content organizer, which is an academic rationalism conception of the curriculum. In addition, these two interior design programs draw on two other conceptions of curriculum in the latter part of their programs: societal-cultural and individual learner (Sowell, 2005). The following section reviews how the literature portrays the curricular conception of academic rationalism, social reconstruction-relevance, and self-actualization and explains how the conceptions relate to interior design programs in general. Then, I analyze and describe in detail College A and College B’s interior design programs and courses with regard to the three curricular conceptions.

**Interior design curriculum’s primary conception.** Academic rationalism continues to have a strong influence in the field of education (Sowell, 2005; Vallance, 1986). This curricular approach was identified through a document analysis to be the primary approach used to develop interior design programs in College A and College B. Sowell (2005) described academic rationalism as “the oldest and most fundamental [curricula] of all purposes of American
education” (p. 39). It transmits knowledge, facts, and skills of one generation to another by encouraging students to investigate and inquire (McNeil, 2009). The knowledge to be acquired is viewed in the form of “skills, competencies, and performance standards” (McNeil, 2009, p. 71). Several authors (Mager, 1984; Popham, 2009; Taba, 1962; Tyler, 1949) viewed such an educational environment as goal-oriented. They claimed that students are in schools because they want to learn and to achieve specific objectives and standards. Educators who use this curricular conception to organize curriculum use objectives to develop curriculum, use a systematic approach to instruction, and evaluate learning experiences more effectively (Tanner, 1972; Tyler, 1949). Lacey (2005) stated that the interior designer’s work is very technical. It involves space-planning design, lighting design, estimating costs and budgets, as well as creating technical floor plans (Lacey, 2005). Although interior design is a creative field, it revolves around a systematic design process concerning goals, standards, and outcomes (Lacey, 2005).

According to Tyler (1949), educational objectives are “the criteria by which materials are selected, content is outlined, instructional procedures are developed and tests and examinations are prepared” (p. 70). Tyler (1949, 1975) developed a rationale that consisted of a four-step strategy when developing a curriculum: purposes of the school, educational experiences related to the purposes, organization of the experiences, and evaluation of the experiences. The purpose of an interior design program is to prepare students for a career in interior design (Guerin & Thompson, 2004). At College A and College B, the schools of interior design integrate and create activities that help students reach that objective by blending theory with practice. College A’s documents, for example, suggest learning activities such as practitioners’ visits to classrooms, discipline-based learning, community service projects, or fieldtrips. However, Watson, Guerin, and Ginthner (2003) affirmed that these types of activities are not sufficient to
prepare graduates for the workforce. Design students also must understand the process and tasks of the professional designer. These tasks follow a systematic process in the form of objectives. Watson et al. (2003) defined these tasks in the form of a checklist in which the designer must determine the objectives of the problem, determine the function of the space to be designed, determine resources and limitations, review existing drawings and specifications, analyze spatial relationships, conduct building code search, check existing furniture and architectural features, etc. In Watson et al.’s (2003) view, interior design students need to go through this typical checklist to be able to start the design process and define their end goal. According to Mager (1984), defining objectives can identify the intended result. Essentially, educators need to decide where they want to go, plan how to get there, and then evaluate whether they have arrived there or not. Mager (1984) affirmed that objectives could be written in various ways as long as they can communicate an intent by stating what the student should be able to do, under what conditions, and how well the student must perform to succeed. Tyler (1949) also identified students, contemporary life, and subject specialists as sources of information when developing a curriculum program. He explained that educational objectives are the changes in behaviour that a school seeks to bring out in its students. Life is constantly changing; therefore, it is necessary to focus the objectives on life’s complex aspects. Educators should not waste students’ time by instructing them on matters from the past that are no longer significant (Guerin & Thompson, 2004; Tyler 1949). Therefore, design educators are responsible to update their knowledge of design practice and to bring current professional practice into the classroom by facilitating the exchange of information between practitioners and students (Watson et al., 2003). Design educators tend to “immerse themselves in design practice in a structured way, enabling them to update their knowledge of design practice” (Watson et al., 2003, p. 102).
Guerin and Thompson (2004) also believed that design educators should collaborate with practitioners to enhance interior design programs. Their study suggested that the development of a connected curriculum is required. In other words, a curriculum “that encourages the integration, application, and discovery of knowledge inside and outside the profession, and that reflects the changing needs of the profession” (Guerin & Thompson, 2004, p. 2). College B offers students a 14-week cooperative work program where they “have the opportunity to explore opportunities within the sector of the industry and city of their choosing” (College B, 2012). Students get to be a member of a design firm where they can “consolidate and apply acquired knowledge and skills in a related work area” (College B, 2012). It is the educator’s role to provide clear objectives and statements about what the students are intended to learn (Marsh, 2009) and design educators can do that by staying current with the work field (Guerin & Thompson, 2004).

Moreover, Guerin and Thompson (2004) explained that as the complexity of the interior design profession grows, it becomes necessary to include the new developing content in the curriculum (e.g. universal design, sustainable design, newly developed CAD programs). Their study found that it is a challenge to include all recent developments into the content of design curriculum. As a solution to this situation, design educators merged numerous topics into one design studio project. For example, “emphasizing sustainability in a project [and] requiring both hand-drafted and CAD drawings at different phases of a project” (Guerin & Thompson, 2004, p. 6). This approach helped instructors to assess multiple objectives through one assessment. At College B, the course Design Technology II merges several educational objectives. The course teaches students “the integration and coordination of building components in the interior environment” (College B, 2012). Course information at College B indicates that students
examine sustainable design principles and materials, principles of construction methods, building
codes and standards, material selection, and accessible design as well as cabinet and casework
construction details. This kind of crowded course syllabi and limited timetable allocations often
require design educators to combine several learning competencies in one project (McLaren,
2008; Stinson 1998) which is also seen in the course information at College B.

McNeil (1996) said that an academic rationalism conception of the curriculum aims to
develop rational minds and to train students to be researchers. Literature on interior design
education indicates that research is a valuable and an essential element in the interior design
education (Dickinson, Anthony, & Marsden, 2009). Guerin and Dohr (2007) affirmed that
research “is a systematic discovery of knowledge or a systematic inquiry” (as cited in Dickinson
et al., 2009, p. 2). The field of interior design values what research brings to the design process
allowing the designer to discover and expand his or her knowledge. Design educators want to
prepare students for a professional life and they can achieve this by emphasizing research in the
curriculum. Design students are constantly encouraged to conduct research to keep up-to-date
with the latest inventions of design; students investigate the newest trends and products of
furniture, materials, flooring, textiles, lighting, and accessories. For that reason, College B
requires students to take an Introduction to Research course. Course information states that “an
overview of the research process and research tools prepares learners to undertake research in
other courses. Evaluation, selection and documentation of secondary sources are stressed”
(College B, 2012).

In addition, objectives are intended to evaluate and measure students’ capability to
perform (Popham, 2009). According to Popham (2009), when objectives are clear and
transparent, educators know the outcomes they seek to realize and how to plan classroom
activities; learning experiences are then worthwhile. However, if objectives are vague, they can be misinterpreted and educators will not know whether or not they have accomplished the objectives. Pable (2009) said that interior design is both subjective and objective. Interior designers use both “subjective artistic expression” as well as “scientific principles in their decision-making” (Pable, 2009, p. 6). Subjective artistic expression is difficult to measure and to evaluate. Popham (2009) explained that assessing un-measurable objectives is insignificant. All objectives should be measurable to be able to know what to look for in determining a program’s success or failure. Eisner (2009) had a different view on the utility of objectives. He claimed that educational objectives are static and ineffective because they do not predict the unpredictable in the classroom and they fail to recognize that subjects vary. Therefore, objectives cannot be used as a standard to assess the achievement of all students and they cannot be applied to all fields (Eisner, 2009). The design field is struggling to assess creative projects effectively (De la Harpe, Peterson, Frankham, Zehner, Neale, Musgrave, & McDermott, 2009). Educators are debating whether they should assess the process, the designer, or the product (De la Harpe et al., 2009). Yet, educators prefer assessing the product because it is the result of the process and the creative thinking of the designer; the product is the creative outcome of the project (De la Harpe et al., 2009).

According to Taba (1962), objectives need to be consistent for all classes and teachers. A curriculum with consistent and common objectives provides all learners with the same unified goals. However, this seems difficult to apply completely in the interior design programs of College A and College B. The interior design program curriculum varies in course offerings; some are more technical than others (Pable, 2009). Many courses are straight forward, in which theories, history, technical drawings, and systematic analysis are taught. It could be argued that
well-defined objectives would work well for such courses. Other courses, however, deal with the arts, where it is difficult to use defined objectives and evaluation methods are subjective.

At College A, the CAD I course taught in the interior design program (See Appendix-H) aims to “introduce the student to computer assisted drawing. Students will learn to use AutoCAD software to create and edit 2-D drawings” (College A, 2012). The CAD I course focuses on technical skills and focuses on the instruction of commands and features. Well-defined objectives could work well for this course. Another example at College A would be the Materials I course (See Appendix-H); this course “teaches students about various materials and finishes commonly used in the interior environment. Students learn the properties, construction techniques, availability, and aesthetic application of each of these materials in residential and commercial installation” (College A, 2012). The content taught in these two courses are structured with defined objectives. This facilitates the selection and organization of content, and students know precisely the expected outcomes of the course (Eisner, 2009). Objectives are also useful in assessing the accomplishment of the objectives and providing “students with the means to organize their own efforts toward accomplishment of those objectives” (Mager, 1984, p. 6).

On the other hand, subjective courses that deal with creativity and artistic expression are guided by objectives that are more general, not as well defined, and therefore more difficult to evaluate. For example, at College B the objective of the Design Studio I (See Appendix-I) course is to introduce students “to the two-dimensional and three-dimensional design world. Students study the abstract fundamentals of space, form and structure, as well as the principles and elements of composition, where they are encouraged to focus on the design process, as much as the design product” (College B, 2012). The objective of the course is stated in general terms and
made known to the students, but educators may not be consistent when evaluating a project. In arts, no particular objectives can be created to evaluate creativity (Eisner, 2009).

**Interior design curriculum’s secondary conceptions.** Some courses taught in the interior design programs at College A and College B have drawn on other conceptions of curriculum beyond academic rationalism. The interior design field seeks to improve an individual’s and a community’s quality of life. According to the association of Interior Designers of Canada’s website (IDC, 2010), interior design is defined as follows:

> [It] is more than just aesthetics. It [is] about finding creative design solutions for interior environments while supporting the health, safety and well being of occupants and enhancing their quality of life. Following a systematic and coordinated methodology including research, analysis and integration of knowledge into the creative process, interior design is a multi-facetted profession whereby the needs and resources of the client are satisfied to create an interior space that fulfils the project goals.

Thus, the interior design curriculum may draw also on curricular conceptions of self-actualization and social reconstruction-relevance. Document analysis revealed that interior design courses offered at College A and College B emphasize the academic rationalism conception at the beginning of their programs then in senior years gradually draw on other conceptions of curriculum, specifically self-actualization, and social reconstruction-relevance, or both concurrently.

Self-actualizers are characterized as self-directed and autonomous. Lacey (2005) affirmed that one important quality of an interior design student is to be autonomous by being able to work independently. It is essential for students to be self-disciplined to be able to “start a project on their own” (Lacey, 2005, p. 13). Students also need to be imaginative, persistent, and
problem-solvers. These qualities are important to be able to grow and be successful as a designer. In the courses Senior Project I and Senior Project II, at College B, students work independently with faculty guidance to select their project topic, research and plan the requirements for its completion, and present it to faculty, students, and invited guests. As such, this course could be considered to be grounded in the curricular conception of self-actualization.

In addition, the work of an interior designer involves creating interior spaces for an individual or a group of individuals. The designer’s job is to make a living or a working space more appealing by the use of colors, furniture, texture, and lighting (Lacey, 2005). The interior design field involves studying the human individual; designers create interior spaces to be occupied by human beings, in which human activities occur (Clemons & Eckman, 2011). For example, the Human Factors: Code, Accessibility, Ergonomics (See Appendix-H) course, offered at College A, teaches “building codes and public safety to design projects” applied to real-life situations. Human comfort and security are the focus in this course. Interior designers design spaces for people. They are involved in planning various interiors, such as offices, restaurants, and schools. Interior designers “improve these spaces for specific purposes, such as to boost worker productivity, to attract a wealthy clientele, or to provide an environment conducive to learning” (Lacey, 2005, p. 9). However, planning interiors does not necessarily involve designing a new space; it is often restoration or renovation of spaces. Pearce, Warsco, and Moss’s (2001) study demonstrated how restoration projects could involve the participation of the community, which can provide a forum of experiential learning for students. Integrating community service with design practice allows students to work in teams and collaborate with community leaders as well as develop their social skills (Pearce, Warsco & Moss, 2001). Such projects provide students an enriched experience of team spirit, community improvement, and
offer a smooth transition to the real-world of interior design. Therefore, interior design education accentuates the well-being of the individual and the community by reflecting their needs in real-life situations or projects. In this context, such courses could be placed in the curricular conception of social reconstruction-relevance. To support program content that address human factors and considerations, College B offers the course Developmental Psychology where students study “biological, psychological and social determinants of human behaviour . . . to explain and anticipate behaviour across the life span enabling them to identify developmental tasks, special challenges and needs for each stage of human development” (College B, 2012).

The above section linked the literature to a general discussion of interior design programs and offered a few examples from College A and College B.

The following section further analyzes and describes College A and College B’s interior design program with regard to conceptions of curriculum. Analysis of the colleges’ interior design curricula, and participant instructors’ course syllabi, assignments, and projects are used to look at consistency between the planned and the enacted curriculum.

**College A.** The objectives of College A’s interior design program are to prepare graduates for the workforce and to “solve problems in a creative, ethical, and logical approach, balancing technological, business, and human values” (College A, 2012). Learning activities at College A are designed to provide students “conceptual sophistication, specialized knowledge, and intellectual autonomy” (College A, 2012). The interior design curriculum is divided into six semesters. I read and analyzed the description of each design course to classify each into a category of curricular conception. Analysis revealed that the majority of design courses focus on the curricular conception of academic rationalism; however, a few draw on academic rationalism as well as other conceptions of curriculum such as self-actualization and social reconstruction-
relevance. Table 5 below shows my analysis of curricular conceptions associated with each
design course offered at College A (See Appendix-H for detailed course descriptions).

Table 5

*College A Interior Design Program Course List*

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Number/Course Name</th>
<th>Associated Curriculum Conception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>1. Drawing from Observation</td>
<td>Academic rationalism</td>
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<td></td>
<td>2. Visual Language 2D</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>3. Visual Language 3D</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>4. History of Art and Aesthetics I</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>5. Materials I</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>6. Interior Design I</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>7. Technical Drawing</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>Semester 2</td>
<td>8. History of Art and Aesthetics II</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>9. Materials II</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>10. Interior Design II</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>11. Presentation Techniques I</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>12. CAD I</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>13. Colour and Lighting I</td>
<td>Academic rationalism</td>
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<tr>
<td>Semester 3</td>
<td>14. Interior Design III</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>15. Construction Documents I</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>16. Presentation Techniques II</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>17. CAD II</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>18. Colour and Lighting II</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>19. Design Theory: 19th Century to Present</td>
<td>Academic rationalism</td>
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<tr>
<td>Semester 4</td>
<td>20. Interior Design IV</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>21. Construction Documents II</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>22. Presentation Techniques III</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>23. Building Systems, Environmental Design</td>
<td>Academic rationalism</td>
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<tr>
<td>Semester 5</td>
<td>Course</td>
<td>Philosophy</td>
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<tr>
<td></td>
<td>24. 3D Studies</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>25. Furniture Design and Construction</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>26. Interior Design V</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>27. Construction Documents III</td>
<td>Academic rationalism</td>
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<td></td>
<td></td>
<td>Social reconstruction-relevance</td>
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<tr>
<td>Semester 6</td>
<td>29. Interior Design VI</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>30. Construction Documents IV</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>31. Professional Practice: Theory</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>32. Professional Practice: Experience</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-actualization</td>
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</tbody>
</table>

Participant instructor documents (course syllabi, assignments, tests, projects, course notes, sample grading sheets) were used to analyze consistency with regard to conception of curriculum in the planned curriculum (program course information from college web site as analyzed in Table 5) and the enacted curriculum (instructor documents). Stephan, Malcolm, and Kevin provided documents for classes they had taught or were still currently teaching. Stephan submitted the course syllabi for three courses: Construction Documents I, Furniture Design and Construction, and Interior Design V. Malcolm submitted the course syllabi for CAD I and CAD II along with examples of assignments and assessments. Kevin provided electronic copies of the syllabus, assessments, assignments, projects, course notes, examples of student work, and sample grading sheets for the course CAD II.

Stephan’s Construction Documents I course documents reveal that the course offers opportunities for students to prepare basic construction drawings and specifications “of floor
plans, elevations, wall and floor sections and other interior elements” (College A, 2012).

Students use manual drafting and AutoCAD as tools to complete the working drawings. This course draws on the curricular conception of academic rationalism only. It is based on two objectives: (1) drawing objects and spaces to scale, and (2) producing working drawings and specifications. Construction Documents I allows students to explore the use of various materials to develop construction assemblies and attain design objectives addressed in the industry. Students develop competencies through the preparation of working drawings for a typical residential wood frame construction project. They draw a complete set of technical documents for interior and exterior construction elements and assemblies according to graphic conventions and construction standards.

In the course Furniture Design and Construction, students learn the basic principles of designing and constructing furniture used in residential and commercial interiors. Similar to Construction Documents I, this course also draws on the conception of academic rationalism. It is based on three objectives: (1) drawing objects to scale, (2) designing custom elements, and (3) producing working drawings and specifications. Students learn to understand and solve furniture construction problems. This course focuses on designing, constructing, and detailing in wood. It also focuses on plastic and composite materials. Students also learn how wood is combined with other materials such as metals and glass. Stephan teaches students through lectures, demonstrations, discussions, fieldtrips, and workshops.

Stephan’s Interior Design V course “teaches students to solve design problems related to hospitality and recreational environments” (College A, 2012). Students also learn “to analyze the complex contemporary programs, prepare design solutions and 3-D development of interior spaces including complex planning of vertical and horizontal interconnecting spaces” (College
A, 2012). This course consists of two projects. The first project, in groups of two students, requires students to explore design issues of large and private leisure spaces. Students develop a program and design concept for a multi-use facility within a chosen multi-storey building (i.e., dinner theatre, performance or dance club, health or exercise club, beauty spa, etc.). This project’s emphasis is on creative, innovative, and three-dimensional design solutions. The second project requires students to explore design issues in small, institutional or community projects. Individually, students develop a design concept based on an institutional program within a small building provided by the instructor. This course is based on four objectives where students need to: (1) interact with clients, resource persons and colleagues; (2) plan a layout for a commercial industrial or public building; (3) create an interior design concept for a commercial, industrial, or public building; and (4) develop an interior design project.

The above course, Interior Design V, draws primarily on the curricular conception of academic rationalism. It is based on multiple objectives, competencies, and standards to be achieved by students. This creative course involves a systematic design process. Students have to research ideas, create various design concepts, use both manual-drafting and computer-drafting skill to draw technical documents such as floors plans, elevations, and sections, and present the project using different means of presentation. But Interior Design V also draws on the curricular conception of self-actualization. It promotes students’ autonomy, self-confidence, and aptitudes by working individually and in teams on a project. This helps students to develop good character and demonstrate good working qualities. In addition, Stephan’s responsibility as an instructor is to support students’ ideas and guide their work process to develop better design solutions. He evaluates students’ work by assessing the progress of every design phase independently rather than evaluating the final product of their design only. Receiving
constructive criticism at every phase of the design process allows students to discover their own abilities, their strengths, and their weaknesses in designing.

Interior Design V also draws on the curricular conception of social reconstruction-relevance. In the second project, students are required to work with community oriented groups, such as pre-schools, youth or senior centers, cultural centers, or centers for special needs. This project allows students to research the psychological and social needs of users of space. This project also allows students to cooperate with the community and consider values cherished by the population for whom they are working. Students create design solutions through real experiences that aim to generate better living environments for society.

Malcolm’s course CAD I (Computer-Assisted Drawing I) introduces students to AutoCAD software. The objective of CAD I is to learn how to create, edit, and plot two-dimensional drawings on AutoCAD. In this course, content is covered through demonstrations, hands-on computer experience, and class discussions. CAD I draws only on the conception of academic rationalism. Learning activities of CAD I clearly state educational objectives and standards to be achieved by students. Learning activities include drawing simple objects as well as architectural plans, elevations, and sections. Learning activities also include creating and revising construction drawings, dimensioning and annotating drawings according to conventional drafting standards, and plotting drawings to a specific scale with appropriately scaled text and dimensions. Technical Drawing, a pre-requisite course to CAD I, also falls into the academic rationalism conception of curriculum.

Malcolm and Kevin both teach CAD II. This course builds upon skills introduced in CAD I. The objective of CAD II is to teach students how to customize, create, and output complex two-dimensional drawings of various objects, interior spaces, and architectural elements
using complex AutoCAD commands. Excel software is also introduced to produce spreadsheets and schedules used in construction documentation. Like CAD I, CAD II draws only on the conception of academic rationalism. CAD II’s content is covered by lectures, demonstrations, and individual computer practice. CAD I is a pre-requisite to CAD II.

**Summary (College A).** The interior design curriculum at College A is divided into six semesters. Document analysis revealed that courses at the beginning of College A’s program can be categorized as courses in the curricular conception of academic rationalism. However, senior year courses reflected a combination of academic rationalism, self-actualization, and social reconstruction-relevance conceptions of curriculum.

Documents for the courses Construction Documents I, Furniture Design and Construction, CAD I, and CAD II include evidence that the courses are grounded in the curricular conception of academic rationalism. These courses are based on standards and objectives to be achieved. The senior course titled Interior Design V combines three curricular conceptions: academic rationalism, self-actualization, and social reconstruction-relevance. This course aims to promote students’ research, problem-solving skills, autonomy, and ability to design for the community.

**College B.** College B’s interior design program aims to prepare students for a professional career in interior design and the built environment. The four-year program has a well-developed experiential component that integrates theory and practice. The program seeks individuals wanting to combine aesthetics, technology, and human needs into interior environments as well as using creative and logic to solve design issues. “The curriculum integrates professional and general studies with an emphasis on critical thinking and applied research, and is enriched with an additional focus on international perspectives in interior
design” (College B, 2012). Like College A, I read and analyzed the description of each design course and classified each into a category of curricular conception. Analysis revealed that the interior design program at College B also focuses on the curricular conception of academic rationalism; however, some courses also draw on conceptions of self-actualization and social reconstruction-relevance. The interior design curriculum at College B is divided into eight semesters and a 14-week co-op active work term. Table 6 depicts curricular conceptions associated with each design course offered at College B (See Appendix-I for detailed course descriptions).

Table 6

*College B Interior Design Program Course List*

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Number/Course Name</th>
<th>Associated Curriculum Conception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>1. Technical Communication I</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>2. Design Drawing I</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>3. Foundations of Design I</td>
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Carol and Martin did not provide documents for the courses they had taught or were currently teaching at College B. However, Karl offered the syllabus and course notes for the course Technical Communication III, which he was currently teaching. Technical Communication III offers learning opportunities for students to communicate their design concepts through the production of technical drawings using AutoCAD software. In other words, they utilize computer-aided drafting to communicate their design solutions. Technical Communication III draws only on the conception of academic rationalism and it demonstrates four learning outcomes to be achieved. When students complete this course, they will have the ability to: (1) to draft within the AutoCAD environment, (2) manage and display architectural drawings, (3) explain and demonstrate intermediate drafting skills used in the production of construction drawings, and (4) submit CAD files showing various AutoCAD styles formatting. In this course, content is covered through lectures, computer demonstrations, computer tutorials, and individual critiques. Learning activities of Technical Communication III include assignments that deal with drawing management within AutoCAD, as well as basic drafting fundamentals,
practice exercises, and in-class tutorials. In relation to the program, this course prepares students to be knowledgeable workers who can apply fundamental design skills in a variety of contexts. It also prepares students to design built environments consistent with industry standards and practices. This course helps students to be critical and creative thinkers able to develop innovative products, and to be effective collaborators able to use communication and interpersonal skills to fulfill a leadership role on an interdisciplinary, multi-cultural design team.

**Summary (College B).** The curricular conception of academic rationalism was the primary approach to organizing course content in the interior design program at College B, particularly early on in the program and in the CAD courses. Such courses were based on objectives, skills, and standards. However, similar to College A, College B’s senior year courses reflected a combination of academic rationalism, self-actualization, and social reconstruction-relevance conceptions of curriculum. Courses in the senior years aimed to prepare students for the workplace, teaching them to be thinkers, self-directed, and involved in the community.

**Interviews**

Interviews with six interior design instructors, three from each college, were used to collect data to answer the four remaining research questions of this study. For each research question, I developed a set of interview questions to engage in dialogue with the participants. All interviews were transcribed, and the transcriptions were coded for common key words and ideas. Ultimately, key words were linked to larger themes. The following sections organized by research question, describe themes that emerged from interview data at College A and College B. In Chapter 5, I link these themes to themes that were identified in the literature.

The interview questions discuss matters related to CAD programs and other software. As a reminder, CAD or computer-aided design is the general term that applies to the use of
computers “to produce maps, diagrams, drawings, plans, and charts. . . . [It is] an easier, digital method for creating and editing documents, which were once drafted by hand” (Foote, 2010, p. 319). There are different types of CAD programs; each CAD program or software function depends on the type of work the designer performs. The CAD program discussed in this study is AutoCAD software. AutoCAD is a computer software used by designers to draw two-dimensional technical drawings and three-dimensional drawings. AutoCAD software is often referred to as just CAD in the industry. In addition, 3D modeling or three-dimensional modelling consists of creating 3D objects in a virtual 3D space. The types of 3D modelling software discussed in this study include AutoCAD 3D, 3ds Max, SketchUp, Revit, and Maya. In addition to CAD programs and 3D modelling software, designers may also use various types of graphic programs to present their projects. The graphic program discussed in this study is Photoshop, which is a professional image editing software.

**Research Question 2: What are instructors’ perceptions for the need to incorporate CAD in interior design programs?**

Several themes emerged from interview data for this research question that were common across interior design instructors. There were also themes that were unique to individual instructors.

**College A.** The emergent themes at College A were: (1) importance of CAD in interior design education due to industry demands; (2) advantages of CAD: saving time and assisting work coordination; and (3) disadvantages of CAD: obstructing fluidity of ideas and misuse of CAD.
Theme 1: Importance of CAD in interior design education.

Industry demands. College A’s three instructors, Stephan, Malcolm, and Kevin, confirmed that CAD, specifically the program AutoCAD, is an essential component in interior design education. Along with AutoCAD, 3D modelling software such as 3ds Max or SketchUp are also essential in interior design education. The program at College A teaches these computer programs because the design industry requires interior design graduates to be competent in the use of such computer software. Design programs at the college-level are more skill-based than theory-based. They aim to train graduates with skill sets for employability. According to Kevin, interior design programs must accommodate workforce needs and ensure that students are employable once they graduate. The mandate of College A’s interior design program, a three-year diploma program, is to prepare students for the workforce. Therefore, it is required to train students how to use AutoCAD efficiently. Kevin said:

[W]e’re training [students] and giving them a broad skills set for the market place. [But] if I was teaching in a bachelor’s level or a master’s level in university, I would have a very different opinion I think [be]cause I would be much more focused on making sure that they’ve got [the design] process down and the theory and the why behind what they produce. (KEV: Sep 20: 547)

He also mentioned:

[Firms look] to have someone that . . . has a certain skill set because there is a very good chance their first job is going to be producing drawings and not designing . . . [Interior design graduates] might work as a quasi-technician or they have to be able to interpret the work of a more senior designer into AutoCAD drawings. That’s the entry level for a lot
of graduates so it’s preparing them for their first job in the workforce . . . (KEV: Sep 20: 96)

Malcolm also affirmed that AutoCAD is a tool that aids interior design students to transition from the academic milieu to the working milieu. He said:

[There is] without a doubt no place for anybody coming in at the entry level who does not have a certain level of CAD skills, to do a certain level of tasks. What those tasks are can be defined for each firm . . . but without [CAD skills] there weren’t simply be candidates for employment in the firms, so it’s critical that they get to a certain level by the time they graduate . . . not experts but to a level that they can be given tasks and expect them to do them within a certain time frame correctly. (MAL: Sep18: 29)

Stephan, Malcolm, and Kevin said that the design industry is now dependant on AutoCAD to produce documentations and to coordinate projects with other professionals. If interior design graduates did not know how to use AutoCAD, then they would not be hired. Lacking computer-based skills would prevent graduates from entry into the design industry.

However, Kevin indicated that students need to know how to design in order for them to be real designers and not just production technicians. He said:

Kevin: I want them to have jobs and I don’t want them to be CAD monkeys. . . . We always have to be careful to be teaching to the industry versus teaching to the goals of our program. We need to give the industry hirable candidates. I think that we owe that to the industry to be producing candidates that they [would] want to hire . . . but we are not a poly-technique institute or a vocational institute, it’s purely skills based. . . .

Researcher: How do you feel about that industry requires students to have excellent CAD skills?
Kevin: I think this is entirely valid but . . . they should be also requiring that they know how to design. (KEV: Sep 20: 748)

**Theme 2: Advantages of CAD.**

*Saving Time.* Stephan, Malcolm, and Kevin saw AutoCAD as a key tool in the field of interior design that can present several advantages to interior designers. One major advantage of AutoCAD that emerged from instructor interviews at College A is that AutoCAD can save time. Stephan indicated that AutoCAD facilitates the manipulation of drawings. For example, students are able to erase, copy, cut, and paste drawing elements easily and faster with AutoCAD. It is unlike drawing by hand, where one needs to redraw an entire drawing sheet if changes are made to a design. AutoCAD can provide “one essential ingredient, which is more time to devote to design and conceptual thinking” (MAL: Sep18: 36). This was confirmed by Malcolm, who explained that AutoCAD is a time saver and all that saved time can be reinvested into problem solving and planning issues of creativity that AutoCAD cannot do. Therefore, AutoCAD allows students to have more time to refine their design and work through better solutions to esthetic questions, materials, and performance. Stephan further detailed how saving time allows students to explore various design solutions. He said:

They will be able to look at [many] different design options. They are able to translate two-dimensional CAD drawings into 3D studies, which is very important where we are always trying to teach our students to visualize in 3D. [Therefore,] . . . a lot of times you’re designing in 2D but we want our students to be able to visualize what they’re doing and plan[ning], [and] don’t think of it as a flat land, [instead,] think of it spaciously what it is you’re creating, and what you’re wanting to create. (STE: Sep18: 49)

*Assisting work coordination.* Another advantage of AutoCAD identified by instructors of
College A was that it facilitates the work coordination between interior designers and other professionals or clients. Interior designers are able to send electronic documents of floor plans, elevations, and sections instantly. For example, designers can send AutoCAD files, PDF files, and photographs to structural engineers, mechanical engineers, electrical engineers, interior designers, landscape architects, and clients. AutoCAD is considered a universal language between interior designers and other professionals in the industry. Kevin mentioned that:

[CAD allows interior designers] to be on the level plane field with all the other consultants in the building industry. . . . [This permits interior designers to speak] the same language and sort of making the same kind of work [by] collaborat[ing] on projects with architects and with engineers and with contractors [and that] justifies I think one of the advantages for . . . teaching [CAD] to interior designers. (KEV: Sep 20: 57)

While AutoCAD is a time saver, which can increase the designer’s productivity and work coordination across designers, Kevin pointed out that increasing the production time is also one of AutoCAD’s pitfalls. He said that when students use and learn AutoCAD, they can certainly go further and faster, but sometimes going further and faster is not necessarily an advantage to the designer’s creative thinking. He insisted that students also need to pause and reflect; reflection is necessary to observe and develop the design being innovated.

**Theme 3: Disadvantages of CAD.**

*Obstructing Fluidity of Ideas.* Despite AutoCAD’s advantages, it can also be a disadvantage to learning in creative fields. “Definite disadvantages are the students getting caught up in the mechanics of CAD” (STE: Sep18: 67). Although AutoCAD is a great drawing tool, Stephan affirmed that it should not be used right from the beginning. Students should first develop their hand drawing skills and then learn how to draw with AutoCAD. He deemed hand
skills to be essential and that AutoCAD should mainly be used to produce technical construction
documentations. Stephan strongly believed that interior design students must first learn how to
draw by hand using pencil and paper and maintain the development of hand drawing and manual
drafting skills in at least the first year of the program. Once hand skills have been developed,
students can start learning how to draw on computers. Instructors at College A aim to develop
the fluidity of ideas of interior design students through hand skills. Stephan stated that hand
drawing in the design process can serve to generate better ideas and concepts. Students are able
to sketch quickly by hand as well as create bubble diagrams and block planning much faster.
AutoCAD can obstruct the fluidity of ideas because students can be caught up in the mechanics
of the computer program. Therefore, it is necessary to develop students’ hand and brain
coordination skills found in hand drawing before developing their AutoCAD skills.

*Misusing CAD.* According to Malcolm, students think “CAD designs things for them
[and] that drawing things on [Auto]CAD makes them . . . design” (MAL: Sep 18: 46). Kevin
admitted that AutoCAD builds the confidence of students who have weak hand drawing skills.
When students use AutoCAD, every line drawn seems correct on the computer screen. Their
work looks precise and aesthetic; therefore, students argue that they have created a complete
design. Yet, simply because AutoCAD aids in creating accurate drawings, it does not mean it can
design. Malcolm explained that students can sometimes misinterpret the use of AutoCAD; they
should understand that it is a drawing tool and not a design tool. Kevin thought that AutoCAD
can be a hindrance. He insisted that AutoCAD could be either beneficial or detrimental to the
interior design student. The overuse of AutoCAD too early on in the design process could stifle
students’ creativity and it can go from being a time saver to a time waster if it is not used
correctly.
**College B.** The emergent themes at College B were: (1) importance of CAD in interior design education due to industry demands and its importance as an effective tool; (2) advantages of CAD: saving time and documenting drawings; and (3) disadvantages of CAD: misuse of CAD and hindering creativity.

**Theme 1: Importance of CAD in interior design.**

*Industry demands.* All three instructors Karl, Carol, and Martin also confirmed that AutoCAD and 3D modelling software are very important tools in the field of interior design and that they must be incorporated into interior design programs. The workforce heavily relies on this computer software and industry expects all interior design graduates to be skillful at computer drawings. Karl stated:

I mean . . . we expect our graduates . . . to draft well. . . . It’s like . . . if you graduated . . . with a degree . . . in English but you didn’t understand grammar properly it’s kind of the same thing. . . . So whether it’s CAD [or] whether it’s drafting by hand, to be able to draft effectively . . . you have to have it. It’s really important because there is not many jobs you’re gonna get where you’re just sitting back coming up with concepts and having somebody else figuring them out for you . . . I mean that would be an awesome job to have but you don’t really get them that often. (KAR: Sep 24: 677)

Karl also indicated that today, industry's production drawings, such as construction documents, are all completed on AutoCAD. Even clients nowadays request having computerized three-dimensional walks through interior spaces. He also believed that AutoCAD will eventually replace manual drafting. “[AutoCAD] is how people . . . develop and present their designs and [it is how] they get things built. So it’s really important” (KAR: Sep 24: 48). Karl affirmed that AutoCAD is important because cleaner and more accurate plans are produced. He then added if
the industry stopped using AutoCAD for some reason, interior design programs would not teach it anymore; there would be no value to AutoCAD.

Martin, like Karl, said that industry’s technical drawings are all produced on AutoCAD. AutoCAD is more accurate than hand drawings and technical drawings produced by AutoCAD can be kept in electronic files as reference for future use. In addition, AutoCAD software can be used to predict how a design will look before building an expensive prototype. Therefore, it allows seeing the actual design three-dimensionally on a computer screen to be able to check and edit the final design before the actual construction phase. Martin explained that some designers are now using three-dimensional printers to be able to see the design outcome in advance before construction.

You create something on a 3D software and the machine is actually gonna print it out. They say print it out but actually . . . it’s foam that they used or some type of . . . light material [to] print it. They say print it but [they] actually . . . build it in . . . 3D form so they can actually see in front of [them]. So, instead of using . . . man power to come in and . . . glue things and put it in an oven and all that kind of stuff and use all kinds of chemicals, they can actually just have a machine that’s just gonna sculpt that out of . . . piece of foam so yea. (MAR: Sep 25: 488)

*CAD as an essential tool.* Karl also pointed out that AutoCAD is just a tool and that it is an excellent tool if it is used well. Karl said:

I always tell my students [that AutoCAD is] just a display tool. . . . They still have to be able to conceptualize and sketch and draw perspectives and 3D drawings and all that kind of . . . massing studies and things before they have to start using CAD. So . . . it’s an
important tool but it’s a supplemental tool to what they [should be] doing as part of their
design. (KAR: Sept 24: 53)

The other two instructors, Carol and Martin, stated strongly that AutoCAD could never be a
design tool because it does not allow the designer to see or feel space as it is in reality. Carol sees
AutoCAD as a presentation tool that assists the technical work of interior designers. Martin, on
the other hand, saw AutoCAD as a precision documentation tool. He explained that it can help
complex projects come into life but it should not be used to develop design concepts. He further
explained that:

The ideas [and] the concept need to be done with my opinion without CAD. It has to be
done with free hand and it has to be done . . . with the thought process and all that.
Whereas, I think . . . with CAD if you use then it sort of restricts your creative process . . .
. To me, it’s a tool that helps either push the concept further to see . . . what can and can’t
be done but it doesn’t help with the idea, the intent. (MAR: Sep 25: 36)

So once you’ve got the concept created and you’ve got . . . an idea of what you’re
looking for . . . three-dimensionally on . . . a piece of paper then you can create it two-
dimensionally or three-dimensionally with CAD and fine tune it to really look at the
proportions and really look at how things interconnect and all that but . . . that’s where it
stops [to me], it’s just a tool. (MAR: Sep 25: 85)

**Theme 2: Advantages of CAD.**

*Saving Time.* As at College A, time saving was the key element that emerged from
College B data as the most important benefit of AutoCAD. Karl affirmed that it facilitates the
work of interior designers. He said:
It makes the profession more cost effective because . . . changes to drawings even though they still take time, they take a lot less time . . . in CAD than they would if they’d be doing it from scratch [be]cause I mean if somebody changes a detail, it changes the plan. Sometimes you [will] have . . . to redraft by hand an entire sheet whereas with AutoCAD it’s quite quick to change a detail. I mean you still need time but the turnaround time and revisions is . . . a lot faster and . . . a lot more accurate. (KAR: Sep 24: 60)

Carol described that AutoCAD can save time in the production of presentation drawings. For example, when students need to work on a building with multiple storeys, AutoCAD can save them time by replicating those storeys and fire exit stairs more rapidly. In addition, with AutoCAD, it is not necessary to redraw or redo everything if a design concept changes. Martin stated that sometimes even when a design concept is accepted, the designer might need to modify the drawings according to new site conditions or desired client changes to certain elements in the project. Karl explained that some clients think that it is easy to change a drawing element on the computer and that it just takes a few seconds. However, applying changes to a drawing on computer also takes time. For example, if the interior designer moves a wall, then he or she would have to know how that affects the rest of the plans, details, elevations, etc. Sometimes, clients have a misconception that if the changes are completed on computer then it is fast. In fact, participants said it is fast and much faster than if it were done by hand but the designer still needs time to analyze, change, and produce a revised drawing. Therefore, producing drawings on AutoCAD can save time; drawing with it is much easier, more efficient, and more precise than producing drawings by hand, but time is still required to effect design changes.

*Documenting drawings.* Martin presented another use of AutoCAD. He said that it is a great tool for documenting drawings.
[CAD] does make it more efficient and quicker . . . and keeps good records keeps [of drawings] . . . and then you can reuse those drawings for those files later on afterwards. They’re not just a piece of paper in a file somewhere [or] in a drawer . . . that you take out and look at and you trace over. You can actually use those . . . created files. The concept wise is like I was saying [that CAD] can help you push your concept further to see if you can [or] can’t do it . . . especially with all the new programs that are out there including CAD that is much better than it used to be but . . . you can make calculations . . . for the curves and with loads . . . [of] different products where they’re gonna . . . be able to . . . communicate not [and] just communicate but to also . . . withstand I guess your . . . concept . . . [in] an immediate use as well. (MAR, Sep 25: 58)

**Theme 3: Disadvantages of CAD.**

**Misusing CAD.** The instructors at College B, as with those at College A, thought AutoCAD had its drawbacks. Karl said that interior designers sometimes rely excessively on AutoCAD and forget about the creative part of designing. He also indicated that with AutoCAD, drawings look neater and more accurate. As such, interior design students think they are creating better design solutions and AutoCAD tends to direct the way they design. For example, it is difficult to draw arcs, curves, and free flowing organic shapes on AutoCAD. Therefore, according to Karl, interior design students try to avoid creating design solutions with such shapes and come up with solutions that are easier to draw on AutoCAD such as rectangular shapes. Creating organic shapes are much easier to draw by hand where the interior design student can move the hand freely on paper without any restraint.

**Hindering Creativity.** Another disadvantage of AutoCAD described by instructors at College B is that interior design students see spaces as blocks. According to Carol, they see the
different space areas in a floor plan as rectangles. They do not see space as movement and do not consider that each space has its function. Most times, students work in this mythical space, the computer screen, in which they zoom in and zoom out without seeing its relation to other spaces. For example, in a lobby of an office floor plan, “[students] don’t see it relative to the elevator core or a particular set of offices, [they] don’t see it in relative size because it gets bigger and smaller . . . you can zoom in and zoom out so you don’t actually see what it is relatively when you’re laying out space” (CAR: Sep 24: 51).

In addition, Carol thought that AutoCAD drawings do not allow individuals to discuss design matters with others. She believed that AutoCAD creates a solo relationship between the designer and the drawing that is on the screen, whereas you can easily share a hand sketch with others who help develop the design concept. Martin agreed with Carol, he stated that AutoCAD should not be used for concept development. He believed that AutoCAD could stifle the creative process.

It blocks [the students’] creative process because the use of hand . . . on a [computer] . . . doesn’t help the flow, . . . something as simple as with the hand coordination and when you’re putting down an idea on a piece of paper, I mean yes some software are much better now but by the time you click this, click that [and], click this . . ., to do a curve or a . . . certain radius, you would’ve done that in a fraction of a second by hand and on a piece of paper . . . so by the time you’re clicking, clicking, clicking, you’re sort of . . . losing this . . . energy, . . . this creative juice that’s flowing right so . . . that’s why it’s . . . in my opinion it shouldn’t be used as a creative tool. (MAR: Sep 25: 73)
Martin also thought that AutoCAD stifles the design process. He mentioned that some design firms favoured using hand drawings instead of computer drawings in the initial phases of design because they can communicate their design ideas better by hand.

Eight years ago when those 3D software were really popular and everybody used them for rendering. Then, after a while some . . . firms came back and they’re like you know what, [CAD] has its place, we do need the software that’s gonna make some nice renderings but we also need the hand renderings as well. So a lot of firms went back to hand rendering because you’re able to modify space a bit more to make it look what . . . you’re envisioning as opposed to make it look more rigid, more accurate, and you’re able to make it look more softer and . . . more appealing to the client. (MAR: Sep 25: 664)

Research Question 3: What are instructors’ perceptions about the placement of learning CAD in the program? For example, what year and what semester should the learning of CAD begin?

Some instructors’ perceptions about the placement of AutoCAD in the program were common and others were unique. In the following section, I report common and unique perceptions of the participants at both College A and College B.

College A. The emergent themes at College A were: (1) current interior design curriculum, (2) review of curriculum, (3) CAD placement in the curriculum, and (4) another review of curriculum needed. Table 7 presents College A’s software programs taught in the curriculum and/or software programs available to students to use independently in the computer laboratories.
Table 7

*Software Programs Taught and/or Available in College A*

<table>
<thead>
<tr>
<th>Program Year /Semester</th>
<th>Course Name</th>
<th>Software</th>
<th>Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1/Semester 2</td>
<td>CAD I</td>
<td>AutoCAD</td>
<td>2D drawings</td>
</tr>
<tr>
<td>Year 2/Semester 3</td>
<td>CAD II</td>
<td>AutoCAD &amp; Excel</td>
<td>Complex 2D drawings &amp; spreadsheets of construction documentations</td>
</tr>
<tr>
<td></td>
<td>Presentation Techniques II</td>
<td>Photoshop</td>
<td>Presentations &amp; image editing</td>
</tr>
<tr>
<td>Year 2/Semester 4</td>
<td>Presentation Techniques III</td>
<td>3ds Max</td>
<td>3D modelling &amp; rendering</td>
</tr>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
<td>SketchUp</td>
<td>3D modelling &amp; rendering</td>
</tr>
</tbody>
</table>

*Note.* SketchUp software is installed in College A’s computer laboratories, but it is not included in the interior design curriculum. Students are permitted, but not obliged, to use SketchUp to present their design projects. If students want to use this program, they must learn it on their own.

**Theme 1: Current interior design curriculum.** AutoCAD is now recognized as an important part of interior design curriculum. College A’s interior design program is a three-year diploma program. Each year constitutes two semesters for a total of six semesters. College A’s interior design curriculum has several courses in the first three terms that integrates manual drafting, but only two courses use manual drafting exclusively: Technical Drawing and Construction Documents I. The interior design curriculum at College A also offers two CAD courses, CAD I and CAD II, as well as one 3D modelling course, Presentation Techniques III. At College A, four different types of computer software programs are taught in the interior design curriculum: AutoCAD, Excel, 3ds Max, and Photoshop. AutoCAD is taught as the basic 2D drafting tool. Students take two courses of AutoCAD; a CAD I course in the second
and a CAD II in the third semester. In the second AutoCAD course, students also learn how to create spreadsheets used in construction documentations on Excel software. Each AutoCAD course consists of a three-hour class taught once a week over a period of 15 weeks. Therefore, students receive 45 hours of 2D AutoCAD instruction per semester. Once students complete their AutoCAD courses, they learn how to use Photoshop to present professionally their design projects. Photoshop is a graphic program used mainly for image editing and presentation techniques. Lastly, students learn 3ds Max software, to model and render spaces. One 3ds Max course, a four-hour class taught once a week over a period of 11 weeks, is offered in semester four. In addition, the software SketchUp, a more intuitive modelling program, is available to students in the computer laboratories; however, SketchUp is not included in College A’s interior design curriculum. Students can use it to present their design projects, but they do not receive official instructions on how to use to it.

Findings from the data indicate that design firms want interior design graduates to have more than just two-dimensional AutoCAD skills. They also want new employees to be very comfortable in drawing three-dimensionally and in using Photoshop. Nowadays, design firms expect employees to execute three-dimensional drawings on AutoCAD then transfer those drawings into Photoshop to play with colors, lighting, textures, finishes, etc. Stephan indicated that it is necessary to teach students how to use the graphic program Photoshop. Industry is now looking for interior design graduates that can use multiple software simultaneously. They want interior design graduates to integrate the use of AutoCAD with 3ds Max, then use Photoshop to refine drawings and add background images, such as a blue sky or adding a background view through a window.
**Theme 2: Review of curriculum.** College A’s interior design program went through several program reviews to ensure that their interior design curriculum meets industry requirements and the provincial ministry’s guidelines. At one point, the interior design curriculum at College A offered numerous fine arts classes. In a recent program revision, College A eliminated five fine arts classes from the curriculum to be able to bring in more interior design courses including 3D computer studies classes. Stephan pointed out that change was necessary to meet market demands — graduates needed to know AutoCAD programs. In addition, the provincial ministry of education requires College A to update its AutoCAD software whenever a newer version is released. This ministry requirement creates some tension in planning and teaching. The industry does not always use the latest up-to-date versions of AutoCAD, therefore, instructors are reluctant to teach students new versions of AutoCAD that are not yet used in industry. This constant software update frustrates interior design instructors as they do not always have time to explore the differences between the old and the new versions of the software, even though changes are often minor.

**Theme 3: CAD placement in the curriculum.** An internal review of the interior design curriculum at College A resulted in the present placement of computer courses in the curriculum, i.e., semesters two, three, and four. Prior to the last program review, AutoCAD was introduced in semester three, not two. The disadvantage of this decision is that interior design instructors teach AutoCAD to students, yet students have not learned the basics of two-dimensional drafting communication of information. The change in placement of AutoCAD in the program is controversial with instructors. Malcolm explained:

I am trying to teach them how to draw a ceiling plan in CAD using layering . . . and they’re not quite sure what a ceiling plan is actually is or how to use the dimensioning
system of AutoCAD when they’re just getting over how dimensions are organized, what they are, what scales are. So, we have a real dilemma, we’re talking in CAD terms that is much more advanced, wrap it around interior design drawings what we have to produce as interior designers and yet they don’t know what . . . that vocabulary is yet of interior design drawings. [Sometimes] . . . [I get] ahead of them by using a term that they are not familiar with and I am only using that term because if you have to draw [an element], this is how you do it in [Auto]CAD and they don’t know what this is because now they’re . . . only in the second semester and they’re only gonna get that in the third semester so I’ve had to pull back some of that. Again, this is only I think . . . the fourth year of doing that and now I’m getting a handle on that but certainly in the first year [and] second year thinking ohhh you know this [and] you know this so now you know a ceiling plan so of course you’re gonna understand. . . . I have to now unfortunately devote some time to basic . . . drafting and elements like that in CAD and I do that now saying okay If I don’t I’m gonna lose them totally. (MAL: Sep 18: 160)

Despite this disadvantage of teaching AutoCAD early on in the program, Malcolm found the placement of AutoCAD in the revised program to be appropriate. However, this program change has created other required program changes that now need examination. Malcolm thought that instructors now need to examine the program to review the two-dimensional manual drafting course delivery and find a faster way to teach students the principles of manual drafting. Stephan, however, disagreed with the placement of AutoCAD in the revised curriculum and believed that AutoCAD should be taught in the third semester of the program. He stated that interior design students need that first year to learn how to draft by hand and develop their freehand drawing skills, as well as work with colors by hand. He deemed it is necessary to
dedicate the first year of the program to develop students’ hand, eye, and brain coordination skills.

**Theme 4: Another review of curriculum needed.** By the fourth semester of the program, instructors of College A expect all interior design students to complete all their work on AutoCAD. Even though Stephan thought College A introduced AutoCAD too early in the program, Stephan affirmed that offering two AutoCAD courses would be sufficient for students to master the CAD software. Therefore, he proposed keeping the two AutoCAD courses in the curriculum to teach two-dimensional drafting and add another one or two courses to introduce more three-dimensional modelling using 3D modelling software. Malcolm also thinks that the interior design curriculum offers sufficient instruction in 2D drafting through its two AutoCAD courses in semester two and three, but more time is needed to teach 3D modelling. Feedback that instructors received from students indicated that students wish they had more training in 3ds Max; 3ds Max is a very complex program and the time devoted to it in the curriculum is very short. However, instructors teach students enough of a foundation in the software to allow students to practice it and learn more about it on their own in the future. Malcolm indicated that 3ds Max may not be the best choice of software for modelling and rendering for the program because of its complexity and its focus on the video gaming industry. He affirmed that the majority of design offices could manage with either SketchUp or just with 3D AutoCAD. Therefore, it may be ideal to replace 3ds Max with an easier to learn 3D modelling software.

Kevin, similar to Malcolm, affirmed that the placement of the two AutoCAD courses is appropriate, i.e., in the second and third semester of the program. However, he believed that introducing 3D modelling, specifically 3ds Max software, in the fourth semester is too late and that it should be taught to students earlier. Kevin also wondered if manual drafting still should
have a place in the interior design curriculum. Kevin thought that offering two courses in manual
drafting is unnecessary and that the interior design curriculum should be reviewed to lessen the
number of manual drafting courses. He explained further by saying:

We still do it, we still start them with that, and the rationale is that . . . you slow the
process [by] . . . teach[ing] them methods . . . by hand . . . then . . . apply [the same
methods] with a different tool. That’s the thinking. I don’t know how successful that is,
I’m . . . still on the fence about that, so in terms of its placement, could it be in term one I
still don’t think so regardless whether or not we taught [manual] drafting. I think they
have to sort of understand the language of technical drawing really quickly and I think
perhaps maybe we just do a little too much of the [manual] drafting maybe it goes on for
too long. (KEV: Sep 20: 229)

Kevin also said that offering two 2D AutoCAD courses and one 3D modelling course is
not sufficient for students to master AutoCAD software. Kevin stated that mastery over a period
of three years is not possible. Mastering software is when the student is able to use that software
as a design tool rather than just a drafting tool, gets the most out of that software, and knows
exactly what will go wrong and how to fix it. He felt that interior design students will continue to
learn beyond the three years of college study—on their own and in the workforce. The
curriculum, at College A, is designed to teach students how to learn by giving them the basics.
Kevin explained that instructors teach students the basics and then how to engage in their own
learning. According to Kevin, students take initiatives to use various 3D modelling programs that
instructors do not teach, such as SketchUp. Therefore, students have the ability to teach
themselves. Stephan confirmed this perception. He stated that interior design instructors can only
teach the basics so students must be motivated to initiate further learning to upgrade their own skills.

When they get to the workforce, they will continue learning. They should keep and continue learning their entire lives. . . . [so] they have a foundation to work. I don’t think any of them that graduated from our program lack the skill to enter the workforce. (KEV: Sep 20: 260)

Stephan and Kevin agreed with Malcolm and thought that it would be ideal to replace the software 3ds Max with another software, such as SketchUp, or perhaps teach those two programs in tandem. Unlike 3ds Max that is a complicated program, SketchUp is an easy-to-use program. SketchUp is an excellent visualization tool that can be quickly mastered as a design tool. Further, Kevin indicated that architectural firms in the industry are currently starting to use another computer program called Revit, and that software may eventually be used in interior design firms as well. Kevin indicated that once Revit becomes the tool for 3D modelling and rendering used in the workforce, the college will be obliged to consider it in the curriculum. However, the feedback Kevin has had from industry is that Revit has the potential to kill the design process, which terrifies interior designers. So, college interior design programs will need to consider this when deciding on its use in the curriculum. “[Revit] is a great production tool but the danger is the same way that CAD I think can be misused is that you know can stiffen the design process because it becomes too real too quick” (KEV: Sep 20: 298).

**College B.** The emergent themes at College B were: (1) current interior design curriculum, (2) CAD placement in the curriculum, and (3) review of curriculum. Table 8 presents College B’s software programs taught in the curriculum and/or software programs available to students to use in the computer laboratories.
Table 8

Software Programs Taught and/or Available in College B

<table>
<thead>
<tr>
<th>Program Year /Semester</th>
<th>Course Name</th>
<th>Software</th>
<th>Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2/Semester 3</td>
<td>Technical Communication III</td>
<td>AutoCAD</td>
<td>2D drawings</td>
</tr>
<tr>
<td>Year 2/Semester 4</td>
<td>Technical Communication IV</td>
<td>AutoCAD</td>
<td>Complex 2D drawings</td>
</tr>
<tr>
<td>Year 3/Semester 5</td>
<td>Visual Communication I</td>
<td>3ds Max &amp; SketchUp</td>
<td>3D modelling &amp; rendering</td>
</tr>
<tr>
<td>Year 3/Semester 6</td>
<td>Visual Communication II</td>
<td>Photoshop</td>
<td>Presentations &amp; Image editing</td>
</tr>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Revit</td>
<td>3D modelling &amp; rendering</td>
</tr>
</tbody>
</table>

Note. Revit software is installed in College B’s computer laboratories, but it is not included in the interior design curriculum. Students are permitted, but not obliged, to use Revit to present their design projects. If students want to use this program, they must learn it on their own.

Theme 1: Current interior design curriculum. College B offers a four-year bachelor degree program in interior design. There are two semesters per year, therefore, eight semesters in total. The computer software programs offered in the curriculum are AutoCAD, 3ds Max, SketchUp, and Photoshop. Students take two AutoCAD courses, Technical Communication III and Technical Communication IV, to learn two-dimensional technical drawings. These AutoCAD classes are three-hour sessions that are taught once a week in the third and fourth semesters of the program. College B organizes its interior design curriculum by first introducing two manual drafting courses in the first and second semesters, then two AutoCAD courses in the third and fourth semesters. The AutoCAD courses complement the manual drafting courses by applying the same drawing concepts but on computer.
Students also learn to use the programs 3ds Max and SketchUp for 3D modelling and the graphic program called Photoshop for image editing and presentation techniques in the fifth and sixth semesters respectively of the program. Revit software is also available to students; the software is installed in the computer laboratories at College B. Revit software is not part of the interior design curriculum at College B; it is not formally taught because Revit is not officially used in the workforce yet. However, Students can use Revit to present their design projects if they want. Karl declared that College B follows the latest trends of industry. This means that if the workforce changes software from AutoCAD to Revit, the college will also modify its curriculum and introduce Revit courses instead of AutoCAD courses. He explained that in the past, the college offered a Maya course. However, Maya was too complex to use and it is not necessarily required for the field of interior design. Therefore, Maya was removed from the curriculum and was replaced with SketchUp instead. This is an indicator of College B’s ongoing program revision.

**Theme 2: CAD placement in the curriculum.** Karl indicated that at some point, College B had placed AutoCAD courses in the first year of the program but then moved them to the second year. Karl thought that when students learned AutoCAD in first year, they were not able to grasp the skills of manual drafting. To Karl, if students do not understand the conventions of manual drafting, they are not able to use AutoCAD efficiently. Therefore, he believed that AutoCAD courses should be introduced to students in the second year of the program. Currently, College B introduces AutoCAD courses in the second year, more specifically in the third and fourth semesters.

I’d rather wait till second year when you’re going to understand how to reference drawings a little bit, till you understand how to do elevations a little bit, till you
understand how to detail a little bit, so that when you do them in CAD you’re just concerned about the CAD part, you’re not worried about . . . why would I do an elevation like that or why should I do that. . . . So you . . . [know] the basics . . . [and] the fundamentals of what you’re doing and why and now all you need to worry about is how to do it in [Auto]CAD, not how to do the thing in general. (KAR: Sep 24: 234)

Like Karl, Carol also believed that students should start learning AutoCAD in the third semester of the interior design program. She stated that the first AutoCAD course must be a standalone course where students learn the basic elements of the CAD program. For example, basic elements of AutoCAD programs would be learning how to use the draw and modify commands, scale, plot drawings, and learn the difference between model and paper space. Carol thought that students should complete drawing exercises to learn basic CAD elements and these drawing exercises should be AutoCAD specific, not be related to other program content at this point. Once students comprehend how to use these AutoCAD commands, then they can begin using AutoCAD as a tool and start applying it in projects found in other courses. Martin also thought AutoCAD should be introduced to students in the third semester of the program. At College B, the curriculum has been re-arranged a few times in the past 12 years and now he believes that AutoCAD is finally placed in the right semester. Karl said that if AutoCAD were taught in the first year, students would get very comfortable with it and would use it as a design tool; however, he felt they should not use it as a design tool. Further, he felt that students would struggle if they learned the basics of manual drafting and AutoCAD at the same time, which had happened in the past when AutoCAD was introduced in the first year. Instructors also noticed negative influences of AutoCAD on students’ design abilities when it was placed in year one; therefore, AutoCAD was moved to the second year. He explained that the negative influence of
placing AutoCAD in year one of the program was that students’ design abilities did not see space as movement, instead they see space areas as rectangles.

[Student] didn’t really think three-dimensionally, they thought two-dimensionally just like a flat surface. . . . They do the floor plan, they do the walls, and they do the ceilings, as opposed to three-dimensional space where people walk, live, and breathe inside the space. So that’s why we moved [AutoCAD] from first year and then . . . third year would be too late. They need to start in second year so now that they’ve got the basics of . . . design skill[s], understand the design process and all that in first year, then in second year, they can start using their AutoCAD. The AutoCAD is basically a little step behind their hand skills, which is a good thing so now when they want to sit down and . . . design, they’re gonna use their hand skills first and then they have to use AutoCAD afterwards so that’s the . . . the philosophy that we have and that we wanna do but we don’t wanna wait until third or fourth year because then they don’t have enough time to apply to use it and then when they graduate they’re not as skilled when . . . they’re employed afterwards. (MAR: Sep 25: 208)

College B aims to provide the necessary skill sets that students need to work in any design industry in the world. Martin explained that local design firms look for graduates that are skilled at producing complex and precise two-dimensional drawings. Yet, internationally, firms look for graduates with good three-dimensional skills. Therefore, College B’s curriculum creates a balance of both two-dimensional and three-dimensional skill sets. The AutoCAD courses prepare students to execute a full set of two-dimensional working drawings with notes, legends, elevations, sections, and details; this is usually what they do once they graduate and work in design firms. Karl affirmed that graduates are always hired once they complete the program.
Therefore, he believed the program meets industry needs. As such, he deemed the placement of learning AutoCAD in the interior design curriculum is appropriate; he did not see the necessity to modify its placement. He added that if the college was to move from AutoCAD to Revit software to meet industry requirements, then two Revit courses should be added to the curriculum because Revit is a complex software and more time would be needed to teach it and for students to master its basics.

**Theme 3: Review of curriculum.** Like Kevin from College A, Karl believed students cannot entirely master a software in the time period of the program; however, they are able to master the basics and be able to develop further skills on their own. Carol thought that two manual drafting and two AutoCAD courses are sufficient for students to master drafting skills and AutoCAD software if they complete all the exercises given in class. She also praised Karl and said he is efficient at teaching AutoCAD and that his class exercises are extremely applicable. Carol expressed how she would like to dedicate more time in the program to manual drafting courses. According to her, students will not succeed in second year AutoCAD courses if they do not understand drafting conventions that are taught in the first year. Carol affirmed that class time should be more than three hours a week. She said she uses the whole three-hour class time to explain drafting conventions, leaving her little time to explain the technical side of drawings such as the principles of building codes and assembly. In addition, students have no time in class to apply what they learn, receive feedback from their instructor, and ask questions. Martin stated that students cannot master the AutoCAD software by just taking two courses. “It’s impossible to master anything when you’re at school . . . I mean you can become . . . very skilled . . . and efficient but to master it no . . . I personally don’t see that” (MAR: Sep 25: 260). Martin affirmed that an instructor’s duty within the interior design program is to teach students how to
learn and then once they graduate then they continue learning on their own in the context of their specific work environments.

Carol strongly believed that students should learn and understand the manual drafting skills before learning AutoCAD software. She explained that instructors in the architectural technology program at College B had thought the interior design program was ridiculous to emphasize manual drafting courses. At one point, the architectural technology program eliminated manual drafting courses entirely for several years and introduced AutoCAD courses alone to students in semester one of the first year. As a result, students were not able to draw well by hand and cannot read drawings correctly. Eventually, the architectural technology program re-instated manual drafting courses into the curriculum and re-emphasized it in the first year of their program. This finding is significant and supports the placement of manual drafting courses before AutoCAD in the interior design program.

**Research Question 4: How do interior design instructors, who use CAD, conceptualize the design process?**

Interior design instructors of College A and College B come from different professional design fields with different design contexts that influences the way they view the design process. All six instructors have used CAD programs at some point in their professional career and/or teaching career. For Research Question 4, I report common and unique themes about how instructors’ at College A and College B conceptualize the design process.

**College A.** The emergent themes at College A were: (1) what is the design process, (2) phases of the design process, (3) CAD use in the design process, and (4) importance of hand sketching in the design process.
Theme 1: What is the design process? The context of design affects the nature of the design process. Instructors at College A had different design experiences due to their professional backgrounds, and they each had their own description of the design process. Stephan conceptualized the design process as actions taken by the interior designer to complete a real-life specific project. Malcolm explained that the design process is about solving a problem, analyzing the functional and esthetic aspects of that problem, and then understanding those aspects to be able to articulate a design solution to that problem. For Malcolm, the design process requires the conceptualization of an idea and its preliminary planning by evaluating functional space organization, material integration, and code requirements. An idea then evolves to presentation stages and lastly to the final design development of a design solution. Kevin on the other hand, said that the design process is all about hand sketching and persistently revising ideas. “I’m gonna steal this from one of my favorite students . . . the design process is a . . . sharpie and a big roll of trace paper” (KEV: Sep 20: 345). Kevin also believed that mastering the design process needs time.

It takes a couple of years to get your head around the design process when you first encounter it . . . but sometimes you may never get it . . . it’s not something that’s really obvious for a lot of people coming into it. . . . This studio environment for learning and creating . . . [is] very foreign to a lot of people and it’s very intimidating and it’s very personal. . . . The process . . . requires a bit more simmering, and a bit more reflection and a little bit . . . sleeping on it or . . . when it will come and hit you when you least expect it times is required for that and I don’t have time in three years, I’ve got some time and I do my best but I’m also trying to give them as many skills as I can to get them to get them a job when they’re done. (KEV: Sep 20: 554)
**Theme 2: Phases of the design process.** Each interior design instructor described their own unique understanding of phases of the design process used to undertake a design project. According to Stephan, the client meeting would be the first phase of the design process. Stephan meets the client to gather all the necessary information, such as the program, needs, budget, and time schedule of project. The program of a design project or the programming stage is about understanding the relationship between the activities that an individual does within a living space. The program also consists of creating a document that presents guidelines, needs, and requirements of the design project. Programming is defined as follows:

The set of criteria on which the design is based, and by which it is later evaluated. The programming phase is where the project is built—not brick by brick, but decision by decision. This is the time when a common vocabulary for the project is created, and preferences and requirements are determined and built into the overall picture before time is invested in design. One of the most important purposes of the program is to reduce the need for later backtracking and redesign. A thorough programming process is essential for maintaining an orderly and cost-effective design process later in the project (Torelli, Durrett, & McCamant, 2007).

Stephan then starts conceptualizing the design. The second phase of the design process would be doing the site survey of the project where he would visit and evaluate the interiors of the building to be able to begin the preliminary planning of the interior space. Third, the preliminary plans are refined into functional plans and three-dimensional thumbnail hand sketches visualising various design proposals. The fourth phase would be to meet with the client again to review the design proposals and select one. Lastly, once the design solution is chosen, materials, colors, and lighting are selected.
Malcolm uses a linear design process. He first begins by understanding the design problem. Then, he conducts research to understand what is required to solve that problem. Afterwards, he conceptualizes a possible solution to the problem by hand sketching two-dimensional or three-dimensional drawings. Next, he validates the design solution with the client and finalizes the plan to fine-tune the concept. The last phase of the design process would be to finalize the design presentation to the client. Finalizing the design presentation means presenting exact design elements chosen such as materials, lighting, and furniture.

Kevin said that the design process should start by researching and gathering information. “You’re learning about the client, you’re learning about the building, [and] you’re learning about the program” (KEV: Sep 20: 319). Then, the next phase of the design process would be laying out the program of the design project, doing space allocations, analyzing the given site, the building criteria, how in an abstract way are these going to become built form, and knowing physical and psychological needs of the client. From there, the design process moves into conceptual design or concept development where he explores “what if we did this and what if we did that . . . what are the potential solutions once you’ve identified what it is you’re trying to address through programming research analysis” (KEV: Sep 20: 328). Based on the concept and the criteria, he proposes a preliminary design solution. Kevin insisted that preliminary ideas have to change. “The first ideas are never the final [ones] . . . revise, revise, revise, revise” (KEV: Sep 20: 333). Kevin indicated that as a rule, the design process should follow a series of phases.

**Theme 3: CAD use in the design process.** In the design processes just described, AutoCAD is used in various ways. Stephan for example stated that he starts using AutoCAD software at the site surveying stage. He first uses a measuring tape, paper, and pencil to note the site dimensions by hand but then he converts the site survey into AutoCAD files. Stephan prints
out the AutoCAD plans then goes back to sketch paper overlays to work on the preliminary planning. Once the preliminary plans takes shape and feedback is received from the client, Stephan said that he would again use AutoCAD to complete the project. Using AutoCAD in the design process aided Stephan to manipulate several drawings simultaneously. It also allowed him to try different design options.

I can look at it easily . . . you can do copy paste. So I just copy a plan, bring it over, I try something else, if it doesn’t really work, I can copy paste and try something else [again]. I might show a client two planning possibilities but I might have looked at five or six [be]cause I can do [that] very quickly. It is very easy to manipulate a CAD drawing; you can rotate it, you can stretch it, you can mirror/image it. There [are] so many things you can do with it, which saves you [time]. It’s time consuming to put the information on CAD but once you have it on CAD, it’s . . . very quick to . . . manipulate it and change it. (STE: Sep 18: 279)

Malcolm used AutoCAD in the design process by taking conceptual two-dimensional and three-dimensional hand sketches and re-drawing them accurately on AutoCAD to validate the design. However, Malcolm explained that drawings always look better on AutoCAD; drawings look so precise and accurate as if they are the final drawing of the design. In reality, drawings may still be in the development process. Malcolm is a firm believer in AutoCAD and thinks that AutoCAD could definitely aid the design process. According to Malcolm, AutoCAD gives interior designers time to do continual research or try alternative design options. Also, AutoCAD has the ability to modify easily elements in a design project. For example, modifying the length of wall or height of doors to create improved designed spaces. Therefore, AutoCAD is a quick and effective tool for exploring different design alternatives. Malcolm indicated that AutoCAD
cannot be a design tool but it could be a design development tool allowing design students to try
different options.

Now let’s do this . . . I’m changing the size of the tile I thought it should be 24 by 24 but I
[want to] try it within that same space 12 by 12 in a 45 degree. So in a space of two or
three minutes, you can have a copy of that and look at it or share it with other people or
even print it out and present it. (MAL: Sep18: 358)

He also believed that AutoCAD is still one of the best design development tools in the world of
design. If a new design tool is invented and would aid the work of designers better than
AutoCAD, Malcolm affirmed that he would be willing to spend time learning how to use that
tool in order to incorporate it in the design process. He said that he is not afraid of learning how
to use new design tools; it is a part of a designer’s professional work. However, he felt that he
must see the benefit of the new design tool in order for him to start using it in the design process.

Kevin thought that AutoCAD’s use in the design process depends on the interior
designer’s level of competency in the software, but he believed that AutoCAD has a place in
every phase of a design project along with the pencil and paper. For example, when calculating
space areas for complex projects, it is usual to do it on AutoCAD software; it is impracticable or
perhaps not feasible to use a calculator and a scale. To him, the design process consists of
oscillating between AutoCAD and hand sketch paper.

That’s the way I use to do it in my practice instinctively . . . maybe it’s generational,
maybe it will change [but] I don’t think it will. I am really hoping it doesn’t . . . I would
go back and forth between CAD and sketch all the time when I was designing and
working. Sketch something up, try it on [Auto]CAD, does it work, not convinced, print it
so . . . more ideas come out . . . faster quicker . . . [and in] some cases I didn’t need to do
that, I could do that on the screen sometimes. For most part, I’d often switch between the
two because [sometimes on] the screen I’d blank for the solution so . . . it’s just a
question of changing your perspective . . . it’s now a piece of paper and I have a pen and I
explore different solutions so different things will come to me, it’s changing your
perspective on the problem . . . . The reason I did was going back and forth between
[Auto]CAD and sketch is that every boss I ever had was from an older generation that
didn’t have [Auto]CAD skills then and so . . . every meeting I had to review my work . . .
on paper with the roll of trace and a pen. I had to be able to draw in front of them, have
conversation in front of them, and we’d have a dialogue with it and I don’t think that’s
changing soon and I don’t think it ever will. I am really hoping it doesn’t because I don’t
think there is anything that replaces [then pen] . . . . I do the same thing with my students
in the design studio, if I am teaching [Auto]CAD, I’ll go to [their] screen and I’ll help
[them] fix things and I’ll show [them] commands and I will fix it when it crashes. If it’s
design studio, I will not look at their screens, they must . . . have to have enough money
in their printing balance. We’re always meeting, talk[ing] and actually I get off their
screens and I will bring them to another table where . . . we will sit down and I think they
will encounter that in the workforce. (KEV: Sep 20: 412)

Similar to Stephan, Kevin stated that AutoCAD is a great production tool that aids the
design process. AutoCAD saves time. It allows the designer to reuse elements from project to
project, which speeds project completion. However, he added that AutoCAD often blocks the
flow of interior designers’ ideas. For that reason, Kevin recommended using both sketch paper
and AutoCAD in the design process in order to change perspectives. This facilitates finding
better and more creative design solutions.
**Theme 4: Importance of hand sketching in the design process.** All three instructors, Stephan, Malcolm, and Kevin said that hand sketching skills are important in the design process. Hand sketching and designing by hand have always been essential skills that every designer needs to have. Stephan and Kevin mentioned that interior designers might need to hand sketch in front of clients or contractors to present or clarify ideas. For example, it may be useful to free hand sketch a perspective for a client to show for example what a piece of furniture would look like from the top, front, or side. Hand sketching is the quickest method of communicating ideas. According to Kevin, hand sketches do not have to be faultlessly drawn; they could be sloppy. Hand sketching is an exploratory process that brings out various possible solutions for a specific design problem. Malcolm claimed that an individual cannot be a designer if he or she does not have hand-based drawing skills. Hand sketching is also necessary to draw on paper thoughts and ideas so interior designers do not forget those ideas afterwards. Each skill set, whether hand-based or computer-based skills, has its role in the field of interior design. Malcolm explained:

As you get into the work force [and if] . . . you can’t sketch, you’re gonna be a CAD technician if [CAD skills] are the only skills you have because you can’t tell someone to draft what’s in your head . . . and if you’re going to draw it up on CAD then you’re just a technician who can plan well perhaps. Whereas if you’re going to be a designer, then you have to have that ability beyond CAD to sketch [and explore] ideas . . . and then take them to [CAD] so if you don’t have that, I don’t think anybody who’s going to be a senior designer or a designer . . . can do that unless they can sketch those ideas and put them on paper in that way. They can’t take the time to draw on CAD a conceptual idea that’s going to be so . . . time consuming that might in the end not have any validity
because once you get it there and look at it [you think it is] not a great idea ehh. (MAL: Sep18: 410)

**College B.** The emergent themes at College B were: (1) what is the design process, (2) phases of the design process, and (3) CAD use in the design process.

**Theme 1: What is the design process?** According to Karl, the design process is a problem solving and creative process that fulfills the needs of a client. Carol, just like Karl, defined the design process as the problem solving process. Martin saw the design process as a combination of personal experience, research, innovation, and emotions.

I guess that’s why we’re designers and not artists, we use both sides of the brains. So then . . . is to come up with a . . . solution that it’ll be both . . . functional and esthetic. I mean it’s typical answer that you . . . hear every day but it’s true, it’s to be functional and esthetic at the same time. (MAR: Sep 25: 293)

**Theme 2: Phases of the design process.** Karl stated that the first step of the design process would be to meet the client and gather information about their requirements, present these requirements to the client to confirm and re-verify them, and apply the client’s requirements to the design by developing a space plan. The next step would be to validate the design with the client and develop design details and finishes. The last major step would be to develop the design technical drawings and oversee the project construction. Yet, Karl affirmed that every client is different; therefore, it is hard to define the design process as it may differ slightly from project to project, whether it was for a real-life project or an educational project.

Again it’s . . . kinda hard to say because . . . it depends what you’re designing I mean you have design buildings and the process is different, I’ve designed furniture and the process is different, I’ve just done space analysis needs for a client and that’s different, I’ve
developed standard floor plans for a client . . . and that process is a little different but in terms of you know fulfilling the client’s . . . needs and having [the design] validated that’s kind of the same. (KAR: Sep 24: 375)

To Carol, the design process is also about understanding clients’ needs and designing a space that answers those needs. To understand a client’s needs, the designer must first create a program. The next phase of the design process would be the preliminary planning, which is allocating space for activities and furniture. Once the preliminary phase is approved, the technical drawings are drawn to determine how the space will be built, construction costs are calculated, and the building permit is obtained.

Martin stated that you cannot define the creative process, or perhaps the phases of the design process are not obvious. There is no specific or rigid design process because the creative process may be slightly different from one design project to another. However, there is potentially a general framework for the design process.

It’s the same thing [be]cause . . . the design process is a design process. . . . Before I started teaching full-time . . . I went through the design process . . . without really knowing consciously what I was doing, . . . [but] when you’re an instructor, . . . [and] when you teach this, you actually have to break everything down step by step even sub-steps by sub-steps and then explain that to the students so that they’re able to . . . apply it so it actually . . . help me to sort of define what the design process is even though I am not explaining it quiet well right now but . . . it actually helped me . . . to define it clearly or clearer than I used to know. (MAR: Sep 25: 338)

According to Martin, the first phase of the design process is to understand the client’s project requirements.
First thing [is what is it] for right? Do you have a client, do you . . . [create] something from scratch, or [are you] creating a piece of furniture, or . . . jewelry . . . from scratch without any pre-conceived requirements . . . or . . . does it need to have a client. . . . Does the client have specific requirements, so that’s the first [step]. (MAR: Sep 25: 307)

The next process phase would be researching, exploring existing ideas and designs, and studying the ergonomics, which are the human factors that come into play.

You have to research . . . what are the possibilities, . . . what can we do, what will work [and] what will not work? So there’s a lot of researching or what we call programming . . . so you research, you come up . . . with advantages and disadvantages of certain . . . ideas, certain directions, certain products to use within . . . the design process, the materials, and all that. (MAR: Sep 25: 311)

Once all these criteria are known, interior designers can start designing, taking into consideration building and fire codes. They then refine the design and verify the design by transferring the drawings onto AutoCAD.

Look at [the design] with your team, you look at it by yourself, you look at it with the client, you go back and you modify it, and . . . once you’ve done that phase, [and] once the concept is accepted then . . . [you] go and start using CAD and . . . start seeing if it actually . . . going to work and if it’s actually gonna meet the requirements, if it’s actually gonna fit, if it’s actually gonna . . . be able to be built and all that and then you have to go back again and . . . refine it some more. (MAR: Sep 25: 329)

**Theme 2: CAD use in the design process.** At her own design firm, Carol completes all zoning and block-planning phase by hand sketching on tracing paper, but when she presents her preliminary design to clients, she presents her work on AutoCAD. She does not use AutoCAD
again unless she has to go back to the zoning phase if the client is not happy about the proposed design solution. Carol affirmed that she never uses AutoCAD at the preliminary designing stage. She only uses AutoCAD to present her work. She believes that AutoCAD can aid in editing drawings easily and can keep track of changes by re-saving and re-dating drawing modifications. Yet, it is very common to lose track of changes. The interior designer must create a good management system to date every drawing issue produced.

I had a case where the client is using a two year old set of drawings to get city approval for . . . a project and she . . . argued left, right, and center with the building inspector herself about the fact that she should be able to build this particular project on that particular property and it wasn’t the zone for it and she argued left, right, and center and got me on three way call and he’s telling me what she should be on that property; you can’t go bigger than this, we designed a building that was much larger than the one he had in front of him. She was using the one that had the house in it and there was no house, very bizarre thing. Finally, it was what versions of drawings are you looking at [and] he gave me the date and I said well the drawing I have in front of me is two years later than that and it has changed entirely so . . . you’re not looking at the same drawing . . . [it is] critical to keep track of stages. (CAR: Sep 24: 461)

Instructors at College B thought that CAD programs, more specifically AutoCAD, can aid the design process. Using AutoCAD in the design process allows the validation of the design. Karl explained that some designers might not be skilled at hand sketching. Hand sketches might be ambiguous and not to scale. Therefore, AutoCAD is great tool to confirm design decisions, measurements, and functionality. AutoCAD is incredibly accurate for drafting straight lines, but it is difficult to use when drafting curves and organic shapes. Therefore, using AutoCAD early
on in the design process could affect design decisions, and influences interior designers to opt for easier design elements and avoid creating complex shapes.

I had . . . an assignment where there wasn’t a straight line in the entire assignment, just to force them to use arcs and splines and curves and all that kind of stuff because as I said when you look at it on your screen it’s really easy to . . . put the orthographic mode on and you’re drawing perfectly straight lines all over the place. It’s awesome but [to] draw . . . this really blobby [organic] shape . . . takes too much time and too much of a pain so that would be I think the only drawback with it but sometimes it tends to . . . not taint but it sort of changes your design a bit because you worried about how much of a pain is it gonna be to draft this thing. (KAR: Sep 24: 437)

Hence, Karl preferred if interior design students hand sketch and use AutoCAD in tandem. According to Karl, it is ideal to commence the design process by hand sketching design ideas then transfer those ideas to AutoCAD to verify if they will be practical and possible to build.

Carol admitted that she feels more comfortable using her hand drawing skills than her computer drawing skills.

I am . . . [meticulous] with how I draw on [Auto]CAD so it doesn’t necessarily save me time in drawing. It can take me longer to set up a floor planning on [Auto]CAD than it will by hand and I’m fast in [Auto]CAD now but it’s still can be faster for me to draw by hand like to whip up a little elevation or something. [It] looks neater by hand than it does on [Auto]CAD . . . it’s a little rougher and it looks a little more tactile and for a client they may want that. They may appreciate that more. (CAR: Sep 24: 479)

Carol, on the other hand, thought that AutoCAD does not aid the design process at the preliminary planning phase. She believed AutoCAD should only be used at the construction and
the technical drawing phase. To Carol, AutoCAD is a tool for presentation; it is not a tool for
design. She expressed a negative view towards AutoCAD. She insisted that it is not a tool for
thinking. Carol thought that AutoCAD could be a barrier to creativity because it does not deal
with space as a flexible and movable entity. It is easier to deal with space when designing on
paper. In addition, Carol admitted that she does not do any 3D modelling or rendering either. She
hires other individuals to do that for her. She stated that she does not have the time to improve
her AutoCAD skills to produce better computer three-dimensional drawings. Carol’s hand
drawing skills are stronger than her computer drawing skills. Therefore, she believed that her
creativity is fostered when she uses her hand skills. She believed that the interior designer should
evaluate his or her skills and check whether he or she is better at designing using hand or
computer skills.

With regard to creativity, Karl thought that AutoCAD can either foster or obstruct
creativity; this all depends on the individual’s approach and application of AutoCAD. Some
designers opt for a challenge and try designing complex organic shapes on AutoCAD, whereas
others avoid using such difficult commands and prefer not to draw such shapes.

Similar to Karl, Carol mentioned that creating curvy and organic shapes are easier by
hand than on computer. It necessitates more time to create curves using AutoCAD. For example,
if a designer had seven initial design possibilities to represent, it would be quicker to hand sketch
those possibilities on paper than by computer. Carol strongly believed that hand drawing skills
foster creativity better than AutoCAD. It is also easier to communicate and exchange design
ideas through hand drawings than computer drawings.

It’s really hard to use [Auto]CAD to communicate with people. To share ideas, you
cannot be on the screen with somebody else and whoever has the mouse is in control so if
the person with the mouse doesn’t wanna see over there you know they’re not gonna go over there and nor with layers etcetera so it’s hard to read a drawing [be]cause not all is in front of you. You can have layers of drawings in front of you or seven drawings . . . on [Auto]CAD but they’re not always readable [be]cause you’re working on a screen, Even if you’re lucky enough to have . . . a screen that’s 30 inches wide. My board is five feet . . . [and] I can have a full set of working drawings laid out on my board and I could see the whole thing at one time. I always print my [Auto]CAD by the way; when I am marking [Auto]CAD, when I am looking at [Auto]CAD, when I am showing it to clients, always it’s printed out it’s never a . . . disc, I don’t give a disc, never ever ever ever. (CAR: Sep 24: 530)

Even though Carol is a firm believer of hand drawings, she thought that computer-based drawings are essential. Interior design students need to be able to take the produced hand sketches and transfer them onto AutoCAD for presentation purposes. In addition, Carol stated that computer-based skills are important because most offices are now using AutoCAD for their production drawings and client presentation drawings.

In his description of the design process, Martin said that he used AutoCAD as a tool to produce technical drawings. However, AutoCAD’s integration in the design process depends on the project itself. He explained:

[T]he architect Frank Gehry . . . couldn’t be able to build his buildings . . . without AutoCAD, that’s a fact. I mean [his] concept[s] [are] created . . . by hand . . . it’s all sketches [and] scribbles that nobody can understand that he would be able to and . . . not that I am a big fan of Frank Gehry okay just to clarify that but anyways the process that he uses it’s a bunch of sketches and then to make sure that it’s actually feasible, that they
can actually do that, then they need AutoCAD . . . to calculate the size . . . of the beams and . . . the structural support not just the beams, [and] all the different structural supports. They need AutoCAD to be able to do that. . . . In our case, in interior design, you walk people through space and the building on the outside but . . . first and foremost what we do is design inside out as interior designers so you imagine people in . . . the space flowing into the space, what are they doing in the space, [what are the] different tasks they need to complete within the space . . . so you look at that and then that . . . should reflect what the building will look on the outside and once you’ve got these ideas, these concepts, which are sketched by hand then you can push them a little bit further again, refine them, fine tune them with . . . software. (MAR: Sep 25: 367)

Martin thought that AutoCAD’s benefits and drawbacks in the design process depend on how and when it is used by the designer. He explained that AutoCAD should not be used at the beginning of the design process because it is rigid software tool that can block the flow of creativity. Otherwise, AutoCAD is a great tool that can aid in producing proportionally correct designs. He insisted that CAD could not foster creativity; it is only a tool. He felt that creativity or the creative process comes from a person’s mind, heart, and life experiences. Creativity cannot be achieved by sitting in front of the computer screen and clicking incessantly on the mouse to create one shape. However, with a pencil and paper, a designer can actually communicate what is inside of him or herself and create different shapes rapidly. Like Karl and Carol, Martin believed that traditional hand sketching and designing by hand are very essential skills that every designer needs to have and maintain. Martin said that losing hand drawing skills and misusing AutoCAD could affect the design. Martin explained that he does not integrate hand-based and computer-based skills together. To him, hand-based and computer-based skills
should not be used together in the design process. He then referred to the structure of buildings located in downtown. He explained that the majority of buildings located downtown have a square shape. Martin said that these buildings lack design and demonstrate that the designer used AutoCAD at the beginning of the design process.

**Martin**: [It] is very important that the hand skills may be maintained and that we’re losing it and that is affecting the design. . . . I mean go downtown . . . see all the buildings that are there?

**Researcher**: Yes

**Martin**: Do you see anything inspiring there?

**Researcher**: I don’t remember anything specific

**Martin**: They’re all squares.

**Researcher**: Yes that’s true.

**Martin**: They’re all disgusting. . . . So to me if you use AutoCAD from the beginning that’s what you get.

**Researcher**: Oh! Okay.

**Martin**: . . . You just get this rigid [and] uninspired [buildings] . . . so to say that AutoCAD or even a pencil . . . helps you with the creative process, no it’s . . . always human [and natural ]factors . . . that gets process in your process and then gets . . . [it] out by the person, okay? That’s . . . the design process. (MAR: Sep 25: 453)
Research Question 5: How do interior design instructors, who teach CAD, teach the design process?

College A’s instructors, Malcolm and Kevin had taught, and still currently teach AutoCAD courses at College B. Stephan did not teach AutoCAD courses. College B’s instructors, Karl, Carol, and Martin have taught AutoCAD at some point in their teaching career. Carol taught AutoCAD at a private college but she had not taught AutoCAD at College B; she only taught manual drafting courses. During the period of my research, only Karl was teaching AutoCAD courses. Based on this data, I report on five of the instructors, two from College A and three from College B, because at some point in their teaching career, they have taught AutoCAD at their respective colleges. Participant responses may vary according to their design backgrounds. Table 9 and Table 10 below are brief reminders of instructors’ academic qualifications and professional experiences and shows who taught AutoCAD at some point in their teaching career.
Table 9

**Summary of College A Instructors’ Qualifications and Experiences**

<table>
<thead>
<tr>
<th></th>
<th>College A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stephan</td>
</tr>
<tr>
<td>Academic Qualifications</td>
<td>Bachelor of Architecture</td>
</tr>
<tr>
<td>Professional experience in</td>
<td>36 years</td>
</tr>
<tr>
<td>the field of design</td>
<td>(Architectural &amp; interior design)</td>
</tr>
<tr>
<td>Number of years teaching</td>
<td>17 years</td>
</tr>
<tr>
<td>in the field of design</td>
<td>(since 1995)</td>
</tr>
<tr>
<td>Number of years using</td>
<td>14 years</td>
</tr>
<tr>
<td>CAD programs</td>
<td></td>
</tr>
<tr>
<td>Courses previously taught</td>
<td>Design and technical design courses.</td>
</tr>
<tr>
<td>at College A</td>
<td></td>
</tr>
<tr>
<td>Courses currently teaching</td>
<td>Design and technical design courses.</td>
</tr>
<tr>
<td>at College A</td>
<td></td>
</tr>
</tbody>
</table>
## Table 10

**Summary of College B Instructors’ Qualifications and Experiences**

<table>
<thead>
<tr>
<th></th>
<th>Karl</th>
<th>Carol</th>
<th>Martin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic Qualifications</strong></td>
<td>Diploma in Interior Design</td>
<td>Bachelor of Interior Design</td>
<td>Advanced Diploma in Interior Design</td>
</tr>
<tr>
<td><strong>Professional experience in the field of design</strong></td>
<td>19 years (Commercial &amp; institutional design)</td>
<td>27 years (Residential design)</td>
<td>20 years (Hospitality, retail &amp; corporate design)</td>
</tr>
<tr>
<td><strong>Number of years teaching in the field of design</strong></td>
<td>17 years (Part-time instructor)</td>
<td>13 years (Part-time instructor)</td>
<td>15 years</td>
</tr>
<tr>
<td><strong>Number of years using CAD programs</strong></td>
<td>20 years</td>
<td>8 years</td>
<td>20 years</td>
</tr>
<tr>
<td><strong>Courses previously taught at College B</strong></td>
<td>AutoCAD courses</td>
<td>Manual drafting courses</td>
<td>AutoCAD courses</td>
</tr>
<tr>
<td><strong>Courses currently teaching at College B</strong></td>
<td>AutoCAD courses</td>
<td>Manual drafting courses</td>
<td>Other related design courses</td>
</tr>
</tbody>
</table>

**College A.** The emergent themes at College A were: (1) teaching the design process, (2) CAD use in design courses, and (3) using other tools to teach the design process.

**Theme 1: Teaching the design process.** Students at College A begin learning the design process in first year of the interior design program. Malcolm used his professional experience of office and retail design to teach the design process. He always used examples from his private practice in his teaching to explain to his students what a real design process would be in a working office. He would often take on the role of the client and assign the role of designer to his students where they were required to present the program of the design project, client’s needs, budget, and time limit for project completion to him. He also tried to show his students good design examples and encourages them to research using magazines or books to stimulate their
mind, be inspired, and obtain ideas for their own design project. By having group discussions, Malcolm taught the design process by giving contextual examples of projects and highlighting the important aspects of those projects. Malcolm stated his way of teaching the design process where he explains to his students about retail design, he said:

We sat down as a group and I raised points about retail design people’s perception of their experiences, so when you see a wide-open store, how do you react? The entrance is very wide [and] when you see it very narrow, are you perceiving something different? How do you perceive colors? When you see yellow at a store, what are you sensing about that store? What are your pre-conceived ideas and we have them even if we’re not designers. . . . [Therefore,] having a discussion trying to get their own experiences to be brought out and thinking about the problem. What is the problem in retail and what are the aspects of the solution? Aspects of the solution is how you enter the store, how you perceive it from 50 feet away when you go in, where you see the cash located, how is the merchandise displayed, what is the ceiling, what is the lighting and that. [Once] now we’ve seen those elements, . . . go look at stores . . . and magazines . . . and tell me what you think, what are your reactions, what do you see about planning, about materials, about lighting, [etc]. Hopefully as they’re doing this they’re absorbing that sort of . . . knowledge so they can synthesize it in the end and put it together when they start [their own design concept].

He continues:

The process is circular . . . and our students are linear. . . . [They think] now that I’ve got the plan, I go to the ceiling and when I go to the ceiling, I go to the elevations but what they should be doing is as they’re thinking of the plan, [they should think] . . . what are
the materials, what are the lighting . . . and that’s the idea of sketching. . . . [It is] trying . . .
to get the students to take it in a linear approach but if they can look at it and spring in
these other elements [such as space planning and lighting]. . . . that you’ve got this
information go back and research some more about these . . . other elements you might
have done at the beginning. (MAL: Sep 20: 487)

Kevin also used projects from his professional experience to explain the design process to
his students. Kevin taught the design process according to the context of a particular project. He
believed that the design process itself does not really change; the process depends on the space
that students are designing, for example, whether the space is residential, commercial, or office
space. In one-on-one mentoring sessions with students, he comments and evaluates
independently every phase of their design project. Design studio courses are meant to guide
students in achieving better design solutions with the help of the instructor.

Malcolm stated that the design process used in the workforce is similar to the design
process taught to students in interior design programs except for the first phase, the research
phase of the design process. He also stated that the research phase is present in the workforce.
However, the workforce does not put emphasis on the research phase to the same degree
instructors do in interior design education. He added that most firms are specialized in one type
of design. Therefore, sometimes firms do not bother to research and create a new program
document for each and every project.

Firms tend to do similar work over [and over]. They sometimes become reliant on their
existing knowledge base without updating their knowledge base. That’s why . . . the
Order of Architects insist that the professionals are taking ongoing courses to keep
abreast . . . they found that often [firms] can easily fall behind work and it’s in the way of
learning sometimes [where] you have to be sort of prodded. . . . [Therefore, in] firms . . . you would hear I’ve done [this] for thirty years so I don’t need to know anything new, the same way I couldn’t convince partners to adopt [Auto]CAD in their firm and sometimes you can’t convince them to go back and re-visit research and do those types of things. (MAL: Sep 18: 265)

Understanding research is considered a basic design skill. Students must research and understand before they can design. For example, Malcolm explained that if students need to design an office or a retail store, they must understand some essential elements that cannot be understood unless observed in real-life settings.

Before you can design . . . [an] office or retail design, understand some essential elements in retail; go into a store look at how the merchandise is displayed, look at how . . . people move into the store, think about your oppressions when you go in, and the fitting room is [it] so small that you can barely turn around versus you go into a store that [has a] very generous [fitting room]. What are your oppressions? [That is] the type of research now validated against some standards you might find in the text book[s]. . . . Now you have some knowledge based to say . . . if I am designing a shoe store, I know . . . the elements that compose that and we put them together into a . . . functional way, now what’s the creative way. (MAL: Sep 18: 275)

Moreover, every interior designer should have the ability to perceive 3D space, which according to Malcolm, is something that instructors cannot teach; students either have this ability or not. However, he believed that instructors at College A could teach students how to hand sketch. Malcolm believes that a creative person can learn how to draw technical drawings, but instructors cannot teach a technician to be creative.
It’s inherent and it’s either you have it or you don’t. You can teach a certain amount of creativity [by] . . . develop[ing] a certain level of creativity a little further but if you don’t have it you’re not gonna teach it so. . . . [In] the process, you can . . . use some of the mechanics . . . and when you do that, take it to an elevation [be]cause then you can really look at proportions . . . correctly [be]cause you’ll never experience proportions sketching it 3D. You really have to see the 2D to look at proportions . . . we could teach you that, that’s good proportions and that’s bad, and you can get the hang of it . . . but you can’t teach . . . creativity and 3D conceptualizations to someone if they don’t have it at some point to start with. (MAL: Sep18: 628)

**Theme 2: CAD use in design courses.** Malcolm and Kevin mentioned that they do not use CAD programs or other computer software to teach the design process, but students could use CAD programs and 3D modelling software in their own design process. Malcolm explained that interior design students need to get through the first AutoCAD course, CAD I, before they incorporate AutoCAD in their design process. He felt that in CAD II, third semester, students could begin to use AutoCAD in design projects. Kevin, however, thought that it is towards the end of the first AutoCAD class that students would be able to incorporate the software in the design process.

Kevin said that CAD is used in every phase of the design process. For instance, in design studio courses, students are usually given a printed dimensioned plan that they must transfer onto AutoCAD. Therefore, in the initial stage of the design process, students need to use AutoCAD to have accurate floor plans and use their hand skills to hand sketch and generate ideas. Hence, to Kevin, the design process is a constant oscillation between AutoCAD and hand sketching. He teaches his students to develop the habit of using both tools in tandem when designing. Malcolm
mentioned that AutoCAD could be a barrier to students’ creativity if they use AutoCAD early on in the design process. Malcolm required his students to complete the first preliminary plan of the design process by hand then transfer the plan and refine it afterwards in AutoCAD. This way, he felt students can manipulate plans easily by exploring multiple design options faster.

With regard to creativity, even though Malcolm valued AutoCAD and believed in its capability to aid the design process, he thought that AutoCAD can be a barrier to creativity if misused by students. According to Malcolm, AutoCAD drawings always look precise and well-founded even if the design is invalid. Kevin confirmed Malcolm’s views. He said that when students discover errors in their design, they tend to overlook them and present their design with the mistakes.

It can be a barrier if we feel like we’re stuck or we’re not advancing and we’re sort of expecting the computer to do it for us . . . [be]cause they don’t have much experience, they . . . think because it’s on the screen and it looks good, it prints well that it’s good. [Therefore,] when we have that discussion, we get our [roll] of paper [to try different options]; okay this isn’t working well or this could be different, have you tried this. They don’t have the speed . . . they’re not as comfortable with the software to really explore all the options you need to explore . . . on the computer. If they’re fast . . . then it can help their creative process because the idea gets up there quicker. (KEV: Sep 20: 499)

In addition, Kevin thought students sometimes think that AutoCAD designs things and solves design problems for them.

Sometimes I find that the weaker students feel that [Auto]CAD will do the work for them that if they can put it on [Auto]CAD it’s designed. They mistake drawing for designing. Like if it’s drawn, it must be designed and it’s not. It could be just poorly designed in
[Auto]CAD as it can be manually so that is a real barrier, they don’t devote the time, they’re too anxious to go to the step of drawing in [Auto]CAD before they really solve the problem or explore the problem. (MAL: Sep 20: 368)

Kevin said that it is very difficult to teach students to use AutoCAD as a design tool; therefore, instructors at College A teach students to use AutoCAD mainly as a drafting tool. Kevin mentioned that AutoCAD is an effective production tool that should be used as a checkpoint throughout the design process to validate hand sketches. He thought that there is a place for AutoCAD in every phase of the process. However, instructors at College A tended to monitor students’ overuse of AutoCAD in the design process because they believed it could limit student creativity. They thought that students must first be comfortable, gain enough speed, and master the important elements of AutoCAD in order for them to use it as a design tool. Kevin said that to master AutoCAD software, students would need to spend a lot of time on it and be able to fix their own mistakes by themselves. This might not happen while they were still students because they were still learning how to use the software. Mastering AutoCAD and using it as a design tool would become the equivalent of easily moving the pencil on tracing paper. As such, Kevin felt that while in school, AutoCAD could not be used by students as a design tool because it needs more time to be mastered and used for creative purposes; AutoCAD was seen a drafting tool until mastered. Kevin mentioned that interior design students need to be independent learners to learn AutoCAD in more depth, to keep educating themselves once they graduate and always go beyond what they learn in school. Stephan also said that in the early stages of learning AutoCAD, it is mainly a drafting tool. However, he felt that once students knew how to use it, they could use it as a design tool.
Theme 3: Using other tools to teach the design process. Instructors at College A sometimes used other tools to assist them to teach the design process. Malcolm, for example, used smart boards, even though he did not find it very efficient. Smart boards, however, allowed Malcolm to draw directly over his illustrations, reuse drawings, and flip back and forth from one drawing to another without the need to erase. This was useful when students did not understand something; Malcolm could easily go back and re-explain the subject without re-drawing what was there. He also used the smart board as a glorified overhead projector because he was not able to draw accurately with it.

Researcher: . . . What are the advantages and disadvantages of the smart board that you noticed?

Malcolm: Well [be]cause it’s there as I suppose to the blackboard and I . . . can’t sort of project on the blackboard and reuse it so I’m over there or over there. I can’t go back and forth and I’m wasting time as opposed to as [I] am right there and I can go back and it’s not erased and I just go flip back to . . . what I draw on there is there and say okay this is what I just drew two slides ago. Now [be]cause you raised the question obviously, you didn’t get it so [I] am gonna go back and go over it a second time [because] I thought you understood it when I went forward. (MAL: Sep 20: 571)

Kevin, on the other hand, used anything that would allow him to hand sketch while teaching the design process whether it was a smart board, chalkboard, or paper and pen. He hand sketched his ideas and suggestions to his students whenever he discussed their design projects. According to Kevin, the design process is about trial and error, and hand sketching many ideas. The design process was seen as a process of ideation, elimination of choices, and then refinement.
**College B.** The emergent themes at College B were: (1) teaching the design process, (2) CAD use in design courses, (3) CAD as a drafting tool in the design process, and (4) using other tools to teach the design process.

**Theme 1: Teaching the design process.** Instructors at College B drew on their professional experience to teach the design process. Karl mentioned that he used his own design projects as examples to explain the design process to his students. In his teaching, he played the role of the client when undertaking a project and required students to design small spaces according to client’s needs. For example, he would assign students to draw technical drawings of a reception area. That reception area would be missing a counter. Students then would need to design the counter and draw all floor plans, elevations, and details on AutoCAD software for the entire reception area. This way, students practiced their design skills and learned AutoCAD software.

Carol taught the design process by first describing the programming phase through an in-class discussion and having her students imagine an experiential experience. When designing a residential space, for example, she consistently required her students to ask themselves what do they do when they get up in the morning; what do they do when they come home, what do they do when they cook and serve food in the dining room, etc. According to Carol, this method of questioning aids in achieving better design alternatives for each function or activity occurring in that space. Carol affirmed that interior design students need to use common sense or logic to build the programming phase by referring to real-life activities.

They’ll draw me a two foot by two foot refrigerator. I’m assuming because that’s the size of their dorm room . . . because that’s the fridge that they have and I said hang on no that’s the fridge that fits underneath the counter and that you’ve put your stuff on top of it
... it’s not a fridge, so how big is the fridge and they have to physically measure a fridge and tell me how big it is ohhh it’s that big, ohhh where’s that gonna go, they put it against the window, well that doesn’t work because the back is against the window so yes physical reality and logical processes [are] very hard to teach and I can only do it by emphasis and repetition. (CAR: Sep 24: 613)

Martin used his professional experience to teach the design process. He first asked his students to identify the context of the design issue and the desired outcome, as well as to research and analyze previous existing designs. Students then are required to start the ideation phase using hand sketching, which is the foundation of a good creative process. Martin did not recommend his students to use the primary generated ideas; he suggests to hand sketch as many ideas as possible and experiment with several design solutions. Afterwards, he mandated students to select two or three hand sketches for which they thought they could push the design further. Martin continually guided his students through the design process. He also helped students, in one-on-one meetings, to construct design elements related to their design projects. Interior design instructors at College B still expected hand sketches for all initial phases of the design process.

Theme 2: CAD use in design courses. Carol mentioned that she did not use AutoCAD programs or any other software to explain the design process in her courses. Instead, she used hand sketch drawings if she needed to teach her students something involving the design process. Martin also did not use AutoCAD to teach the design process. He first taught his students to produce technical freehand drawings and once they grasped the technique of freehand drawings, they transferred them to AutoCAD.

Here at ... College B when I taught CAD, I simply taught [Auto]CAD [courses alone], ... I didn’t teach a design course with [Auto]CAD, it was just pure [Auto]CAD. Now, ...
depending on what . . . level [and] what semester they’re at, they might . . . incorporate a
design . . . component like . . . if they’re learning how to draw floor plans, they might use
a floor plan that they’ve designed in their design studio but it’s not all mixed up the same.
We teach [Auto]CAD to learn how to do [Auto]CAD . . . so when they come to me in
third year they know how to use [Auto]CAD . . . then they just apply it on their own. If
they’re stuck, they may come and see me and I say well do it this way, do it that way,
whatever. (MAR: Sep 25: 577)

Karl taught only AutoCAD courses at College B. Therefore, it was usual that he assigned
designing projects in which students need to incorporate AutoCAD in the design process. Karl
added that students only need to have basic AutoCAD skills to incorporate its use in the design
process. According to Karl, examples of basic AutoCAD skills would be that students are able to
set up a drawing, define the units, understand how the object snap command works, and know
how to use the drawing and modifying commands. Carol, though, believed that students needed
to have more than basic skills in AutoCAD if they are to be able to integrate it in the design
process. For instance, they should know how to plot a drawing to scale and manipulate layers in
a drawing. Students should also understand that the rectangle they are drawing on the computer
screen is an actual space that is part of physical circulation. Carol affirmed that space is critical;
therefore, students need to have a clear idea that AutoCAD is simply a presentation tool.

I don’t use [Auto]CAD in the design process [be]cause I do find it a stumbling block, a
restriction. We get into a project in second year and this is when [students] start to want
using [Auto]CAD . . . and we do a . . . retail store, and they have to program the retail
space according to their imagined client and they have a very specific client list and they
have to develop it, research it, and then they start to plug it in to their preliminary design
and they start using [Auto]CAD at that point and . . . I find that they’re using it in a way that makes it very difficult to see how . . . people move through a space and you know they’re asked to program the space so when they program the size of area needed for a cash desk and a wrap area for example, they block it out as a six foot by ten foot rectangle and that’s all they ever see it as and they’ll some of that, it’s not . . . just a surface it’s actually walking space. They don’t see how it relates to the three foot hallway behind or/and because they have that as a block too, like space you can walk behind a desk and then maybe that’s what they should be looking at but they see them as individual entities as opposed to fluidic connections. (CAR: Sep 24: 630)

She added that the use of tracing paper is a design tool that is very helpful in the initial stages of the design process. Interestingly, Karl mentioned that AutoCAD should not be taught in first year of the program because students would stop drafting by hand if they learned to use AutoCAD too early. Students would have the tendency to produce their work immediately on AutoCAD because it is faster and easier. He also indicated that students need to develop the habit of using their hand skills first in order to create better design solutions.

**Theme 3: CAD as a drafting tool in the design process.** Martin declared that teaching practices of AutoCAD programs could vary from one post-secondary institution to another and from one instructor to another. Karl taught his interior design students to use AutoCAD as a drafting tool; although he estimated that 80 % of his students used AutoCAD as a drafting tool and 20% used it as a design tool. Martin mentioned that hard working students typically had better AutoCAD skills. These students aimed at creating concepts that were more complex. He explained that students could not create a complex design without being comfortable and proficient with the use of AutoCAD software. Karl, however, reminds his students that
AutoCAD could not design for them. Karl categorized AutoCAD as a drafting or technical tool that supports and validates a design. However, he considered 3D modelling software such as Revit and SketchUp as design tools.

Martin believed that 3D modelling software is more important than AutoCAD software to help students develop their design ideas. Along with hand sketching, Carol also thought that 3D modelling software could definitely help the design process. She wished that 3D modelling could be used without having to learn AutoCAD. Carol said that, unfortunately, to be able to draw in three dimensions requires an immense ability in AutoCAD. It is very essential to understand what space is and how to manipulate volume. Students need first to learn how to use the mechanics of AutoCAD in order to use it efficiently in design projects. According to Carol, AutoCAD provides fantastic skills that should be taught as a separate entity. She thought it would be ideal if interior design students learned 3D modelling early on in the program, or if students entered the interior design program with 3D abilities in AutoCAD. She would like students to learn AutoCAD during the summer, prior to beginning the program, because during the program students have to learn how to hand sketch and how to use AutoCAD all at the same time, which is arduous to them.

They don’t know what they’re doing. When you go into SketchUp, it says build a wall, well what’s a wall . . . so unless they understand what a wall is, they can actually bring it up in volume and extend. [You] can’t extend it without putting a roof on top and those types of things, get that technical information first before you begin with the [Auto]CAD tool yup. (CAR: Sep 24: 669)

**Theme 4: Using other tools to teach the design process.** Karl tells his students that no specific design tool can help the design process. The choice of design tool depends on each
individual’s preferences, abilities, and skills, and on the project’s needs. Karl said there are a broad variety of tools and software programs, but it is up to interior design students to figure out how they want to apply those tools and whether they use them or not. Martin added that the invention of the digital hand sketching tablet would also be a good design tool once refined. The tablet could be another method of hand sketching with different hand skills. It could eventually replace the pencil and paper. The digital tablet could allow sending hand sketches electronically and facilitate working with other consultants across the world.

**Summary.** The findings of this study confirmed AutoCAD’s importance in interior design programs at College A and College B. Even though instructors thought that AutoCAD may inhibit an interior design students’ creativity, they identified many advantages of AutoCAD’s use in the work of interior design students and professionals. If AutoCAD is used effectively, it can save time, document drawings, and can assist in better coordination with other professionals in the workforce. Nowadays, the industry is hiring potential interior design graduates that possess extensive AutoCAD skills. The interior design programs of College A and College B were obliged to have several curriculum reviews to be able to satisfy the industry’s requirements and ensure the employability of their students. Currently, the placement of AutoCAD courses in College A and College B differ; College A introduces CAD to students in the second semester of the program and College B introduces CAD to students in the third semester of the program. Both programs include the use of 3D modelling software, but different types of such software; College A offers 3ds Max courses only, whereas College B opted for 3ds Max and SketchUp simultaneously. These variations in the placement of AutoCAD in the curriculum are due to differing objectives of the interior design programs at College A and College B. College A aims to train skilled interior designers for the workforce. College B aims to
prepare graduates to become professional interior designers in the industry and/or take their
studies further to become researchers of the interior design profession.

Moreover, each interior design instructor referred to his or her own professional practice
to conceptualize and teach the design process. The phases of the design process described by
each instructor are context specific to a design project, whether it was retail, office, or residential
design. Lastly, AutoCAD’s use in the design process depended on the instructor’s preferences,
skills, and abilities. Some instructors liked to use it in the design process, others preferred to use
their hand sketching skills, or perhaps use both.

In the final chapter, Chapter 5, I discuss the results and link them to themes that emerged
from both interview data and the literature. This discussion is organized again by research
question. I then present what I see as the contributions this study makes to the literature on post-
secondary interior design education. I conclude by suggesting future research that would further
enhance the literature.
CHAPTER 5

DISCUSSION AND CONCLUSIONS

This thesis sought to understand the curricular conceptions of College A and College B’s interior design programs, how these programs integrate CAD into the curriculum, and how their interior design instructors adopt and integrate CAD into their teaching. To this end, document analysis and individual instructor interviews were conducted.

Documents, such as program information and course descriptions deemed from web sites and instructors’ syllabi and course materials were collected and analysed. Four historically recurring conceptions of curriculum found in the literature on curriculum theory were used for the document analysis: academic rationalism, self-actualization, social reconstruction-relevance, and technology (Eisner & Vallance, 1974; Marsh & Willis, 2007; McNeil, 2009; Pratt, 1994; Sowell, 2005). I then classified each course offered in the interior design curricula of College A and B into categories based on these conceptions of curriculum. I also analyzed, to provide more detail, a few course syllabi provided by four of the six participating instructors currently teaching at Colleges A and College B. Findings indicate that several courses offered early in the programs belonged to the curricular conception of academic rationalism, while other courses offered later in the programs organized the curriculum for each course using more than one conception of curriculum.

In addition to the document analysis, instructors’ interview data were used to analyze and document instructors’ perceptions and beliefs about the use of CAD in interior design and its integration into the college curriculum. The analysis of interview data was conducted through a coding-theme process. Six themes were identified across all interview data: the importance of CAD in interior design education, the advantages and disadvantages of the use of CAD in
interior design, the placement of CAD in the college curriculum, review of interior design curriculum in the college programs, the conceptualization and teaching of the design process, and the use of CAD in the design process.

In this final chapter, the analysis of both documents and interviews are discussed in terms of major themes that emerged and the literature review presented in Chapter 2. This discussion is organized by research question. Then, I present the limitations of this study, my contributions to the literature, and finally discuss implications for future research.

**Research Question 1: What is the nature of the curriculum in college-level interior design programs?**

The interior design curriculum at both College A and College B is mainly organized using the academic rationalism conception of curriculum. However, it also draws on two other conceptions of curriculum: self-actualization and social reconstruction-relevance. Examination of course descriptions in the colleges’ literature revealed a progression in the interior design curriculum at both Colleges A and B, from a singular academic rationalism approach in the early part of each program, to an integration of academic rationalism, self-actualization, and social reconstruction-relevance conceptions of curriculum in courses situated in the later part of the college programs.

In addition, there is conceptual consistency between the course descriptions found in the literature or on the web sites of the two colleges and the documents collected from instructors of College A and College B. Instructor documents included course syllabi, course notes, examples of assignments, and tests, etc. The following sections discuss the progression of the interior design curriculum at College A and College B and how the documents provided by instructors
during their interview sessions were conceptually consistent with the course descriptions in the
colleges’ program information.

**Progression of interior design curriculum.** The interior design program at College A is
a three-year career program that aims to train students for the industry. This program focuses on
providing students with a college diploma and the necessary skills to obtain direct entry into the
design field. All courses taught in the first year, semester one and semester two, of the interior
design program at College’s A organise the curriculum using the curricular conception of
academic rationalism. This indicates that the program at College A first aspires to teach students
the necessary concepts and tools for them to work in the field of interior design. Examples of
concepts and tools include learning how to: draw by hand and on computer, develop visual
literacy, understand history of the different art periods and styles, and use various materials and
finishes used in interior design as well as the principles of color and lighting. Each concept or
tool is taught in a separate course without relating it to any other course in the curriculum. The
interior design program at College A follows a planned and systematic curriculum and is guided
by objectives to be achieved by students. Courses also focus on teaching students how to
problem-solve and generate ideas. By the second year of the program, interior design students
encounter a course, Interior Design IV, that organizes the curriculum using academic
rationalism, self-actualization, and social reconstruction-relevance. At this time in the program, it
is believed that students have grown intellectually and are able to use their previous knowledge
to explore interior design concepts on their own. Instructor’s roles then change. They become the
students’ mentors where they guide students to progress independently in their learning. They
require students to innovate several design options and distinguish between what satisfies and
what does not satisfy design objectives by continuously considering real-life situations. Further,
the last year of the program at College A, semester five and semester six, continues to offer courses that integrate the three curriculum conceptions by requiring students to critically redefine public spaces by using their own design abilities and skills.

The interior design program at College B is a four-year bachelor degree that “prepares students to pursue a professional career related to the design of the built environment” (College B, 2012). Upon completion of the program, students receive a Bachelor of Applied Arts- Interior Design. The curriculum at College B is a blend of theory-based and skills-based courses that combines design-focused studies with general studies to emphasize critical thinking and research. Like College A, all courses taught in the first semester of the interior design program at College B organise the curriculum using the curricular conception of academic rationalism. These courses teach students the fundamentals of interior design. In the second and third semesters of this interior design program, the curriculum integrates the approach of social reconstruction-relevance along with academic rationalism in three courses: Issues in Design I, Environmental Psychology, and Design Studio III. The course Global Perspectives is solely grounded in the curricular conception of social reconstruction-relevance. In the fourth semester, academic rationalism remains the primary approach to organise content, but the curricular conception of self-actualization is introduced in two courses: Design Drawing IV and Interpersonal Communication. The fifth semester remains strongly focused on academic rationalism. By the sixth semester onwards, courses tend to integrate more than one curricular conception in various courses.

This progression of content organization with regard to conceptions of curriculum at both College A and College B is an indication that the main goal of the two interior design programs is to train students to develop rational minds. College B also puts an emphasis on critical
thinking and research. The interior design curriculum of both institutions aims to prepare students for everyday life, in this case, the world of interior design. However, the interior design curriculum at College B seems to offer students more personal and societal experiences than that of College A. College A’s interior design program focuses more on offering design related technical application courses than theory courses. College B’s interior design program also focuses on offering design related technical application courses but also includes various theory courses. Since this study also focused on pedagogy used to teach CAD, it is important to indicate that the CAD courses offered in the curriculums of College A and College B belong to the curricular conception of academic rationalism. These courses teach students specific software programs that are used as tools in the design process. Thus, the CAD courses are considered to be technical and skill application courses. Table 11 portrays the list of technical or applied courses and theory courses in the interior design programs of College A and College B.

Table 11

List of Technical Applied Courses and Theory Courses in College A and College B

<table>
<thead>
<tr>
<th>Course Type</th>
<th>College A (Appendix- H)</th>
<th>College B (Appendix- I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical/Skill Application Courses</td>
<td>Total of 32 courses: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, and 32.</td>
<td>Total of 36 courses: 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 34, 36, 38, 41, 42, 44, 49, 50, and 51.</td>
</tr>
<tr>
<td>Theory Courses</td>
<td>Total of four courses: 4, 8, 19, and 31.</td>
<td>Total of 27 courses: 3, 5, 6, 9, 11, 12, 13, 17, 19, 20, 24, 27, 33, 35, 37, 39, 40, 41, 43, 45, 46, 47, 48, 49, 50, 51, and 52.</td>
</tr>
</tbody>
</table>

*Note.* Some courses can be listed in both categories as they may combine technical and theoretical content.
Based on the above summary of course type in Table 11, I have determined that College A focuses mainly on skills because it teaches students more technical or applied courses whereas College B focuses on both skills and theory because it teaches students technical or applied courses and various theory courses. This is perhaps due to differences in the length of the two programs. College A is a three-year program and College B is a four-year program. College B has more program time to introduce theoretical courses in the program that draw on social reconstruction-relevance and self-actualization. Teaching courses from the perspectives of self-actualization and social reconstruction-relevance takes more time than teaching courses grounded in academic rationalism with a focus on content or theory alone. College B also has a cooperative work term in a design related industry where students have the opportunity to apply their knowledge and skills learned during the program. This can potentially further ground the senior years of the program in curricular conceptions of self-actualization and social reconstruction-relevance.

Consistency between course descriptions and course syllabi. Document analysis revealed that both College A and College B have a coherent curriculum in relation to the objectives of their programs at various curricular levels in the programs. Consistency was found between the programs’ course descriptions, the course documents collected from the instructors, and curricular conceptions identified in my analysis. The following sections illustrates how the planned curriculum is coherent with the enacted curriculum; the learning outcomes stated in the course documents collected from the instructors at College A and College B are consistent with the programs’ course description objectives.
College A.

Stephan. The three course syllabi provided by Stephan outlined the objectives of the courses and explained in detail the projects and/or assignments to be completed by students. The three courses were Construction Documents I, Furniture Design and Construction, and Interior Design V.

Construction Documents I and Furniture Design and Construction course syllabi matched the course descriptions outlined in the interior design program information curriculum. These two courses are content-oriented following a pre-planned curriculum and systematic learning process; Stephan teaches to the test. The course syllabi demonstrate a weekly schedule of topics that are discussed and learned in class. The course syllabi also indicated when tests or assignments were due; students know in advance the objectives to be achieved in order to succeed in the two courses. In Construction Documents I, students are required to draw floor plans, sections, and elevations to demonstrate their competence in the subject. The test and the drawings are worth 90% of their final grade. The remaining 10% is devoted to professionalism.

In the course titled Furniture Design and Construction, students need to complete four projects. The first project consists of a furniture design analysis that is worth 5% of the grade. The second project is divided into two tasks that are evaluated independently; students must first design a table for which they have to research design principles, ergonomics and anthropometrics, then create the model of the table. The first task is worth 15% and the second task is worth 30% of the final grade. The fourth project is worth 40% and consists of the creation of a millwork piece which is a finished piece of woodwork that can be installed as part of a construction process for a residential or public space. The remaining 10% is devoted to professionalism.
Analysis of the third course syllabus, Interior Design V, that Stephan provided integrates three approaches of curricular conceptions: academic rationalism, self-actualization, and social reconstruction-relevance. Nevertheless, it mainly focuses on the approach of academic rationalism because it is mainly content-oriented. In this regard, the course syllabus of Interior Design V also matched the course description in the interior design program information. Even though the class is pre-planned, it aims to promote high-quality experiences where students need to understand the objectives to be achieved in order to make choices when creating design solutions. Stephan evaluates his students based on two projects: a recreation design project and a community design project. The first project is worth 65% of the final grade and the second project is worth 35%. The remaining 10% is assigned to professionalism.

Malcolm. Malcolm submitted course syllabi and examples of assignments and tests for two courses, CAD I and CAD II. Both courses were consistent with my curricular conception analysis of the course descriptions found in the interior design program information; Malcolm organized the content of the two courses based on the approach of academic rationalism. CAD I and CAD II are content-oriented as these courses include specific learning activities utilizing AutoCAD software. In CAD I, students are evaluated based on in-class assignments, two projects, and one test that together comprise 90% of their final grade. The course work always requires students to draw and use their computer skills. The remaining 10% is assigned to professionalism, aptitude, and communication. In CAD II, students are evaluated based on four assignments and one test that together are worth 90% of their final grade. Again, the remaining 10% is assigned to professionalism, aptitude, and communication. This course also requires students to draw and use their computer skills.
Kevin. Kevin, like Malcolm, also teaches CAD II. He provided me with electronic copies of the syllabus, tests, assignments, projects, course notes, examples of student work, and sample grading sheet of the course. Unlike Malcolm, Kevin’s required learning activities were general in nature whereas Malcolm’s learning activities were more descriptive and detailed. In addition, Kevin evaluates CAD II differently than Malcolm even though the objectives of the course are the same. Students are evaluated based on in-class assignments, two projects, and one test that together are worth 90% of their final grade. All course work requires students to draw utilizing AutoCAD software. The remaining 10% is assigned to professionalism, aptitude, and communication. Kevin’s course syllabus for CAD II was also based on the approach of academic rationalism and aligned with my curricular conception analysis of the course description in the interior design program information.

College B.

Carol and Martin did not provide course documents for courses they had previously taught or were currently teaching. Only Karl provided me with documents that included his course syllabus and course notes.

Karl. Karl submitted his course syllabus and course notes for the course titled, Technical Communication III. Analysis of these documents portrays a course organized according to the curricular conception of academic rationalism. Again, the instructor’s course materials matched my analysis of curricular conceptions of course descriptions in the program information. Karl follows a weekly schedule where he teaches the basics of CAD programs utilizing AutoCAD software. The weekly schedule illustrates topics to be covered and due dates for assignments. The course is planned according to specific learning outcomes. Students must complete four
projects to demonstrate their drawing capabilities in order to pass the course. Together these assignments are worth 100% of their final grade.

**Research Question 2: What are instructors’ perceptions for the need to incorporate CAD in interior design programs?**

All six instructors from College A and College B thought that it is important to incorporate CAD in interior design programs. CAD is now the standard tool used in the design industry. It facilitates the work of interior designers and interior design graduates are expected to be highly skilled in CAD (Lyon et al., 2009). Malcolm and Kevin (College A) indicated that CAD must be taught in interior design programs to ensure students’ employability. In the industry, drawing documents are now completed on CAD to facilitate project coordination with other professionals. In their interviews, the instructors of College A and College B also confirmed finding in the literature, that CAD saves time, can provide alternative design solutions, and can document the phases of the design progress independently (McLaren, 2008; Yazıcıoğlu, 2011). In addition, Martin (College B) confirmed findings from Ding’s (2008) study by stating that CAD can facilitate idea communication and visual presentation by using generated 3D design models to visualize three-dimensional spaces. Martin also mentioned that CAD could generate structures that are beyond an interior designer’s ability (Ding, 2008). Carol (College B), on the other hand, corroborated findings from Wilson and Parrott’s (2011) study that indicated that hand sketches are more appealing to clients and can enhance idea communication.

According to instructors of College A and College B, interior design students can misuse CAD; they think that CAD can design for them. This misconception on the part of the students
indicates that they do not understand that the use and application of CAD is dependent on the designer’s need to complete a particular design project and that CAD cannot perform everything that a human mind can conceive. CAD can be limiting and a barrier to creativity because software programs could not emulate entirely a creative human mind (Çil & Pakdil, 2007). However, with experience and expert knowledge, this complex program is used by practicing experts as a creative tool, not only a technical tool (Meneely, 2007).

**Research Question 3: What are instructors’ perceptions about the placement of learning CAD in the program? For example, what year and what semester should the learning of CAD begin?**

The actual placement of CAD courses in the interior design program differs at College A and College B. College A introduces CAD courses in the second semester of the program whereas College B introduces CAD in the third semester of the program. This difference in CAD placement may be associated to different program lengths at Colleges A and B. Table 12 below compares the placement of CAD courses in College A and College B’s programs.

**Table 12**

*Comparison of the Placement of CAD Courses in College A and College B’s Programs*

<table>
<thead>
<tr>
<th>Program length</th>
<th>College A</th>
<th>College B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program length</td>
<td>3-year Diploma program (6 semesters)</td>
<td>4-year Bachelor program (8 semesters)</td>
</tr>
<tr>
<td>CAD placement in the curriculum</td>
<td>CAD offered in 1st year-2nd semester 2nd semester 6 semesters</td>
<td>CAD offered in 2nd year- 1st semester 3rd semester 8 semesters</td>
</tr>
</tbody>
</table>
Finding from Watson et al.’s (2003) study indicated that CAD courses should be placed near the beginning of college level interior design programs. Based on my comparison of CAD placement in the interior design programs at College A and College B, both colleges place CAD near the beginning of their programs and, taking into consideration the different length in the two programs, one could say that the CAD courses are similarly placed in the two programs.

Learning how to design using hand sketching and manual drafting tools is different from learning how to design with CAD. Interior design students need an extended amount time to learn both means of design. They need time to learn how to hand sketch and hand draft but they also need time to learn how to use CAD. In addition, interior design instructors should be teaching both means of design representation in tandem in an interior design program so students develop a habit of interchanging between hand sketching and CAD during the ideation phase of the design process. As Kevin (College A) mentioned in his interview, for CAD to be applied in design work, CAD has to become part of the designer’s thinking.

With regard to the placement of CAD in the curriculum, instructors’ opinions varied in both College A and College B. For example, two CAD instructors at College A, Malcolm and Kevin, indicated that the current placement of CAD in the program, in semester two, is appropriate. They mentioned that students need to learn CAD early in the program so they can integrate it into their work; a skill required by the industry. These finding confirmed findings from McLaren’s (2008) study, that interior design programs must focus on the teaching of CAD early on in programs for students to graduate with significant CAD skills as required by the industry. Stephan (College A), however, thought CAD was taught too early in the program and should be introduced a semester later. This difference in perceptions is possibly because Stephan mostly taught design studio courses where hand sketching skills are considered essential for
Stephan thought students should first develop their hand sketching skills before starting to learn CAD. On the other hand, instructors of College B—Karl, Carol, and Martin—all agreed that CAD should be introduced to students in the second year of the program, more specifically in the third semester. They believed students should excel first at hand sketching to foster ideation in design and to ensure that CAD did not interfere with the creative process required for ideation.

In addition to differences in the placement of CAD in the two interior design programs, there were also differences in the software used in the CAD courses at Colleges A and B; three software programs are taught at College A and four at College B. College A teaches students AutoCAD, 3ds Max, and Photoshop, whereas in College B, students learn AutoCAD, 3ds Max, SketchUp, and Photoshop. This difference in software programs may be due to the fact College A is a three-year diploma program and College B is a four-year bachelor degree program. As a result, College A has less time devoted to computer instruction than College B. Within a limited period of three years, College A had to arrange a well-balanced interior design curriculum combining design courses and computer software courses. According to Stinson (1998), devoting more time to computer instruction means less time to teach other essential subjects that a designer needs to know, such as building codes and environmental awareness. Information deemed from the individual interviews leads me to conclude that College A decided to exclude SketchUp from the interior design curriculum because it is easier to learn software than 3ds Max, and students could potentially be able to learn it on their own once they become skilled at the basic commands of CAD programs.
Research Question 4: How do interior design instructors, who use CAD, conceptualize the design process?

The participating interior design instructors at College A and College B come from different design fields. The analysis of interview data revealed that this was significant with regard to how each instructor conceptualized the design process. Karl and Martin (College B) mentioned that it is difficult to define the design process as it can vary from project to project, and from one related design field to another, whether it was for a real-life project or an educational project. This finding confirmed Hill and Anning’s (2001b) study, Mawson’s (2007) study, and McGlashan’s (2011) study that affirmed the specificity of every design project.

The literature on interior design education presented various point of views and attitudes towards the use of CAD. There is an ongoing oscillation between whether to use CAD, hand-drawing skills, or both in the design process (Şenyapili & Basa, 2006). Design educators seem to be reluctant to embrace CAD in their teaching of the design process as they claim it blocks the flow of ideas in the design process (Çil & Pakdil, 2007). Data from instructor interviews at College A and College B confirmed that hand sketching skills are essential in designing, particularly in the first phases of the design process where ideation occurs. Kevin (College A) and Karl (College B) explained that while hand sketching is important, good hand sketching skills are not essential for interior designers because it is acceptable to hand sketch inaccurate hand drawings to generate initial ideas. While instructor interviews documented that interior designers must first hand sketch good design solutions and then use other tools, such as AutoCAD and 3D modeling software, to validate the design, Johnson (2005) pointed out that there is no empirical evidence that justifies seeing CAD as an inappropriate tool for conceptualization. CAD could aid the design process; however, it depends on a designer’s skills
and abilities in using the software. Kevin (College A), Karl (College B), and Martin (College B) said that it is up to interior designers to select tools that enhance their capabilities to design. If an interior designer has strong hand sketching skills, then he or she would use those skills in the design process. If a designer has better CAD skills than hand sketching skills, then he or she would use CAD. With regard to creativity, Şenyapili’s (2004) study found that CAD was not a barrier to a designer’s creativity if the designer is proficient in using the software; instructor interviews confirmed this finding. No matter what tools are used in the design process, creative students will always generate creative designs whether they use hand sketching skills or CAD skills (Brandon & McLain-Kark, 2001).

Research Question 5: How do interior design instructors, who teach CAD, teach the design process?

Two interior design instructors at College A, Malcolm and Kevin, said that they apply the same design process used in their professional practice to teach the design process to their students. They taught the design process to their students by presenting the phases of the design process they used in their professional practice. Hill and Anning (2001b) stated that the instruction of the design process in elementary and secondary school in Ontario, Canada and in England has been generic; it is not contextualized to a specific design domain and that this is in contrast to how different design professions design. This confirms Mawson’s (2007) study that found the concept of a generic design process to be inappropriate because professional designers do not follow the same design process pattern. Therefore, it is evident that transferring knowledge from practical work setting to educational settings would not be consistent from one
interior design instructor to another due to variations in their academic and professional experience.

Hill and Anning (2001b) affirmed that design professionals from different professional fields do not have a common design process or use common design tools. Each profession applies the design process and design tools in unique ways, and this can even vary according to any given design project within a design field. In this thesis, interior design instructors of College A and College B came from different architectural and interior design domains (See Tables 9 and 10 in Chapter 4), which explains the variation of CAD use in their teaching practices. This is an important finding for colleges to consider when hiring instructors. The fact that an individual has CAD skills is not enough to teach CAD to interior design students. Findings in this thesis would suggest that to achieve a consistent and cohesive program, an educational institution could consider applicants’ work experiences in the hiring process because instructors’ CAD teaching practices are influenced by their professional experiences. Institutions that offer interior design programs may want to consider applicants’ professional experience and the way they used CAD to verify if there is a match between an applicant’s background and their program’s goals, objectives, and implementation plans for CAD.

In addition, when instructors come from different design backgrounds, CAD teaching can vary from one instructor to another. In the two Canadian college programs that I examined in this study, alternate instructors taught design courses from one semester to another; therefore, there was less consistency in CAD course teaching. If this variation in teaching design is desirable, hiring practices still need to plan for the variance.
Contributions to the Literature

The contributions to the literature identified in this section are based on the perceptions of six interior design instructors currently teaching interior design at two different Canadian colleges. This thesis contributed to the literature on post-secondary interior design education in five ways.

- The first finding pointed out by the majority of participants in this study is that CAD courses should be taught early on in interior design programs. However, there were varied views about how it should be taught in relation to hand sketching and hand drafting. For example should hand and computer skills be learned in tandem, interactively, parallel to each other, or coincidentally.

- The second and related finding is how students perceive movement in interior space when using CAD to generate initial ideas and how this perception influences their thinking about space in the initial stages of design.

- A third finding is that instructors’ interior design backgrounds and professional experiences influence how they teach design. Therefore, when instructors are hired from different design fields to teach CAD courses in interior design programs, they bring with them different professional experiences, which influence how they teach the design process and use CAD in designing. This suggests that the hiring process should take into account specific instructor experience to ensure a match to program goals.

- The fourth significant finding expands upon finding three by delineating the design process as unique by client. Designing is conversing and responding to clients’ needs. Yet, those needs differ from one client to another and from one
project to another. This finding further emphasizes that it is difficult to define a
generic design process.

- Fifth, Hill and Anning’s (2001b) study supports my research and the above
contribution three and four. However, my study is unique in that no other
research has examined the professional designerly thinking and practice of
interior designers and the teaching practice of interior designers who teach CAD
within interior design programs.

**Future Research**

This study sought to understand the nature of the interior design programs and the use of
CAD at two different colleges in two different Canadian provinces. Potential research could be a
replication of this study in all post-secondary programs in Canada, with the inclusion of
classroom observations. It would also be valuable to conduct the study in other countries to see if
there are cultural differences with regard to the nature of the interior design programs and the use
of CAD.

It would also be interesting to examine further interior design students’ work at the
ideation stage when designing by hand versus designing on computer and how CAD programs
affect students’ understanding of space. In this study, data revealed that when students used CAD
for initial design ideas, they thought of space as rectangular units or blocks instead of functional
spaces where movement occurs. It would also be important to study how designing spaces on
CAD programs can get too real too fast, which can, as this study found, sometimes allow interior
design students to elude exploring further design solutions.

Other potential research could be to study the impact that the constraints of industry
requirements, with regard to proficiency in CAD, have on the creative abilities of interior design
graduates. Often, new interior design graduates’ first job is to draft drawings on AutoCAD software, and as such, proficiency in CAD is required for entry-level employment. I suggest that this industry requirement may, on the long term, create an interior design field that has less creative designers. This long-term effect of required CAD proficiency on the creative abilities of interior designers needs further research.

Further, five of the six instructor participants in my study were male. There was only one female instructor, Carol. Carol admitted that she only learned CAD because the industry was imposing it on its practicing professionals. Prior to her learning CAD, she hired her past students to draft construction documents on AutoCAD. Pektaş and Erkip’s (2006) study indicated that there is a significant gender difference in attitudes towards computers; males’ attitudes towards computer use are more positive than females. While this study did not focus on gender in the use of CAD, I suggest that future research considers how gender can influence instructors’ perceptions of pedagogy used to teach CAD in interior design programs.
References


Blossom, N., & Thompson, J. A. (2005). New knowledge or artefact? *Published proceedings of the 4DED Doctoral Education in Design Conference*, Phoenix, AZ.


Appendix-A

Sample Interview Guideline

Research Question 1
1. What is the nature of the curriculum in college level interior design programs?
   i. None (Document analysis: Interior design program course description)

Research Question 2
2. What are instructors’ perceptions for the need to incorporate CAD in interior design programs?
   i. How important is CAD in interior design programs?
   ii. In general, what do you think CAD provides for interior designers? Advantages? Disadvantages?
   iii. So how do you see these contributions of CAD and advantages and disadvantages of these computer programs fitting into interior design programs?
   iv. At your college, what type of CAD software is offered in the interior design program? What version?
   v. Do they teach an imposed curriculum? Or do you plan the syllabus as you like? How does the curriculum happen in the college?
   vi. How did you develop your CAD skills? And how do you intend to acquire new CAD skills?

Research Question 3
3. What are the instructors’ perceptions about the placement of learning CAD in the program? For example, what year and what semester should the learning of CAD begin?
   Over the past few weeks, I have examined different interior design curriculums offered across several college-level institutions; and I have noticed that they organize their curriculum differently and CAD may not be taught at the same time, so...
   vii. When do you think CAD should be taught in interior design curriculum? Could you please explain your reasons for the placement of CAD in X semester, placement in XX semester, and placement in XXX semester.
   viii. How many CAD courses are offered in your program?
   ix. Do you think that offering [number of courses] CAD courses in the interior design program is sufficient for students to master the software? Please explain. What would you change and why?

Research Question 4
4. How do interior design instructors, who use CAD, conceptualize the design process and use CAD in this process?
   i. I will begin by asking you, as an interior design instructor, what is the design process to you?
1. If I asked you to summarize the design process phases, what would they be?
2. Do you see the design process as a practicing interior designer and an instructor in an interior design program, as one and the same? That is, do you use the same design process in both your professional and teaching careers?

i. Then, how do you undertake a design project in your teaching?
1. Do you use an established design process prototype?

ii. In the design process you just described for instruction, where would you use CAD? And how?

iii. What do you think are the advantages and disadvantages that CAD provides when utilized in the design process?

iv. Now that you mentioned the advantages and disadvantages of using CAD in the design process, would you say that CAD could aid the design process? Please explain.

v. Do you think CAD can be a barrier to creativity or can it actually foster it?

vi. In the field of interior design, traditionally, sketching and designing by hand have always been essential skills that every designer needs to develop;

1. Do you believe that hand skills are still essential today for an interior designer as he or she practices design?
2. Thinking now of CAD software and its use by interior designers in design, how important is it to master computer-based designing skills? And why?
3. CAD software has ongoing improvements and upgrades, how do you keep up-to-date with the changing CAD programs?

Research Question 5
5. How do interior design instructors, who teach CAD, teach the design process?

i. How do you teach your students the design process you explained earlier?

ii. Do you use CAD while teaching the design process?
1. If yes, how do you incorporate CAD in the process? Is CAD integrated at a specific design phase? What type of CAD software do you use to teach the design process?
2. If no, why you do not use CAD in the design process?

iii. For students to be able to incorporate CAD in the design process, what level of CAD skills do they need to possess?

iv. What other design tools do you believe would help you teach the design process?

v. The design industry today requires interior design graduates to possess excellent CAD skills, how do you feel about that?
1. Do you think design instructors teach students to use CAD as a design tool rather than just a drafting tool? Please explain.
Appendix-B

July 27, 2012

Miss Nadya Al-Mousa, Master’s Student
Faculty of Education
Duncan McArthur Hall
Queen’s University
511 Union Street
Kingston, ON K7M 5R7

**GREB Ref #: GEDUC-628-12; Romeo # 6007179**

Title: "GEDUC-628-12 An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors"

Dear Miss Al-Mousa:

The General Research Ethics Board (GREB), by means of a delegated board review, has cleared your proposal entitled "GEDUC-628-12 An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors" for ethical compliance with the Tri-Council Guidelines (TCPS) and Queen’s ethics policies. In accordance with the Tri-Council Guidelines (article D.1.6) and Senate Terms of Reference (article G), your project has been cleared for one year. At the end of each year, the GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB, of any adverse event(s) that occur during this one year period (access this form at [https://eservices.queensu.ca/romeo_researcher/](https://eservices.queensu.ca/romeo_researcher/) and click Events - GREB Adverse Event Report). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes to the level of risk, applicant characteristics, and implementation of new procedures. To make an amendment, access the application at [https://eservices.queensu.ca/romeo_researcher/](https://eservices.queensu.ca/romeo_researcher/) and click Events - GREB Amendment to Approved Study Form. These changes will automatically be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or irvingg@queensu.ca for further review and clearance by the GREB or GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, Ph.D.
Professor and Chair
General Research Ethics Board

cc: Dr. Ann Marie Hill, Faculty Supervisor
Dr. Don Klinger, Chair, Unit REB
Erin Wicklam, c/o Graduate Studies and Bureau of Research
Certificate of Completion

This document certifies that

Nadya Al-Mousa

has completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE)

Date of Issue: 26 April, 2012
Appendix-D

Letter of Information

“An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors”

Principal Investigator: Name: Nadya Al-Mousa
Faculty of Education
Queen’s University
Kingston, Ontario, Canada
(613) 530-7873
E-mail: 0mna2@queensu.ca

Co-Investigator(s): Faculty Supervisor: Dr. Ann Marie Hill
(613) 533- 6000 x 77432
Email: annmarie.hill@queensu.ca

This research is being conducted by Nadya Al-Mousa under the supervision of Dr. Ann Marie Hill in the Faculty of Education at Queen’s University in Kingston, Ontario.

What is this study about?
The purpose of this research is to better understand how (a) interior design programs integrate CAD into the curriculum and how (b) interior design instructors adopt and integrate Computer-aided design (CAD) into their teaching practices.

What does participation entail?
To get at these goals, you will be asked to participate in a semi-structured individual interview. The interview will be audio recorded using a digital device. It will require one visit of approximately 60 to 90 minutes in length. The interview can be held in the instructor’s office or in any available classroom in the college. There will be a follow-up interview, only if needed, for clarification purposes only. If a follow-up interview is necessary, it will consist of one session of 30 to 60 minutes in length. They can be either telephone or personal interviews depending on the instructor’s preference.

You are receiving this Letter of Information because you:
• Are currently teaching in the selected college-level interior design program;
• Have worked as a practitioner in the design field;
• Have used CAD, whether teaching it or not at the moment.

You will be asked to complete the attached questionnaire about your academic background and professional experience. There is the possibility that not all instructors who agreed to participate will be interviewed.
There are no known physical, psychological, or social risks associated with this study. However, due to the small number of participating candidates, it might be possible for readers of an eventual paper to deduce your identity. In this case, there is a risk that the coordinator of the program or your supervisor might perceive your comments negatively. To minimize this risk, any comments you make will be published only in anonymous form. *This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.*

**Is my participation voluntary?**
Yes. Your participation in this study is voluntary and you are free to withdraw at any time without negative consequences, even after signing the consent form or part-way through the study. The coordinator of the program, or your supervisor, is not involved in the consent process and he or she is not informed of who will take part in the study. You may request removal of all or part of data. You should not feel obliged to answer any question that you find objectionable or which makes you uncomfortable.

**What will happen to my responses?**
Your responses will stay confidential to the extent possible. Only the faculty supervisor, Dr Ann Marie Hill, and I will have access to this information. The data may also be published in professional journals or presented at conferences, but any such presentations will be of general findings, in which any direct quotes will be presented in anonymous form. Since there are a small number of colleges that offer interior design programs in the region, others may be able to identify you on the basis of references you make. Please keep this in mind in deciding what to tell me during the interviews. However, identities will be kept confidential to the best of the researcher’s ability. Should you be interested, you are entitled to a copy of the findings. In accordance with the Faculty of Education’s policy, data will be retained for a minimum of five years and then will be destroyed. Your signature below indicates that you understand these provisions around confidentiality.

**What if I have concerns?**
Any questions about study participation may be directed to Nadya Al-Mousa 0mna2@queensu.ca or thesis supervisor Dr. Ann Marie Hill at (613) 533-6000 x 77432 and annmarie.hill@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or at (613) 533-6081.

Please complete the attached questionnaire and return it to Nadya Al-Mousa with the consent form.
Background and Training Questionnaire

1. Complete your preferred contact information:
   a. Telephone:____________________________________________________
   b. Email:________________________________________________________

2. Academic and Work Experience:
   ▪ What are your academic qualifications?
     ________________________________________________________________
     ________________________________________________________________
   ▪ How many year(s) have you been working as a professional in the design field? Please specify the design field.
     ________________________________________________________________
   ▪ How many year(s) have you been teaching in the field of interior design education?
     ________________________________________________________________

3. Computer Technology Experience:
   ▪ Have you used any Computer-aided design (CAD) programs during your professional career? If yes, how many year(s) have you been using CAD?
     ________________________________________________________________
   ▪ Have you used any Computer-aided design (CAD) programs during your teaching career in the interior design program? If yes, how many year(s) have you been using CAD?
     ________________________________________________________________
   ▪ Are you certified in any CAD software? If yes, which one(s)?
     ________________________________________________________________

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Consent Form

“An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors”

1. I have read and retained a copy of the Letter of Information and Consent Form and had any questions answered to my satisfaction.

2. I understand that I will be participating in the study called “An Examination of CAD use in Interior Design Programs from the Perspective of Curriculum and Instructors” that aims at examining how (a) interior design programs integrate CAD into the curriculum and how (b) interior design instructors adopt and integrate Computer-aided design (CAD) into their teaching practices. I understand that I will be asked to answer questions in an individual interview of 60 to 90 minutes in length, but there will be a follow-up interview, if needed, for clarification purposes only. The interview will be audio recorded using a digital device.

3. I understand that my participation in this study is voluntary and I may withdraw at any time and request removal of all or part of my data. I understand that every effort will be made to maintain the confidentiality of the data now and in the future. Only the principal investigator, Nadya Al-Mousa, and the faculty supervisor, Dr Ann Marie Hill will have access to the data. The data may also be published in professional journals or presented at conferences, any such presentations will be of general findings, in which any direct quotes will be presented in anonymous form; I understand that the name of my institution and my name will be replaced by pseudonyms. I understand that there is the possibility that my identity may be deduced from my responses to the interview questions. Should I be interested, I am entitled to a copy of the findings.

4. I understand that there are no known physical, psychological, or social risks associated with this study. However, due to the small number of participating candidates, it might be possible for readers of an eventual paper to deduce your identity. In this case, there is a risk that the coordinator of the program or your supervisor might perceive your comments negatively. To minimize this risk, any comments you make will be published only in anonymous form.

5. I am aware that if I have any questions, concerns, or complaints, I may contact the researcher, Nadya Al-Mousa at Omna2@queensu.ca or thesis supervisor, Dr. Ann Marie Hill at (613) 533-6000 x 77432 and annmarie.hill@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or at (613) 533-6081.

I have read the above statements and freely consent to participate in this research:

Please sign one copy of this Consent Form and return to Nadya Al-Mousa in the return stamped envelope. Retain the second copy for your records.
Name (please print clearly): ______________________________________________

Signature: ___________________________ Date: ______________________

Please include your email or postal address if you request a copy of the results of the study:

Email: ________________________________________________________________

Postal Address: _______________________________________________________

_____________________________________________

_____________________________________________

_____________________________________________

_____________________________________________
Appendix-E

Recruitment Letter

“An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors”

Principal Investigator: Name: Nadya Al-Mousa
Faculty of Education
Queen’s University
Kingston, Ontario, Canada
(613) 530-7873
E-mail: 0mna2@queensu.ca

Co-Investigator(s): Faculty Supervisor: Dr. Ann Marie Hill
(613) 533- 6000 x 77432
Email: annmarie.hill@queensu.ca

Dear [name of instructor],

I, Nadya Al-Mousa, am currently completing a master thesis study under the supervision of Dr. Ann Marie Hill, in the Faculty of Education at Queen’s University in Kingston, Ontario. My study is entitled, An Examination of CAD Use in Interior Design Programs from the Perspective of Curriculum and Instructors. For my study, I am seeking a minimum of three interior design instructors that:

- Must be currently teaching in a college-level interior design program;
- Must have worked as a practitioner in the design field;
- Have used CAD, whether teaching it or not at the moment.

The purpose of this research is to better understand how (a) Interior design programs integrate CAD into the curriculum and how (b) Interior design instructors adopt and integrate CAD into their teaching practices. To get at these goals, instructors will be asked to participate in an individual interview. The interview will be audio recorded using a digital device and will require one visit of approximately 60 to 90 minutes in length. In addition, there will be a follow-up interview if needed, for clarification purposes only.

If you are interested to take part of this study, please contact the principal investigator, Nadya Al-Mousa, by telephone at (613) 530-7873 or by e-mail at 0mna2@queensu.ca.

Your cooperation is highly appreciated. Thank you.

Best regards,

Nadya Al-Mousa
Appendix-F

Data Coding

Example of Data Coding from Stephan’s Interview Transcript

Example of Data Coding from Martin’s Interview Transcript
Appendix-G

*Three-code notation of direct quotations*

<table>
<thead>
<tr>
<th>Code Notation</th>
<th>College A</th>
<th>College B</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Stephan</td>
<td>Malcolm</td>
</tr>
<tr>
<td>STE</td>
<td>MAL</td>
<td>KEV</td>
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### College A Interior Design Program Course List

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Number/ Course Name</th>
<th>Course Description</th>
<th>Associated Curriculum Conception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>1. Drawing from Observation</td>
<td>The objective of this course is to introduce students to visual language and the act of drawing. The course will increase the students’ capacity to perceive and record accurately from the external world. The students will develop technical competency in rendering the visible world based on observation, and using drawing media, with an understanding of the properties and techniques for the different drawing media.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>2. Visual Language 2D</td>
<td>The students will develop visual literacy using the elements and principles of 2-D design through thumbnail drawings, the handling of 2-D design tools and materials, form and space, tonality and texture, and the presentation of projects.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>3. Visual Language 3D</td>
<td>The students will develop visual literacy using the elements and principles of 3-D design through thumbnail drawings, the handling of 3-D design tools and materials, the presentation of projects, and elements of 3-D design including line, plane, positive/negative form, light and shadow, geometric and amorphic shapes, and additive and subtractive form.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>4. History of Art and Aesthetics I</td>
<td>Students will be introduced to the ?why? or purpose of art and architecture throughout the history of Western civilization and shown how art production evolved in relation to the socio-economic, political, religious, and philosophical trends of the time. They will learn to distinguish between the art of different periods and styles, from pre-history to the Renaissance, to identify different media, techniques and methodologies, and to explain and define art in historical terms.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>5. Materials I</td>
<td>This course teaches students about various materials and finishes commonly used in the interior environment. Students learn the properties, construction techniques, availability and aesthetic application of each of these materials in residential and commercial installation.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td></td>
<td>6. Interior Design I</td>
<td>The objective of this course is to identify for the students the creative process steps, and to enhance their creative abilities and favourable attitudes towards creative and critical thinking. Students will learn to solve design problems through observation of existing designs, conceptualization, 3-D thinking and planning. They will apply the design elements and functional requirements to interior spaces.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>Semester 2</td>
<td>7. Technical Drawing</td>
<td>The goal of this course is for the students to understand the basic architectural drawing techniques leading to the completion of plans, sections and elevations.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>8. History of Art and Aesthetics II</td>
<td>This course continues the study of the purpose of art throughout the history of Western civilization showing how art and architecture evolved in relation to the socio-economic, political, religious, and philosophical trends of the time. Students will learn to distinguish between the art of different periods and styles, from the 16th century to the current era, to identify different media, techniques and methodologies, and to explain and define art historical terms.</td>
<td>Academic rationalism</td>
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</tr>
<tr>
<td>9. Materials II</td>
<td>This course introduces materials and finishes commonly used in the residential interior environment. The students will learn to research products and materials; compare products from various manufacturers; specify textiles, upholstery, drapery etc. for existing plans of residential and small commercial spaces; and study materials (plastic, metal, textiles, glass, etc.) not covered in Materials I.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>10. Interior Design II</td>
<td>The objective of this course is to reinforce methods of graphic communication; to solve residential design problems through conceptualization, 3-D thinking and planning; and to teach the design elements and the functional requirements of spaces.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>11. Presentation Techniques I</td>
<td>This course teaches the students to draw pictorial views of objects using orthographic drawing. Students learn how to accurately draw axonometrics, one-point and two-point perspectives using plans and elevations.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>12. CAD I</td>
<td>The objective of this course is to introduce the student to computer assisted drawing. Students will learn to use AutoCAD software to create and edit 2-D drawings. This course will be complementary to Construction Documents I.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>13. Colour and Lighting I</td>
<td>The aim of this course is to introduce students to the basic principles of light and colour systems and its application to the interior environment. Students will study the properties and qualities of colour in combination with lighting concepts for specific residential or other small interior spaces.</td>
<td>Academic rationalism</td>
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</tr>
<tr>
<td>Semester 3</td>
<td>14. Interior Design III</td>
<td>This course introduces the graphic thinking process of solving small commercial design problems using a contemporary design approach which will enhance a sense of aesthetic in the selection of design elements.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>15. Construction Documents I</td>
<td>This course will provide students with knowledge about interior construction documents. Using architectural drafting standards, students will prepare working drawings of floor plans, elevations, wall and floor sections and other interior elements. Technical hand drafting and AutoCAD will be used as tools.</td>
<td>Academic rationalism</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
<td>Academic Major</td>
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<tr>
<td>16.</td>
<td>Presentation Techniques II</td>
<td>The objective of this course is to instruct students in the methods of graphic black &amp; white and colour presentation, including perspective drawing and rendering as a means of visual communication. Photography and digital software will be introduced as tools useful for future designers.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>17.</td>
<td>CAD II</td>
<td>This course teaches the computer assisted design aspects of complex 2-D construction drawings, using AutoCAD. Other software will be introduced to produce spreadsheets and schedules used in construction documentation.</td>
<td>Academic rationalism</td>
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<tr>
<td>18.</td>
<td>Colour and Lighting II</td>
<td>This course teaches students to understand more complex principles of lighting and colour, to identify different light sources (natural and artificial), differentiate between different lighting systems (advantages and disadvantages), and to understand the effects of colour, lighting and materials in a commercial project.</td>
<td>Academic rationalism</td>
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<tr>
<td>19.</td>
<td>Design Theory: 19th Century to Present</td>
<td>This course studies the history of interior architecture and design ideas from the 19th century until the present, using examples of design philosophies. Social and political values are linked to design theory so that students can understand the context of the creative processes that influence interior design.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>20. Interior Design IV</td>
<td>This course teaches students to solve design problems related to office environments. Students learn how to analyze the functional requirements of programs and prepare design solutions that reflect the users’ physical and psychological needs. Aesthetic development of interior spaces including materials, colour, furniture, lighting and acoustics will be explored.</td>
<td>Academic rationalism</td>
<td>Self-actualization, Social reconstruction - relevance</td>
</tr>
<tr>
<td>21.</td>
<td>Construction Documents II</td>
<td>The aim of this course is to familiarize students with typical interior detailing for small construction projects. The content will cover: detailing and standards of doors and windows, construction methods of straight and spiral stairs, custom cabinetry in kitchens or bathrooms, lighting plans, cross-referencing of details, specification of finishes and equipment, and electrical legends.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>22.</td>
<td>Presentation Techniques III</td>
<td>In this course, students will use 3D computer software to apply drawing and colour rendering techniques to the development and presentation of design projects. Emphasis will be on rendering materials and finishes in the marketplace.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>23.</td>
<td>Building Systems, Environmental Design</td>
<td>This course familiarizes students with fundamental theories of environmental systems and how they affect interior design. Using the office building as a case study, innovative building systems and sustainable interior environments will be explored.</td>
<td>Academic rationalism</td>
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<tr>
<td>24. Semester 5</td>
<td>3D Studies</td>
<td>The objective of this course is to introduce a method of visual analysis of architectural spaces, which in turn will be used to develop relief and 3-D design. Various techniques of construction and materials will be explored.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>25.</td>
<td>Furniture Design and</td>
<td>This course promotes an understanding of how to solve furniture construction problems and emphasizes designing and detailing for contemporary materials.</td>
<td>Academic rationalism</td>
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<tr>
<td>Semester 6</td>
<td>26. Interior Design V</td>
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<td></td>
<td>This course teaches students to solve design problems related to hospitality and recreational environments. Students learn how to analyze the complex contemporary programs, prepare design solutions and 3-D development of interior spaces including complex planning of vertical and horizontal interconnecting spaces.</td>
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<td>Academic rationalism</td>
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<td>Self-actualization</td>
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<td>relevance</td>
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<thead>
<tr>
<th>27. Construction Documents III</th>
<th>Students learn to coordinate complex construction drawings and details in an office project. Schedules, budgets and specifications will be applied to design projects.</th>
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<td>Academic rationalism</td>
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<tr>
<th>28. Human Factors: Code, Accessibility, Ergonomics</th>
<th>This course applies building codes and public safety to design projects. Accessibility, adaptable design and ergonomic principles will be introduced.</th>
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<td>Academic rationalism</td>
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<td>Social reconstruction</td>
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<td>relevance</td>
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<tr>
<th>29. Interior Design VI</th>
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<tbody>
<tr>
<td>Using individual interior design projects, this course guides students through the design process of elaborate and complex spaces by synthesizing the acquired knowledge from all previous semesters.</td>
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<td>Academic rationalism</td>
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<td>Self-actualization</td>
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<td>Social reconstruction</td>
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<td>relevance</td>
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<tr>
<th>30. Construction Documents IV</th>
<th>This course teaches students the total scope of detailing as an important and integral aspect of interior design. Students learn to research and source materials and to create details in accordance with graphic standards, regulations and safety codes, and the particular constraints of their final design project.</th>
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<td>Academic rationalism</td>
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<tr>
<th>31. Professional Practice: Theory</th>
<th>This course gives students a general background in professional practice. It familiarizes students with the profession and governing bodies, explores the nature of the interior design business, and develops an understanding of business practice, ethics and contract documents.</th>
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<td>Academic rationalism</td>
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<tr>
<th>32. Professional Practice: Experience</th>
<th>This course gives students a specific introduction to professional practice within the office environment. Marketing tools will be introduced. Students will participate in a practicum by observing a design office.</th>
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<td>Academic rationalism</td>
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<td>Self-actualization</td>
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## Appendix-I

### College B Interior Design Program Course List

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Number/ Course Name</th>
<th>Course Description</th>
<th>Associated Curriculum Conception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>1. Technical Communication I</td>
<td>In this introductory course, students learn the basic principles of architectural drafting emphasizing layout, the quality of drafting, drafting expression and the communication value of this type of drawing to the designer. Students explore the intersection of drafting and freehand line.</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>2. Design Drawing I</td>
<td>This course is the first of a series of courses which teaches students, through the study of freehand drawing, to communicate their ideas, concepts, thought processes, and design solutions in the many visual methodologies used by designers of the built environment. Emphasis is placed upon the development of the student’s perception and the ability to think visually in both two and three dimensions. Students explore methods of communication in their own, as well as other cultures.</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>3. Foundations of Design I</td>
<td>This course introduces the student to the theories of 2D design and the design principles and elements used across all design disciplines. Two and three-dimensional examples with a unique focus on form, space and human perception, are studied in a broad context to allow the student to investigate and understand how these 'tools’ make up the world of design around us.</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>4. Design Studio I</td>
<td>This course is an introduction to the two-dimensional and three-dimensional design world. Students study the abstract fundamentals of space, form and structure, as well as the principles and elements of composition, where they are encouraged to focus on the design process, as much as the design product. Students are introduced to the basic design vocabulary.</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>5. Communications and Academic Writing</td>
<td>Effective communication is an integral component of success in the workplace and in lifelong learning. In this course, students review communication theory and its connection to expository writing. Frequent writing exercises encourage the development of content that is coherent, well organized and correct. Students consider and use strategies to generate ideas, to collect and organize information, to acknowledge sources, to identify and develop a thesis and to adapt format, style and tone for different purposes and audiences.</td>
<td>Academic rationalism</td>
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<tr>
<td></td>
<td>6. History of Art I</td>
<td>This course is a broad-based survey of the history of art, design and architecture as it is reflected in the prehistoric ancient Egyptian and Mesopotamian cultures through to the Renaissance and Reformation styles.</td>
<td>Academic rationalism</td>
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<td></td>
<td>7. Technical Communication I</td>
<td>Students build upon basic drafting skills previously</td>
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<td>2</td>
<td><strong>Communication II</strong></td>
<td>Studied to learn to communicate visually via accepted interior design/architectural drafted drawings such as floor plans, sections and paraline drawings. Presentation drawing production, pictorial illustration of architectural elements and measured survey drawings are all included.</td>
<td>rationalism</td>
</tr>
<tr>
<td>8. Design Drawing II</td>
<td>In this course, students build upon their drawing sketching skills and from this basis, continue their exploration of freehand drawing as a means of communication. Tonal value, texture, the effects of light and other methods are explored to understand the subtleties of expression.</td>
<td>Academic rationalism</td>
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</tr>
<tr>
<td>9. Issues in Design I</td>
<td>This course is the first of two courses which explores the role of design from a historical and critical perspective. Students explore the significant forces shaping the future of design, specific implications of design decisions, the setting of priorities from the many directions possible and the implications of these decisions on future generations. Students also expand their design thinking through an examination of everyday effect of design on the whole spectrum of human activity. Current design issues, as they arise, are discussed and analyzed.</td>
<td>Academic rationalism; Social reconstruction-relevance</td>
<td></td>
</tr>
<tr>
<td>10. Design Studio II</td>
<td>Students continue to examine the dialectic between form and space through the creation of abstract and increasingly tangible three-dimensional design problems. Exploration and more complex learning of two-dimensionality continues and includes the study of colour. The integral relationship between 2D and 3D design development is stressed. Human factors scale and materials are studied as contributors to the design of built environments.</td>
<td>Academic rationalism; Social reconstruction-relevance</td>
<td></td>
</tr>
<tr>
<td>11. History of Art II</td>
<td>A continuation of History of Art I, this course provides a chronological survey of the history of architectural and fine art periods from the Renaissance to the present day.</td>
<td>Academic rationalism</td>
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</tr>
<tr>
<td>12. Logic and Critical Thinking</td>
<td>Logic and critical-thinking skills play an important role in both daily life and on-going academic studies. As foundational skills, they support both the development and assessment of ideas, concepts and courses of action that are presented on a daily basis. Approaching the subject from both a practical and theoretical perspective, students hone their skills in analysis, argumentation, reasoning, and persuasion. A range of topics and thinkers provide material with which students can exercise and apply their skills.</td>
<td>Academic rationalism</td>
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</tr>
<tr>
<td>13. Environmental Psychology</td>
<td>In this course, students learn about the reciprocal relationship between the built environment, natural environment and human behaviour. Students study what distinguishes the study of environmental psychology from other forms of psychology, the genesis of environmental psychology and how an understanding of human behaviour influences and informs responsible design decision making. Emphasis is placed upon the effect of design decisions on human behaviour in interior spaces.</td>
<td>Academic rationalism; Social reconstruction-relevance</td>
<td></td>
</tr>
<tr>
<td>Semester 3</td>
<td>14. Design Technology I</td>
<td>This is the first of a series of courses which focuses on developing an understanding of the integration and</td>
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<tr>
<td>15. Technical Communication III</td>
<td>In this course, students learn to communicate their concepts through the production of technical drawings and documents utilizing AutoCAD software. Students begin the study of computer-aided drafting to communicate their design solutions.</td>
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<td>Academic rationalism</td>
</tr>
<tr>
<td>16. Design Drawing III</td>
<td>In this advanced studio course, learners perfect their manual communication skills through the continued study of sketch drawing techniques and particularly perspective drawings as a communication tool. An introduction to colour rendering is incorporated to expand the study of light and tone of the architectural environment.</td>
<td></td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>17. Foundations in Design II</td>
<td>Building upon the basic fundamentals of design, students are encouraged to cultivate their creative and critical-thinking skills using design thinking as a methodology for the creative process. Projects explore historical precedents, creativity and the importance of the design process at all scales of design. Collaboration and teamwork reinforce the cross-disciplinary nature of design and the important role of communication in design.</td>
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<td>Academic rationalism</td>
</tr>
<tr>
<td>18. Design Studio III</td>
<td>This course synthesizes the diverse built form issues discussed in previous design studios and shifts to a more thorough investigation of interior space, both in programming and in meaning. Lectures and assignments focus upon the theoretical, historical, cultural and social aspects of housing through a cross-cultural perspective.</td>
<td></td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>19. Introduction to Research</td>
<td>This course provides an introduction to academic research. An overview of the research process and research tools prepares learners to undertake research in other courses. Evaluation, selection and documentation of secondary sources are stressed. Exercises in identifying are integrated with other courses where possible.</td>
<td></td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>20. Global Perspectives</td>
<td>Sociology, through its exploration of the organization of society and the connections between people and their surroundings, provides new ways of looking at the world. In this course students learn the basic principles and methods of sociology and then use this perspective to examine globalization and its impact on Canadian society.</td>
<td></td>
<td>Social reconstruction-relevance</td>
</tr>
<tr>
<td>Semester 4</td>
<td>21. Design Technology II</td>
<td>In this course, students continue a study of the integration and coordination of building components in the interior environment. Sustainable principles and materials are discussed. Students examine the principles of construction methods, material selection and accessible design. Cabinet and casework construction details are examined as students continue to build knowledge of the Ontario Building Code principles and</td>
<td>Academic rationalism</td>
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<tr>
<td>Course Title</td>
<td>Course Description</td>
<td>Academic Focus</td>
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<tr>
<td>22. Materials and Products I</td>
<td>This course introduces students to the importance of appropriate product and material specifications, for architectural environments. Students examine the designer’s responsibility in providing aesthetic, code-compliance, sustainable product and finish specifications for a variety of spaces. Students are introduced to the designer’s role in the process of criteria establishment for evaluation, selection, product specification, product availability and impact on interior design.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>23. Technical Communication IV</td>
<td>In this course, students strengthen their working knowledge of AutoCAD and its application beginning with an emphasis on consistency, accuracy and time saving principles and practices. As the last in the series of technical communication courses, students perfect layout and presentation of construction drawing packages.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>24. Issues in Design II</td>
<td>Students continue their investigation of design forces shaping and informing designers in the 21st century. Topics for more advanced dialogue are drawn from architectural and design philosophy, theory and contemporary areas of research in the field. Assignments help students think critically about existing design paradigms and key influencers (shelter, culture and technology, and sustainability) to help them form a deeper understanding of the complexity of their own design decisions.</td>
<td>Academic rationalism</td>
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<tr>
<td>25. Design Studio IV</td>
<td>In this design studio course, students synthesize knowledge obtained in previous courses to complete studio assignments centred upon the design of environments with an emphasis on the retail sector. Students engage in research, analysis and synthesis of information to create unique, innovative and responsible solutions to the creation of interior environments. Retail design in other cultures is studied.</td>
<td>Academic rationalism</td>
<td></td>
</tr>
<tr>
<td>26. Design Drawing IV</td>
<td>As the final course in the design drawing series, students are encouraged to incorporate experimentation to improve their confidence allowing them to create sophisticated work which effectively conveys their advanced design concepts and ideas.</td>
<td>Academic rationalism Self-actualization</td>
<td></td>
</tr>
<tr>
<td>27. Interpersonal Communication</td>
<td>This course provides an overview of the elements of interpersonal communication and introduces techniques for dealing with interpersonal communication challenges in the diverse workplace. Communication barriers, verbal and non-verbal communication, listening, team work and relational dynamics are addressed. Through role-play, analysis, and case studies, learners engage in simulated and authentic interpersonal communication situations.</td>
<td>Academic rationalism Self-actualization</td>
<td></td>
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<tr>
<td>Semester 5</td>
<td><strong>28. Design Technology III</strong></td>
<td>In this course, students are introduced to the process of producing contract documents for a commercial space. They determine code restrictions, understand the coordination between drawings and specifications and study architectural details while completing a full set of working documents.</td>
<td>Academic rationalism</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
<td>Academic rationalism</td>
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<tr>
<td>29.</td>
<td>Lighting</td>
<td>In this lighting course, students focus on the fundamentals of light: its sources, variations, quality, design implications, product variations, technologies and cost/benefits. Students learn how to integrate appropriate lighting choices (from both technical and aesthetic viewpoint) into design decision making and the importance as a form-maker. Lighting for the specific sectors of built environments (residential, retail, corporate, etc.) is discussed and evaluated.</td>
<td>Academic rationalism</td>
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<tr>
<td>30.</td>
<td>Visual Communication I</td>
<td>In this advanced course, students learn to use digital software tools to expand and amplify design ideas. They develop the ability to transfer concepts to a variety of programs in order to formulate three-dimensional thinking, visualize ideas and illustrate virtual spaces of their construct.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>31.</td>
<td>Materials and Products II</td>
<td>The choice and specification of many different kinds of products and materials forms a significant component of a designer’s responsibility in the design and implementation of interior environments. In a workshop setting, learners investigate new, interdisciplinary and collaborative approaches to product development, construction and specification. They are encouraged to research products from a variety of sources, situations and new and emerging technologies, and explore alternative uses for traditional and non-traditional materials and products.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>32.</td>
<td>Design Studio V</td>
<td>This course examines increasingly complex design issues drawn from the area of corporate design. Students acquire a more comprehensive technical and aesthetic competence. Design projects explored range from a wide-variety of workplace environments and use corporate environments as a platform for the examination of broader ranged research tools and methodologies.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>33.</td>
<td>Developmental Psychology</td>
<td>In this course, students examine human behaviour from a multidisciplinary perspective. They learn key biological, psychological and social determinants of human behaviour using principles from these disciplines to explain and anticipate behaviour across the life span enabling them to identify developmental tasks, special challenges and needs for each stage of human development.</td>
<td>Academic rationalism Social reconstruction-relevance</td>
</tr>
<tr>
<td>Semester 6</td>
<td>34. Design Technology IV</td>
<td>This course examines heavy construction materials and the interrelationship between environmental systems and the structure specific to commercial construction. The Ontario Building Code regulations are again studied as are the fundamentals of specification writing through the Master Format system. Students increase their ability to transfer design concepts into production documents.</td>
<td>Academic rationalism</td>
</tr>
<tr>
<td>35.</td>
<td>Project Management</td>
<td>In this course, an overview is provided to the process of coordinating the design and implementation for the delivery of simple to complex interior design projects, focusing on the principles of general project management, contract documentation and administration.</td>
<td>Academic rationalism</td>
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<tr>
<td>36.</td>
<td>Visual Communication</td>
<td>In this advanced communication course, students synthesize learning from all previous communications.</td>
<td>Academic rationalism</td>
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<tr>
<td>Code</td>
<td>Course Title</td>
<td>Description</td>
<td>Learning Approach</td>
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<tr>
<td>II</td>
<td>Courses to produce advanced digital presentations of complex design projects and portfolio preparation. Students utilize various software programs combined with manual techniques to confidently create appropriate multi-media presentations in their own personal style.</td>
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<td>Academic rationalism, Self-actualization</td>
</tr>
<tr>
<td>37.</td>
<td>Professional Practice and Ethics I</td>
<td>This course provides students with an overview of the professional practice of Interior Design. Topics discussed include professional associations and accreditation, maintaining professional status, professional ethics, socially responsible design, business management, fee systems, career goal planning and portfolio preparation. This course introduces and launches the students’ co-op preparations.</td>
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<tr>
<td>38.</td>
<td>Design Studio VI</td>
<td>This course introduces the advanced student to interior design problems responding to socially responsible health care issues. The focus is on understanding and proposing design solutions for appropriate environments for a full range of patients, residents and users. Environments which students explore include hospitals, clinics, long-term care facilities and wellness centres. An evidence-based approach to problem solving is applied.</td>
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<td>39.</td>
<td>Environmental Science</td>
<td>Environmental Science is an interdisciplinary study of how the earth works, how we interact with the earth and how we can address the environmental problems we face. In this course, students explore natural capital and the degradation of natural capital. Students engage in case studies, critical thinking and analysis of alternatives in exploring solutions and trade-offs in trying to address degradation.</td>
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<td>40.</td>
<td>Introduction to Sociology</td>
<td>Social interactions between individuals and groups can be analyzed from both applied and theoretical perspectives. Students use sociological theories and accepted methodological approaches to interpret these complex interactions. Students examine a number of variables, including culture, social class, race and gender, and the ways in which these variables can unite or fragment society.</td>
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<td>Co-op:</td>
<td>41. Cooperative Work Term</td>
<td>This placement provides learners with the opportunity to consolidate and apply acquired knowledge and skills in a related work area. Students work as members of a design team and are challenged to address increasingly complex design situations encountered in the workplace. Students are encouraged to assess their own performance in the work they produce and to build their professional portfolios. Students have the opportunity to explore opportunities within the sector of the industry and city of their choosing.</td>
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<td>42.</td>
<td>Senior Project I</td>
<td>In this course, students choose their senior project topic and undertake the synthesis, planning and research required for its completion in the following semester. With faculty guidance, yet working towards more self-directed learning, students develop and prepare a strategy and programming document as the first stages in the completion of their senior project.</td>
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<td>43.</td>
<td>Applied</td>
<td>This advanced course is designed to give students an</td>
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<tr>
<td>Course Name</td>
<td>Description</td>
<td>Core Values/Principles</td>
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<td>Research</td>
<td>Understanding of applied research, the process of applying existing knowledge or processes to create useful products or services. A major applied research project serves as the vehicle for developing skills in analyzing qualitative data, establishing an implementation plan, conducting research and reporting on it.</td>
<td>rationalism</td>
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<td>44. Design Studio VII</td>
<td>Students apply knowledge obtained in the previous years to complete studio assignments centered upon complex environments with an emphasis on the hospitality sector. They engage in advanced research, analysis and synthesis of information to create unique, innovative and responsible solutions as faculty take on an &quot;advisory role,&quot; similar to that of a senior designer in an office setting.</td>
<td>Academic rationalism Self-actualization Social reconstruction-relevance</td>
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<td>45. Preservation and Adaptive Reuse</td>
<td>In this course, students learn and apply the principles and theories of preservation and adaptive reuse to historical or non-historical buildings. They also delve in historical Canadian architecture and building methods.</td>
<td>Academic rationalism</td>
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<td>46. Environmental Economics</td>
<td>Environmental economics is about the way human decisions affect the quality of the environment, about how human values and institutions shape our demands for improvements in the quality and, most especially, about how to design effective public policies to bring about these improvements. Students will be exposed to analysis and problem solving as they relate to environmental policy analysis in the Canadian context.</td>
<td>Academic rationalism Social reconstruction-relevance</td>
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<td>47. Academic Writing II</td>
<td>In this advanced course, students concurrently work on an applied research and a senior project. Techniques for reporting technical information, developing an academic style, and communicating clearly, correctly and coherently are emphasized. As participants complete drafts of academic writing, they are reviewed and revised based upon peer and professor feedback.</td>
<td>Academic rationalism</td>
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<td>Semester 8</td>
<td>48. Global Citizenship</td>
<td>Informed citizens in today’s world have knowledge of the meaning of civic life at the local, national and global level. In this course students reflect on and develop a personal awareness of the meaning of freedoms, rights and obligations in a diverse global community. They consider the political, social and economic drivers that influence patterns of human behaviour and the health of the planet. Based on general principles of global citizenship, students look beyond national borders to consider their responsibilities related to the health and well being of the planet and those who inhabit it. Students critically evaluate information related to environmental and social health and pursue a journey into adopting attitudes and behaviours that foster global environmental and social responsibility.</td>
<td>Social reconstruction-relevance</td>
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<td>49. Senior Project II</td>
<td>Having studied many of the issues, practices and opportunities of the major sectors of the design profession, students choose their own complex design project for completion and presentation to faculty, students and invited guests. Students work independently</td>
<td>Academic rationalism Self-actualization Social reconstruction-relevance</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Description</td>
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<td>50. Senior Seminar</td>
<td>This is an advanced theory course which focuses upon readings and discussions of contemporary thought and movements within the field of interior design and architecture with special emphasis on the future of design and design criticism. Through guest lectures and a variety of topics, students reflect upon current design issues, trends and implications for future design interventions.</td>
<td>actualization</td>
<td>Academic rationalism</td>
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<td>51. Professional Practice and Ethics II</td>
<td>In this advanced course, students continue their study of workplace practices, business management and prepare for employment as a professional designer after graduation. Students engage in research, analysis, and discussion of topics related to varying workplace environments and practices both in Canada and abroad in order to better understand international design and business practices.</td>
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<td>Academic rationalism</td>
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<td>52. World Literature</td>
<td>This course provides a survey of key texts from 20th and 21st century World Literature. Readings provide an introduction to themes, styles and writers from a variety of cultures. Critical analysis of texts supports the development of arguments related to the assigned readings.</td>
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<td>Academic rationalism</td>
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