Teaching Strategies of Research in Interior Design Education: Linking Research to Practice

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Abstract: Interior designers need to understand the importance of research and evidence-based solutions in design. In interior design education, senior students usually start the "research phase" of their projects before the practical phase. They often struggle with crafting a well-refined research thesis, relying on a scientific research background, and implementing appropriate research methods. The present study aims to explore the teaching strategies that instructors at a private university in Saudi Arabia use to conduct senior thesis projects. The study will be conducted using mixed methods. First, a qualitative description of the teaching methods that have been used through different semesters will be explained. These strategies have been developed over time and evaluated through several semesters in an effort to aid the students with their senior theses, adjust to students' capabilities, and follow the developing trends of design pedagogy. The study will then be supported by an analysis of students' work and the application of knowledge gained through several semesters using a grading rubric developed by the instructors of the course and based on the requirements of each assignment submitted by students. For the quantitative part, senior students' completed questionnaires will be used to assess their level of understanding of the research methods and achievement of desired learning outcomes. The study will be limited to the evaluation of research methods taught for senior students. The obtained result will contribute to the literature on interior design pedagogy, specifically in relation to the integration of research methods and the practice of interior design.

Introduction

The concepts of interior design revolve around the creation of interior environments that actively support and enhance the aesthetic appeal, functionality, and cultural sentiments of those individuals who inhabit the interior spaces. Therefore, interior design stands as a strong representation of how humans interact with their surroundings by creating interior spaces that are both appropriate and enjoyable to live in (Piotrowski 2011). There is an increasing demand in the field of interior design for the skills of evidence-based design. Introducing research to undergraduate students would provide them with experience in evidence-based design decisions that would aid them throughout their careers. The complex relationship between conducting research and teaching research methods in higher educational settings is the main concern of this study. Understanding research methods can support their differentiation between the creative versus the applied science parts of design and gives

students the ability to connect between the two aspects of design (Dickinson, Anthony, and Marsden 2012). Yet, there is a gap in the literature regarding the investigation of research teaching methods in the discipline of interior design.

The significance of research in the field of interior design lies in its ability to bridge the gap between the two existing perspectives on the profession of interior design. One viewpoint establishes a connection between interior design and the social sciences, while the other associates interior design with the realm of the arts (Robinson and Parman 2015; Dunlap 2011). The acquisition of critical thinking, problem-solving, and collaboration skills appears to be of utmost importance for students in their educational journey. These skills, in conjunction with domain-specific knowledge and skills, enable individuals to effectively make informed professional decisions and successfully implement solutions.

The Developed Teaching Model

The ID Senior I Studio is a research-based course that aims to lay the foundation for the Senior Design Project to be taken in the following semester. In consultation with the faculty and through guided research, students select an appropriate topic for their Senior Project. The main task of this course is to write a sound research proposal featuring their preliminary design idea. Throughout the semester, students start by articulating research questions and describing the scope of their project's background. As a first step in this course, students search for a topic of interest to research that will become the base of their design project. Before the development of this course with its new content, students did not have any steps to follow and did not have clearly defined steps for their research, which resulted in the lack of a sound search of the body of knowledge and, therefore, the lack of a literature review. Tranfield, Denyer, and Smart (2003) defined literature review as researchers' rigorous study of previous bodies of knowledge that are conducted to bring the field closer together. The course requirements were limited to allowing students to choose a design project topic and then immediately work on the programming phase of the project and on developing the concept. Although instructors required students to conduct case study analysis, their analysis was not built on a clear reasoning of these selections (Tranfield, Denyer, and Smart 2003; Kraus, Breier, and Dasí-Rodríguez 2020).

In case study analysis, a real-time exploration is considered within a particular context, with the consideration that context will create a difference (Rashid et al. 2018). To enhance the quality of the course learning outcomes (CLOs; Table 1), which are mapped to the program learning outcome (PLOs; Table 2), all PLOs, and therefore the CLOs, are mapped to the National Qualifications Framework in Saudi Arabia (NQF) that aims to ensure a high level of quality, competitiveness, and international recognition of national qualifications. Instructors developed the course to present a newer model (Table 3) that also includes new national and international trends related to the field of study. The developed curriculum has clear phases throughout the semester and steps that the students follow to present their final research proposal successfully. Students are asked to choose from three possible design topics.

Their chosen topic is then mapped to The United Nations (UN) Sustainable Development Goals (SDGs) and the Saudi Arabia Vision 2030. Secondly, students must create a clear proposal with a problem statement and a proposed solution supported by significance that is evident in the literature body of knowledge.

Table 1: Course Learning Outcomes

Skills	Course Learning Outcomes
Knowledge	▪ CLO1 Define a design problem and a solution within the cultural context. 4b (PLO1)
Skills	▪ CLO3 Develop a holistic design programming for the proposed design (PLO 4) ▪ CLO2: Analyze case studies related to the proposed design solutions. (PLO4) ▪ CLO4 Choose a site location, codes, and standards for the design project 16a (PLO7) ▪ CLO5 Demonstrate verbal and visual communication skills for the project presentation 9a (PLO 8)

Source: Prince Sultan University, Interior Design Department (2016)

Table 2: The Interior Design Program Learning Outcomes

	Knowledge
K1	PLO1: Define social, cultural, economic, and ecological context and value in all aspects of interior design.
K2	PLO2: Recognize the knowledge of human experience and behavior to design the built environment.
K3	PLO3: Outline the principles of interior construction and codes in relation to building construction systems.
	Skills
S1	PLO4: Analyze the history and theories used in the interior design body of knowledge throughout the design process.
S2	PLO5: Differentiate the systems of color, light, and indoor environment quality that impact human well-being.
S3	PLO6: Demonstrate students' ability to work individually and collaborate in team tasks in creatively solving a design problem.
S4	PLO7: Show the ability to use law codes, standards, and guidelines that impact human experience of interior spaces.
S5	PLO8: Demonstrate verbal, visual, and written communication skills required for the profession.
	Values
V1	PLO9: Illustrate the use of technology in design solutions to integrate furnishings, materials, and finishes.
V2	PLO10: Employ elements and principles of design in two and three-dimensional approaches across a range of media types.

Source: Prince Sultan University, Interior Design Department (2023)

It is also important to understand how the multidisciplinary nature of interior design should help practitioners, educators, and, most importantly, students to have connections with other fields (Thamrin et al. 2019). In addition to architecture and engineering, interior design requires a knowledge of other disciplines, such as the humanities and social studies, as they all have a direct relationship with human life, experience, and basic needs (Thamrin et al. 2019; Cys 2009), which in turn enhance the education quality for interior design students. Unfortunately, in many interior design programs, education has often been limited to the basic knowledge students gain from design-related subjects, their observations, and their daily life experiences. According to Thamrin e al. (2019), many interior design students consider the aesthetic part and taste of clients in designing their projects rather than searching for and trying to solve design, social, or cultural issues. Students are not really taking advantage of the power of the multidisciplinary aspects of the interior design field and are not fully aware of how important it is to link between the design discipline and other fields. Huber, Waxman, and Clemons (2017) also mentioned that interior design students often lack the opportunity to conduct research and deep investigation using the knowledge of other fields that can help solve related issues. Such knowledge deficiency leads to difficulties in identifying the design problem, appreciating the importance of research/knowledge-centered design, and applying the findings to serve the design (Huber, Waxman, and Clemons 2017). With these deficiencies, students' design solutions and implementation without prior knowledge and appropriate research can be aesthetically appealing but usually result in insufficient design solutions that are not linked to the human experience or their needs. To resolve such a knowledge deficiency, interior design students need to be trained to focus on the core of the problem and to be aware of the methods needed to learn of these design-related issues through research as well as knowledge acquired from design subjects and other disciplines.

Interior design students require training to create balance in their work between creativity, learned mostly from design-related subjects, and critical thinking and research skills learned from other disciplines. Therefore, the knowledge-centered approach has been adopted in many interior design programs worldwide. Many educators are now aware that helping students understand the method and the ways of conducting research for a better understanding of design problems first necessitates education, and that will shape their future ways of thinking. According to Dazkir (2019), by researching the most up-to-date information found in the literature, designers and stakeholders can develop better decisions to design the built environment.

In higher education, information needs and information-seeking behavior become the focus and the priority for learners and educators. Educators must understand the importance of assessing students to be learners the same way they teach them to be historians and designers (Felek and Gül, 2019). Educators should also help students understand the importance of seeking the users' needs and how the design decision could play an important role in changing the life experience in any built environment (Huber, Waxman, and Clemons 2017). Being aware of knowledge from the design field and other disciplines should help

young designers to have a multi-perspective base that can be used to solve complex design problems, come up with better solutions to the built environment, and improve the quality of human life (Thamrin et al. 2019). According to Huber, Waxman, and Clemons (2017), the role of educators is to encourage students to be keen observers and look carefully at the user's behaviors and conditions. The knowledge-centered approach aims to prepare learners to gain detailed information from different areas related to a concept or design problem, taking into consideration that knowledge should be learned in a sequential way and always linked to the main concept or design problem. Scientific research methods are adopted in many interior design programs around the world.

One of the research methods that helps to investigate design problems is case study analysis. This method requires students to find similar projects to what they are targeting and start conceptually breaking down and analyzing the existing projects. Students should focus on and review all areas related to design, such as construction, sustainability aspects, and solutions (Khoukhi et al. 2020; Huang and Cacciola, 2020; Tuhus-Dubrow and Krarti 2010; Al-Homoud 2009); HVAC system components (Selamat et al. 2020); space planning, building configuration (Duncanson and Curry 2020); facilities provided, light sources and levels (Huang and Cacciola, 2020); and materials and finishes (Khoukhi et al. 2020). Students should look deeply into those projects and the specified areas to identify the similarities, trends, and possible solutions that they could adopt in their own projects, as well as realize the deficiencies that they should avoid.

The other research method that can enrich interior design students' knowledge is the site visit. According to Bao et al. (2021), the site visit and analysis practice have increasingly captured the attention of educators and stakeholders as a way of enhancing learners' awareness of certain design aspects. Such practice should help learners physically be on site and to be part of the user's experience. Being in the same situation as the individual's occupied space will have a great impact on the design solutions that young designers prepare for the end users.

Literature reviews of the body of knowledge remain an important method of searching for relevant information about any proposed project by the senior students. Investigating recent information on a certain issue is a great opportunity for educators and learners to encounter recent trends and solutions. Starting a project that others have concluded will play an important role in helping young designers and educators develop creative designs, solutions, or models (Bao et al. 2021). Interviews and questionnaires can also serve as excellent research supplements to a literature review because they help designers to have direct contact with the users to fully understand the individuals' occupied space needs and the challenges they are facing.

As educators, training students to conduct all or most of the above-mentioned methods will indeed add more value, enhance education quality, and improve the learning experience (Landicho 2020). The use of these methods will elevate students' design solutions as they will have a sound base of knowledge and can address each phase of the design process with another perspective gained from prior learning. For this exact purpose of improving interior design education, the Interior Design program at a private University adopted a curriculum

design that could help interior design students take advantage of several scientific research methods and practice those methods before starting the work on their final senior projects.

Research Methods in Interior Design Education

As a starting point, students are given an introductory lecture about the meaning of creativity in interior design, and they are given suggestions about choosing creative topics in interior design that should be sustainable. These topics are linked to the UN Sustainable Development Goals (SDGs) and mapped to one or more of the Saudi Arabia Vision 2030 goals. The aim of this lecture is mainly to inspire students to creatively search for trending topics in the field of interior design. After further consultation with the instructor and choosing a solid topic to pursue, students are given a series of lectures to walk them through the research methods step by step. The lectures were developed with consideration to the level of undergraduate students and their abilities. Several known resources for research methods were used to develop these lectures (for example, Creswell and Clark 2017). The lectures start with the basics of crafting a research problem, transition to creating a rigorous literature review, and end with the design of research methods and qualitative and quantitative tools (such as surveys, interviews, and case study analysis). During the literature review phase, the instructor aids students by asking them to create two to three themes related to their topic that they can search for during the literature review phase. Next, the instructor provides students with a matrix to aid their literature review search (see example in Table 3). Research that students conduct throughout the semester employs a mixed methods approach that aims to investigate, collect, and analyze data, integrate the findings, and draw conclusions using both qualitative and quantitative cross-sectional data (Creswell 2013; Tashakkori and Creswell 2007).

Table 3: Literature Review Matrix to be Used by Students to Develop Their Literature Review

Purpose of study	Research method	Population sample	Key findings	Significance/ Conclusion and (how is this important to your project) why is it important
The study evaluated the effect of physical comfort on employees' performance and health that lead to absenteeism.	Workplace observations and an occupant satisfaction survey that measure indoor environment comfort.	Three case studies involving 30 participants each, with a total of 90 participants	In their study, Ali et al. found that controllability over office environments had a significant effect on employees' comfort.	The study provides findings that suggest that poor office environments (lighting, thermal, and humidity) can affect well-being and, thus, productivity. - Controllability is a significant factor in providing employees' comfort. -The sample was small but well-justified

Source: Atyah

Case study selection and analysis are considered a vital part of the interior design process. Therefore, students are guided toward the selection of case studies that they would analyze and that are relevant to their proposed topic. According to Yin (1994), the case study design contains five components: the research problem, its significance and proposed solution, its unit(s) of analysis, a direction of how the analysis is linked to the proposed solution, and criteria to interpret the findings. During this step, students have to define the relationship and similarities between the selected case study and their proposed design solution. They must explain how this case study would inform their next step, which is the programming phase. As a rule, all case studies should show a link to sustainability, green design, and innovation of design applications. Students are also encouraged to review Leadership in Energy and Environmental Design (LEED) certified projects as case studies. Next, students design a survey that is guided by their literature review and their case study analysis. The aim of the qualitative follow-up is to explain the quantitative results in more depth (Creswell and Clark 2017). A mixed methods approach is used in the structure of this course to investigate the research proposed design, gathering complementary data to explore "counterpart analysis" and converge upon stronger research conclusions that could not be accomplished with a single method alone (Creswell and Clark, 2017). Robson (1993) indicates that multiple methods "can be used in a complementary fashion to enhance interpretability" (Green, Kennedy, and McGown, 135). The clearly defined curriculum has given the students the chance to understand sound research crafting methods and their application in the field of interior design. During this course, students explore the creation of a questionnaire instrument, formal interviews, and focus group interviews to establish the perspective of the targeted population with their design. Prior to that step, students receive a lecture explaining the different instruments and how to design them using sound methods and analysis of the results. Throughout the semester, students are exposed to eight lectures about research methods, and each lecture focuses on steps of research.

Additionally, to elaborate, an assessment of the body of knowledge is necessary for every higher education course to ensure the instructors are following the most up-to-date teaching and learning methods. Healey and Jenkins (2005) have suggested that undergraduate students must engage in research activities to enhance their learning outcomes. Furthermore, research methodology plays an important role in finding solutions to real-world problems, and by learning research skills, undergraduate students can be better prepared for their post-graduate studies (Motjolopane 2021). In their study, Hosein and Rao (2016) have suggested that with the popularity of teaching research methods in the twenty-first century; however, there is still limited empirical research on the pedagogical approaches adopted in the teaching and learning of research methods at the undergraduate level. Developing a rigorous research curriculum can aid students and guide them in completing their research projects. Moreover, undergraduate students often have "a negative attitude towards research methods as they consider it to be dry and irrelevant to their research project" (Hosein and Rao, 2016, 111). Dickinson, Anthony, and Marsden (2009) surveyed sixty-five interior design educators, and

most of the responses reported that students have difficulties understanding the research studies they read. Some argued "as to whether undergraduate students should be taking research-related coursework" (Dickinson, Anthony, and Marsden 2009, 11). Dazkir (2019) conducted a study on interior design undergraduate students to understand their knowledge base of research methods. The findings of his study indicated that interior design students need more exposure to evidence-based design using rigorous research methods and the use of credible sources, such as peer-reviewed journal articles related to the field of design.

Curriculum design is defined as the educational experiences that students encounter in their learning journey to achieve educational goals and objectives that have been developed within a framework of research, past and present professional practices, and the changing needs of society (Parkay, Anctil, and Hass 2014; Chan et al. 2019). While there is a growing range of learning resources, such as textbooks and web resources, on teaching research methods to undergraduates, recent evidence in the literature has suggested that studies on the design of research methods curriculum are limited (Kilburn, Nind, and Wiles 2014; Earley 2014; Wagner et al. 2011). In their study, Kilburn, Nind, and Wiles (2014, 192) stated that there is "a lack of 'pedagogical culture' in the form of debate, investigation, and evaluation concerning how research methods are taught and learned." Furthermore, a research methodology course has the potential to assist students in developing twenty-first-century communication skills, as students need to present their research effectively in both oral and written formats. Therefore, the instructional strategies used should allow for the development of these literacies (Motjolopane 2021).

> Despite identifying common themes surrounding learners' characteristics, course content, and teaching approaches, this review concluded that the literature contributes little to how students actually learn research methods. As a result, methods teachers are left to 'rely on a network of peers, scattered research literature, and much trial-and-error' for developing their practice. (Earley, 2014, 2)

Teaching and learning of research, therefore, pose significant challenges. To facilitate a more focused curriculum about the "how-to" of research for undergraduate students, it is important to actively engage them in the different practical tasks involved in the research process through several steps (Lewthwaite and Nind 2016; Boström 2019). Learning about research methods within a particular field involves the construction of knowledge. During their classes, students should understand the different tasks of research methods and reflect on them by using these methods on their own research projects (Kilburn, Nind, and Wiles 2014). Moreover, the teaching of research methods in higher education depends on providing students with appropriate research tools to complete projects and write a thesis; additionally, such teaching should aid students in communicating critical and balanced perspectives on the body of knowledge within the domain of study (Boström 2019). One of the main challenges related to teaching research methods is finding a way to make the course interesting to students (Motjolopane 2021).

Another challenge is that many students start the course with a weak foundation for conducting research, making the course challenging to the instructor. Furthermore, students are faced with having to read a large number of articles to understand the body of knowledge of their research topic and the methods used to determine the contribution of their research findings to the field (Motjolopane 2021). While conducting research for their culture-inspired design project, Dazkir et al. (2013) discovered that novice interior design students had difficulty locating relevant and credible sources. All of these findings indicate that students either lacked a solid grasp of research-informed design or lacked the motivation to conduct research on credible sources during the design process. As undergraduate research methods courses are necessary, there is a compelling need to focus on the development of appropriate pedagogical approaches and a rigorous curriculum for the field of interior design and how these course contributions can affect students' cognitive skills and attitudes toward research and research methods. Galliers and Huang (2012, 2) have argued that "[t]he task of teaching research methods […] is not the transmission of a body of knowledge, or the drilling of students in the use of techniques, but rather a matter of helping them to build up relevant knowledge and capabilities, and to develop the necessary intellectual virtues."

To encourage an efficient curriculum in teaching research methods in higher education, many scholars recommended a student-centered pedagogical approach (Hosein and Rao 2017). This approach suggests activities such as active learning, and some examples of this method have been introduced into research methods in some programs to prompt students' deep learning by connecting their ideas with rigorous research methods (Earley 2014; Hosein and Rao 2014). Teaching undergraduate research methods has become increasingly common, especially with the rise of evidence-based design. Therefore, there is a strong need to focus on the development of appropriate pedagogical approaches in the curriculum for teaching research methods (Hosein and Rao 2017; Motjolopane 2021). Literature on research methods pedagogy has provided findings on the effect of teaching research methods on the development of students' cognitive skills (Barak 1998; Earley 2009), their future jobs (Barak 1998; Hosein and Rao 2012) and their attitudes toward the use of research as evidence in their work (Hosein and Rao 2012; Kawulich, Garner, and Wagner 2009; Zuckerman and Lo 2022; Murtonen and Lehtinen 2005; Turner et al. 2018). However, there is limited empirical research on the pedagogical approaches of research methods for undergraduates in their curriculum and how such pedagogy affects their experiential knowledge of the research and their development as researchers (Strayhorn 2009). Hence, research in this area tends to focus more on the supervisor-supervisee relationship and could use further development in the realm of undergraduate education (Leahey 2006; Hosein and Rao 2017).

Methods

This study's primary objective is to systematically evaluate the efficacy of the new senior design studio teaching and learning model, which emphasizes the development of a research thesis for the students' graduate projects the following semester. In addition to considering

students' assessments of course learning outcomes, the researcher employs a multifaceted assessment strategy to provide a more robust evaluation of the model. First, the researcher acknowledges that although student evaluations are valuable, they can be influenced by a variety of factors that may not exclusively reflect educational processes and objectives. The researcher acknowledges, based on the experiences of educators and prior research (Mordacq et al. 2017; Soares, Carvalho, and Dias 2018), that personal issues, misunderstandings, and interactions with instructors can influence students' perceptions and contribute to subjective evaluations. The researcher employs student evaluations as one of the assessment components but not as the sole determinant of the model's efficacy.

Instructors perform an essential role in evaluating learning outcomes. To ensure a fair and objective evaluation, the researcher employs a "rubric assessment" strategy that incorporates students' final presentation evaluations. The rubric is aligned with the learning outcomes of the course and provides a standard framework for evaluating student performance. This method mitigates any potential biases that may arise from subjective judgment. In addition, the researcher is aware that evaluating the efficacy of teaching methods, the quality of assignments, and the suitability of course requirements is crucial for a comprehensive evaluation of the new model. To accomplish this, the researcher conducts a second evaluation by surveying students' perspectives. This survey is intended to capture a variety of variables pertaining to the student's experiences with the course, such as the effectiveness of teaching methods, the relevance and rigor of assignments, and the alignment of course requirements with their academic objectives.

The researcher acknowledges the importance of anonymity in encouraging voluntary responses. Therefore, the survey is conducted entirely anonymously via the university's portal. This strategy ensures that students feel safe expressing their authentic opinions without fear of repercussions. In addition, the researcher intends to analyze the data accumulated over ten semesters and five academic years. This longitudinal approach allows us to identify prospective trends and changes in the model's efficacy over time, providing valuable insights into its long-term effects.

By combining student evaluations, instructor rubric evaluations, and comprehensive survey data, the researcher intends to provide a balanced and all-encompassing evaluation of the new senior design studio teaching and learning model. This multifaceted strategy will provide a more solid foundation for drawing conclusions and making informed decisions regarding the model's future implementation and enhancements.

Results

The primary objective of this methodology is to comprehensively assess senior students' levels of sustainability knowledge, satisfaction, significance, and efficacy within the interior design department. The overarching objective is to improve the department's overall educational quality and experience. The researcher gathered data from students over five years and ten semesters to ensure a robust and exhaustive analysis.

While satisfaction is one of the variables considered, the researcher acknowledges that deceptive factors may influence it. Therefore, the researcher recognizes that assessing the acquisition of skills and advancement of knowledge is of the utmost importance to comprehend better the department's effectiveness in promoting sustainability in interior design education. Utilizing a broad range of relevant sources, the researcher has implemented multiple evaluation methods to assess the acquisition of skills and advancement in knowledge. First, the researcher conducted student evaluation tests every semester to measure the students' levels of knowledge and skills before and after exposure to curriculum-based sustainability efforts. These evaluations are based on the researcher-established measurement instruments and interior design education-relevant standardized examinations. In addition, the researcher incorporated project-based evaluations that emphasize applying sustainability principles in practice. These projects evaluate the student's ability to incorporate sustainable, effective practices into their design projects, demonstrating their progress in acquiring and implementing sustainable design knowledge and skills.

To enhance the robustness of the research findings, the researcher conducted an analysis of the data while taking into account demographic parameters. The researcher took measures to guarantee that the sample of senior-level interior design students at the College of Architecture and Design was both gender-balanced and representative. The researcher aims to enhance the comprehension of the department's sustainability initiatives by integrating assessments of knowledge and skill acquisition with evaluations of satisfaction. This methodology facilitates the identification of areas for enhancement, enables data-driven decision-making, and supports the continuous improvement of educational quality and effectiveness in sustainability activities within the interior design department. Table 4 provides a comprehensive overview of the attributes and quantity of participants during a span of five consecutive academic years.

Table 4: Demographic Characteristics of the Respondents

Demographic Variables	Item	Number
Gender	Female	
College	College of Architecture and Design	
Department	Interior Design	
Level	Senior Level	
Academic year of study		
2017–2018		44
2018–2019		37
2019–2020		35
2020–2021		32
2021–2022		40
N =		188

Source: Atyah

Measurements were conducted based on a subjective evaluation of the students across areas such as Knowledge, Satisfaction, Quality/Significance, and Effectiveness. These parameters were self-reported by the students at the end of each semester. For instance, one of the items of the Knowledge dimension asked the students to evaluate if "Course objectives are achieved at the end of the term." In addition, one of the items of the Satisfaction dimension was "I am satisfied with the overall learning resources provided to support my learning activities." In terms of the Quality/Significance dimension, one of the questions that the students were asked was, "The amount of work I am expected to do to achieve the course objectives was reasonable." Finally, in terms of the Effectiveness dimension, one of the items included "Define a design problem and a solution within the cultural context." The mode of teaching was changed in Year 3, which was partially prompted by the occurrence of the COVID-19 pandemic. In Year 1, only 34.1 percent of the students strongly agreed that the course objectives were achieved at the end of the term and that they were able to achieve the course learning outcomes. Furthermore, 22.7 percent of the students strongly agreed that their grades were based on their performance in the course.

Figure 1: Knowledge and Satisfaction Dimension Year 1

Moreover, in terms of the Satisfaction dimension, only 34.1 percent of the students strongly agreed that they enjoyed learning together with their friends in the course, while only 36.4 percent strongly agreed that they were overall satisfied with the learning resources provided to support their learning activities. Finally, only 34.1 percent of the students strongly agreed that they were satisfied with the overall quality of the course.

In terms of Quality/Significance, only 31.8 percent of the students strongly agreed with the statement that the actual coursework met the course objectives and that the amount of work that was required was expected to achieve the course objectives. Further, only 31.8 percent of the students perceived that a different variety of the assessment was employed in the course.
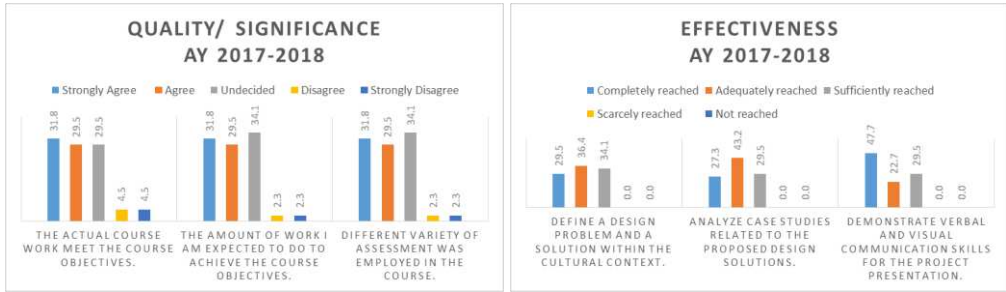
Figure 2: Quality/Significance and Effectiveness Dimensions Year 1

Finally, for Year 1, the overall Effectiveness, as measured by the instructor's evaluation according to the grading rubric, was also noted to be average. For instance, only 29.5 percent of the students were reported to be able to define a design problem and a solution within the cultural context. Only 27.3 percent of the students completely reached the goal of being able to analyze case studies related to the proposed design solutions. Finally, only 47.7 percent of the students were able to completely reach the milestone of being able to demonstrate verbal and visual communication skills for the project presentation.

In Year 2, the performance of the students and their self-report statistics remained relatively the same. While the score of certain dimensions increased, this increase was not consistent. For instance, while the scores of the Knowledge dimension, Satisfaction dimension, and the Quality/Significance dimension showed a sharp increase, the Effectiveness dimension indicated a decrease. More specifically, about 59.5 percent of the students strongly agreed that course objectives were achieved at the end of the term, while 56.8 percent of the students strongly agreed that they were able to achieve the course learning outcomes, and 59.5 percent of the students strongly agreed that their grades were assigned based on their performance in the course. Moreover, 62.2 percent of the students strongly agreed that they enjoyed learning together with their friends in the course. In addition, 59.5 percent of the students strongly agreed that they were satisfied with the overall learning resources provided and satisfied with the overall quality of the course.
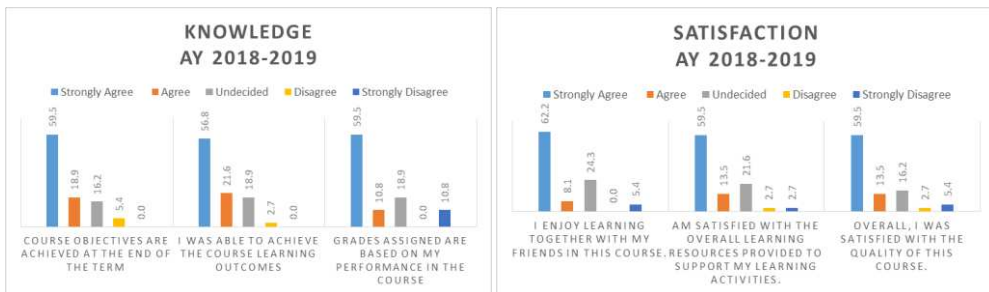

Figure 3: Knowledge and Satisfaction Year 2

In terms of the Quality/Significance dimension, 62.2 percent of the students strongly agreed that the actual coursework met the course objectives and that the amount of work they were

expected to do to achieve the course objectives was appropriate. In addition, a similar 62.2 percent of the students strongly agreed that a different variety of assessment was employed in the course taught. However, in terms of the effectiveness of the course, only 29.5 percent of the students completely reached the stage where they were able to define a design problem and a solution within the cultural context. Only 27.3 percent of the students completely reached the stage where they could analyze case studies related to the proposed design solutions. Furthermore, only 47.7 percent of the students were able to demonstrate verbal and visual communication skills for the project presentation. The overall effectiveness of the students in Year 2 remained at relatively the same level as that of the Year 1 students.
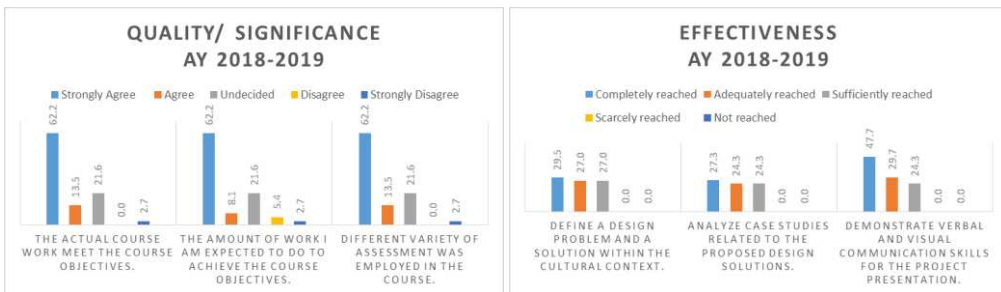

Figure 4: Quality/Significance and Effectiveness Year 2

In Year 3, following the start of the pandemic, the instructor introduced a change in the way assessments were conducted. In doing so, the instructor developed a student-centric learning approach wherein the undergraduate students were required to complete a research thesis. While the Knowledge and Satisfaction Dimensions reduced from Year 2, this change could be attributed to the COVID-19 pandemic as well as a sudden shift in the way the course was delivered. For instance, the scores of the Knowledge dimension were established at 40 percent for all three items of the dimension, while the satisfaction dimension ranged from 31.4 percent to 37.1 percent.
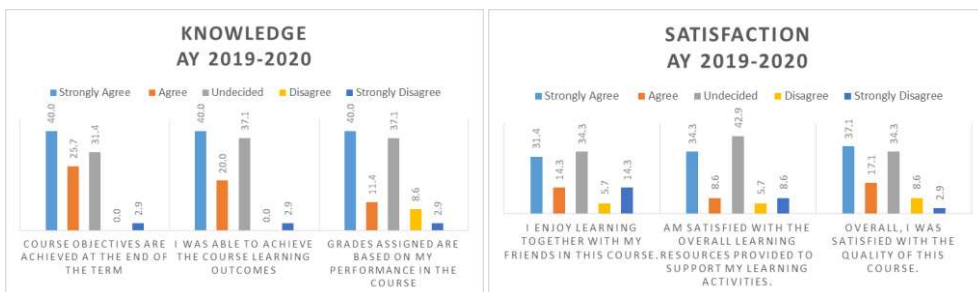

Figure 5: Knowledge and Satisfaction Dimensions Year 3

Similarly, the Quality/Significance dimension remained relatively stable, with percentages ranging from 42.9 percent to 34.3 percent across the three items. On the other hand, the Effectiveness dimension showed a considerable increase, wherein 45.7 percent of

the students completely reached the stage where they were able to define a design problem and a solution within the cultural context. Moreover, 42.9 percent of the students were fully able to analyze case studies related to the proposed design solutions. Finally, 42.9 percent of the students were also able to demonstrate verbal and visual communication skills for the project presentation.
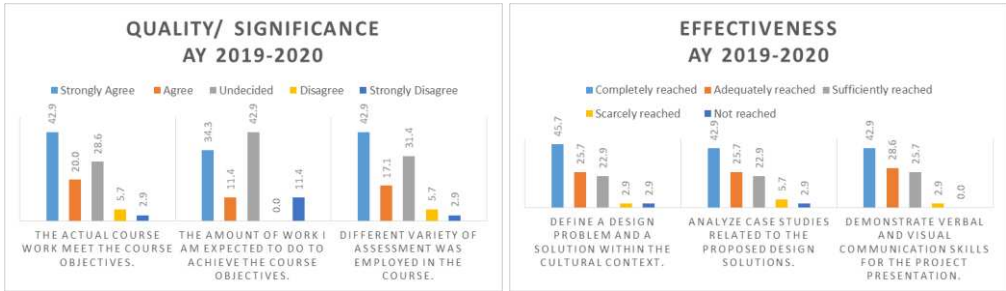

Figure 6: Quality/Significance and Effectiveness Dimensions Year 3

Following Year 3, the performance of the students and their perceptions regarding the Knowledge, Satisfaction, and Quality/Significance dimension has grown. This growth is also seen in their level of effectiveness. For instance, as evident in the below figure, both Knowledge and Satisfaction dimensions have shown steady increases, with 56.3 percent of the students perceiving that their course objectives were met, that they were able to achieve the learning outcomes of the course, and that their grades assigned were based on their performance. Moreover, the scores of the Satisfaction dimension were also high, ranging from 53.1 percent to 59.4 percent.
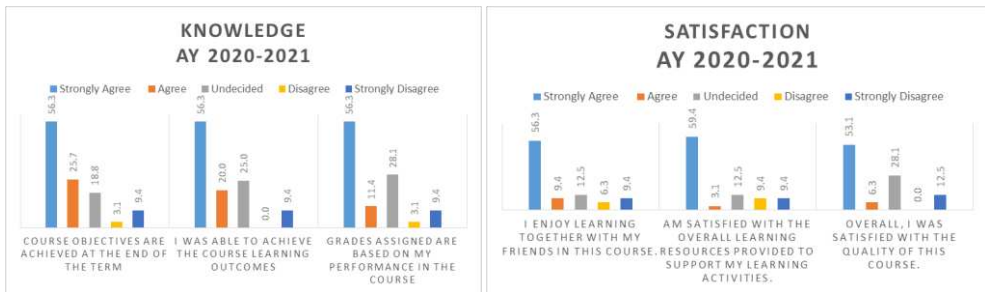

Figure 7: Knowledge and Satisfaction Dimensions Year 4

Similar trends have been noted in terms of the Quality/Significance dimension, wherein the scores ranged from 53.1 percent to 59.4 percent. Perhaps the greatest shift was observed in the Effectiveness dimension, wherein 65.6 percent of the students were completely able to define a design problem and a solution within the cultural context, 53.1 percent were able to analyze case studies related to the proposed design solutions, and 62.5 percent were able to demonstrate verbal and visual communication skills for the project presentation.
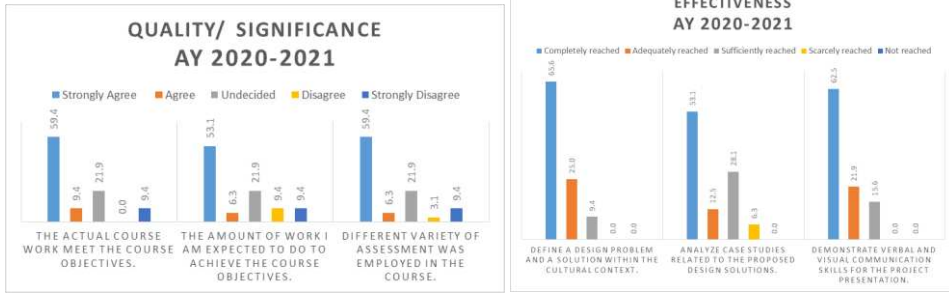
Figure 8: Figure 6: Quality/Significance and Effectiveness Dimensions Year 4

Finally, in Year 5, the students' performance across all the dimensions peaked. For instance, the Knowledge dimension steadily increased and maintained at the range of 55 percent to 57.5 percent across the items. Along with that, the Satisfaction dimension was also stable between the ranges of 50 percent to 60 percent.

Figure 9: Knowledge and Satisfaction Dimensions Year 5

Further, in terms of the Quality/Significance dimension, the scores ranged from 52.5 percent to 65 percent, indicating an overall high quality and significance dimension. Finally, in Year 5, the Effectiveness dimension was the highest: almost 80 percent of the students were able to effectively define a design problem and a solution within the cultural context, 80 percent were able to analyze case studies related to the proposed design solutions, and 77.5 percent were able to demonstrate verbal and visual communication skills for the project presentation.

Figure 10: Quality/Significance and Effectiveness Dimensions Year 5

The results indicated that interior design students demonstrated advanced measurement levels regarding the proposed curriculum and activities conducted by the senior-level instructors and a positive attitude toward these efforts, as well as a strong belief in the importance of supporting sustainable educational practices.
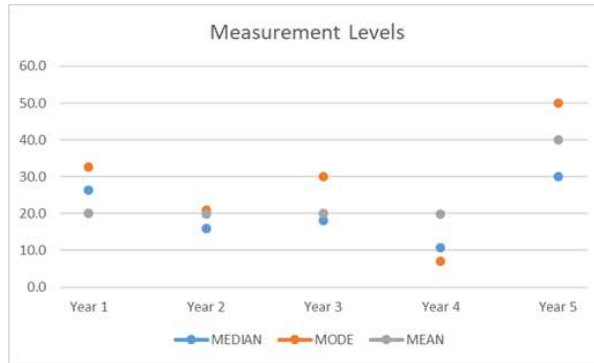

Figure 11: Measurement Levels through the Five Years

Discussion and Conclusion

The study's conclusions are supported by empirical evidence collected from a group of senior-level students studying interior design in the redefined course. The findings emphasize the students' adept utilization of interdisciplinary methodologies in their respective sector and their acknowledgment of the crucial need of creating connections with other academic subjects. According to the findings of Huber, Waxman, and Clemons (2017), the research has identified a significant lack of comprehensive avenues for interior design students to actively participate in in-depth exploration and evaluation that leverage the expertise and competencies of professionals in associated fields. This observation suggests that students may face difficulties when it comes to recognizing design issues, comprehending the importance of research and knowledge-driven design, and successfully integrating their discoveries into the design process. To solve these concerns, it was crucial to build an educational program that facilitates students' exploration of many academic disciplines and their ability to integrate their knowledge to tackle design-related problems.

The findings of the study exhibit a high level of clarity and depth, contributing to the overall conceptual framework of the paper by emphasizing the importance of a comprehensive and interdisciplinary approach in the field of interior design education. The findings underscore the positive impacts of the updated curriculum on students, as evidenced by increased knowledge, more contentment, a more favorable evaluation of the quality and value of the educational experience, and higher achievement of learning objectives. The study's findings offer significant contributions to the academic field by presenting persuasive evidence for the efficacy of systematic approaches and empirical investigations in the realm of interior design instruction at the university level. The research conducted by Kravale-Paulia, Romanovska, and Presnakova (2021) presented a thorough examination of the

difficulties encountered in higher education institutions during and after the epidemic. The issues have resulted in substantial and diverse ramifications. The recognition of these difficulties in the investigation signifies a deliberate evaluation of the broader framework in which the study is located.

The researchers demonstrate self-awareness by identifying the underlying limitations in their study, which encompass potential biases or constraints associated with data collecting. This study provides valuable insights into the potential benefits and drawbacks of the new curriculum in higher education by employing a more analytical methodology and considering alternate viewpoints. This study makes a significant contribution to the field of interior design education by highlighting the importance of interdisciplinary learning and empirical research. The significance of these findings lies in their contribution to the discipline, as they showcase the efficacy of systematic methodologies and empirical investigations within the realm of interior design education at the university level. In addition, a comprehensive examination of the available scholarly works pertaining to design education, pedagogical approaches, and the impact of crises on higher education would facilitate the researchers in their analysis and interpretation of the study's results. The study's positive findings suggest that the implementation of the new curriculum could potentially offer benefits within the realm of higher education, even when confronted with challenging circumstances. By adopting a more discerning perspective and including different perspectives, the research has the potential to make a significant scholarly contribution to the area and offer valuable insights for the improvement of design pedagogy and educational practices.

Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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