

Students Perception and Experiences on the Integration of Critical Thinking into Interior Design Education

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Abstract

Critical thinking has been highlighted as one of the seven soft skills for the higher education system. The interior design program is one of the higher education programs that implement these skills into curricula. Assessing students' perception and experiences is valuable for better adjustment in the pedagogical approaches to meet the needs, shortcomings, and talents of their students. It makes it possible to build critical thinking abilities in a more customised way. The critical thinking abilities are essential in the interior design process. Due to its importance, it was integrated into undergraduate interior design programs as required by the Ministry of Higher Education. However, there is very limited understanding of the effectiveness of its integration into undergraduate interior design programs. Many students seem to resist thinking critically in the design process, but they prefer giving more attention to the technical skills and aesthetic value. Therefore, the purpose of this study is to explore the student's perception and their experience on the integration of critical thinking in interior design programs. This is a qualitative study using single case study approach. Data of this study collected through the semi-structured interview with the final semester of interior design students at the University A. All participants were just passing the final semester during this study conducted. The data were analysed through thematic analysis using the Atlas.ti software version 23. The findings of this study revealed three themes represent the student's

perception and their experience on the critical thinking integration into interior design education. First theme is the perception of the integration of critical thinking into interior design education, ii) their experience of the way critical thinking is integrated into the interior design process, and iii) challenges faced by them during the practising of critical thinking. This study proposed an initiative to be carried out to improve the development of critical thinking among interior design students. Future studies may examine the connection between creativity and critical thinking in interior design. It could look at how these two factors work well together or against one another during the design process.

Keywords: Critical Thinking, Interior Design Education, Barriers, Teaching Practices.

Introduction

Critical thinking skills become an essential skill for higher education students. According to a survey conducted in the United States, 92% of the 400 organisations surveyed said that critical thinking skills are the second most important talent needed for new hires in the sector, after communication competence. A survey by Talentcorp (2014) to a local college revealed that critical thinking abilities rank second with a score of 56%, behind communication skills, which rank first with 81%. As this skill is important to higher education graduates, the Malaysia Ministry of Higher Education (MOHE) highlighted critical thinking skills as one of the seven soft skills that should be equipped by higher education students. Interior design is one of the higher education programs that integrates critical thinking into the curriculum and instructional design. Although critical thinking is implemented into interior design curricula, its feedback and the way it is integrated are less explored. Therefore, this study aims to explore students' feedback on their experiences in implementing critical thinking in interior design programs.

Literature Review

Critical Thinking

Experts define critical thinking as deliberate, reasoned reflection focused on making decisions about what to believe or do (Ennis, 1985). Critical thinking is commonly characterised as a metacognitive procedure encompassing various sub-skills (such as analysis, evaluation, and inference). When employed effectively, these skills enhance the likelihood of arriving at a logical conclusion in an argument or finding a solution to a problem (Dwyer, Hogan & Stewart, 2014). Critical thinking is crucial as it indicates a lack of education and preparedness for modern decision-making, leading to personal, professional, and societal failures that can be avoided through better decision-making (Goldsmith, 2013).

Interior Design

Interior design is a branch of architecture education that focuses on designing and solving issues in interior spaces, whereas architecture mostly focuses on the building's basic structure and exterior view. Interior design, as a discipline and in its output, is (or maybe) free of the weight of architecture, even if the design processes of architecture and interior design have the same procedural sequence and core disciplinary language (Hildebrandt, H., 2004). Both are involved in the design process stage during the design phase.

The phrase "design process" refers to a series of actions that, when skilfully carried out by the designer, provide a well-thought-out and expertly crafted design solution that satisfies the client's needs (Dodsworth, 2009). Interior design students must develop the cognitive and

ffective skills necessary to become critical thinkers. They also must learn how to approach design problems and design processes using a variety of pedagogical approaches, including comprehension, understanding, being open to new ideas, evolving critical thinking, developing the capacity to assess design concepts, rapidly expressing concepts visually, and converting meaningful concepts into visually appealing and sensual proposals (Vaikla-Poldma, 2003).

There are many ways to cultivate critical thinking skills. One of the many initiatives to educate individuals on how to think critically is incorporating critical thinking in course materials (Bağ, & Gürsoy, 2021). A study by Sughra, & Usmani, (2022) shows that when students followed an integrated curriculum, their critical thinking skills were stronger than those of students following a standard curriculum.

Teaching Critical Thinking Approach

Teaching critical thinking skills has four approaches, namely: i) general approach, ii) infusion approach, iii) immersion approach, and iv) mixed approach. The general approach focuses on teaching critical thinking in non-school contexts, separate from existing subject matter offerings, aiming to develop critical thinking skills in students (Sternberg, 1987). The infusion approach involves explicitly teaching critical thinking skills within the context of specific subjects. Unlike the immersion technique, where students may not realise they are being taught critical thinking, the infusion approach clearly emphasises critical thinking concepts (Behar-Horenstein, & Niu, 2011). Furthermore, the mixed approach combines the general and infusion techniques, emphasising the teaching of both subject-specific learning in a separate course and basic critical thinking skills. This strategy guarantees thorough and efficient instructional techniques (Apsari, 2016). According to Al-Ghadouni (2021), among all approaches, the immersion approach is the least effective and most frequently used, while the mixed approach is the most effective and the least frequently used.

Critical Thinking in Interior Design

Interior design professionals cultivate critical thinking skills while navigating the problem-solving process, exerting influence over the entire scope of interior design projects. This skill set plays a pivotal role in elevating the abilities of designers and employers, nurturing effective business management, and satisfying individual needs proficiently (Piotrowski, 2011). The integration of critical thinking in the design process enables designers to develop distinct and imaginative environments for both interior and exterior spaces (Kareem, & Hameed, 2021). Throughout the design process, critical knowledge develops alongside critical thinking and a critical approach, particularly during stages such as problem-based research, analysis, evaluation, the creation of innovative solutions, and final product development (Ucar, & Kandemir, 2018). Critical thinking in the design process involves conceptualising, analysing, synthesising, and evaluating ideas to create a final product or service. It involves careful consideration, observation, and scrutiny to ensure its effectiveness (Deutsch, 2020).

Critical Thinking and Student Perception

Students experience the integration of critical thinking into the curriculum during their formal learning at the university. Each of the institutions aims to improve the development of this skill among students. Thus, students are the individuals who need to be developed, gaining insight into student perceptions and experiences can be valuable for comprehending the

impact of critical thinking on their capacity to perform change (McAdam, 2020). Many studies conducted on students' experiences on critical thinking in higher education. A study by Eze, I. Iwu, & Dubihlela, (2022) reveals that the students felt that critical thinking is an essential talent for their daily lives, even though they did not know much about it. While Bowen, (2022) found that students held the perception that "critical thinking" (1) encompassed the practical application and utilisation of knowledge, (2) was distinguished from passive learning methods, particularly the memorisation of facts, (3) had its roots in prior experiences predating the study of organic chemistry, and (4) was driven by various intrinsic and extrinsic factors. A study in Malaysia by Rodzalan, & Saat, (2015) indicates that students rated themselves as possessing strong critical thinking and problem-solving skills, as they concurred with the idea of evaluating both the pros and cons when analysing others' ideas. Additionally, male students were perceived as more adept critical thinkers and competent problem solvers compared to their female peers. However, no significant difference was observed between students in science and engineering disciplines in this regard. The literature review shows that studies highlight the significance of critical thinking in student development, revealing that students perceive it as a vital skill for academic and everyday life. Gender differences in perceived competence can help educators tailor teaching strategies to develop critical thinking skills, preparing students for complex problems and positive change.

Research Methodology

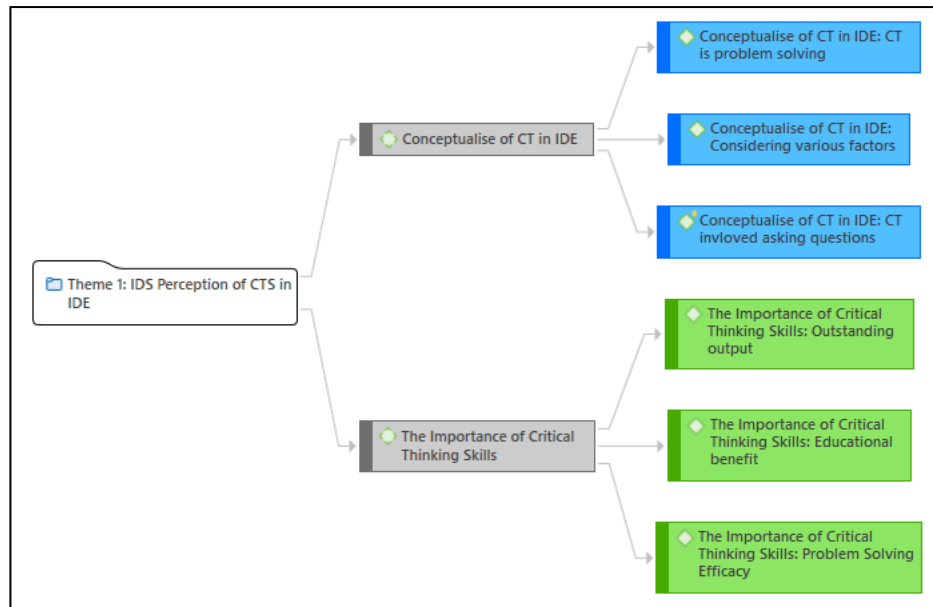
The main purpose of this study is to explore the students' experience on the integration of critical thinking in the interior design process. This qualitative study employed the case study approach by collecting data through semi-structured interviews with ten students at University A. A total of ten final semesters of Bachelor Interior Architecture students volunteered to participate in this study. The interviews were conducted in November 2023, following the students' final project presentations. All participants had completed two and a half years in the Bachelor of Interior Architecture program. Based on the student's availability, the interview sessions were scheduled ahead of time, with some sessions taking place at night. Each interview lasted at least 20 minutes and was recorded and transcribed verbatim.

Research Approach

This qualitative study used the case study method. According to Merriam & Tisdell (2015), a qualitative study is often conducted when there is a lack of theory or when existing theories fail to explain a phenomenon adequately. This study uses a single case study method. The selected case study was selected due to its experience in implementing the integration of critical thinking skills in interior design programs. The reason for choosing a single case is that the researcher has access to a situation that was previously inaccessible for empirical study. Thus, conducting the case study is valuable, as the descriptive information alone will be enlightening (Yin, Robert, 2014). The data gathered from the semi-structured interview were analysed using thematic analysis using Atlas.ti software version 23.

Result and Discussion

The semi-structured interview reveals two main themes for this study. The first theme is the student's perception of the integration of critical thinking in interior design education, and the second theme is the student's experience of how critical thinking is integrated into the design process. Those themes are as shown in the figure below, generated from Atlas.ti version 23.

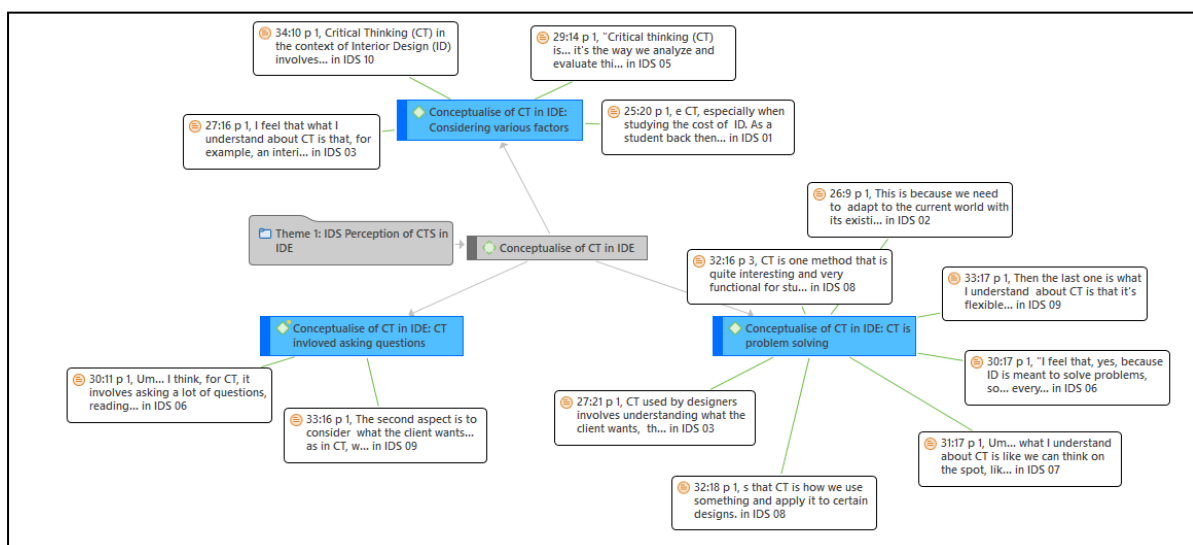


Theme 1: Students' Perceptions of Critical Thinking Concept in Interior Design Education.

The first theme that emerged from the interview data is the perception of students towards the concept of critical thinking in interior design education. There are two sub-themes under this theme, namely, conceptualise critical thinking in interior design education and their perception of the benefit of critical thinking in interior design education.

Sub-theme 1.1: Conceptualise Critical Thinking in Interior Design Education

The first sub-theme is the conceptualisation of critical thinking in interior design education. There are problem-solving, considering various factors, and questioning methods. Among those three sub-themes, problem-solving is a crucial attribute discussed by students. Students share their thoughts on the existence of critical thinking skills during the interior design process in the design studio. Their thoughts were based on their understanding of critical thinking, which is thinking out of the box and deep thinking. Therefore, their perception was based on their understanding of what critical thinking is all about. The figure below shows the network of theme one, which is analysed through thematic analysis using Atlas.ti software.



a. *Problem-Solving*

Six out of ten students perceived that critical thinking exist during the problem-solving process. They perceive that critical thinking plays a crucial role in the problem-solving process. Thus, it helps them to come up with original, creative designs and concepts that set their work apart from others.

So, critical thinking is not only applied during client meetings; there may be challenges in the middle of the process, and we need to analyse what the problem is, understand it, and solve it until the project is completed (IDS 03).

[...] like we can immediately come up with... not a solution, but like, we can solve the problem at the same time. (IDS 07).

Critical thinking is one method that is quite interesting and very functional for students to solve complex design problems. At the same time, critical thinking also allows you to generate designs and ideas that are truly out of the box. (IDS 08).

b. *Considering Various Factors*

Students' participants emphasise that critical thinking involves the process of considering various factors. They are aware that interior design deals with the decision-making process to fulfil the user's needs in numerous criteria to come out with fresh new ideas to solve the problems that arise.

[...] I feel that what I understand about critical thinking is that, for example, an interior designer needs to be careful and analytical, considering various factors. (IDS 03).

[...] but what we want is to explore new ideas in various ways. In this context, especially for students, we need to explore and... we need to find something new that is trending. (IDS 09).

[...] Critical thinking in the context of Interior Design involves considering various aspects, especially when dealing with human behaviour. (IDS 10).

c. *Questioning Approach*

The third theme is the questioning approach. Participants from the student body share the belief that asking lots of questions promotes critical thinking. Asking several questions about the requirements of the design project is one way to improve the project's output.

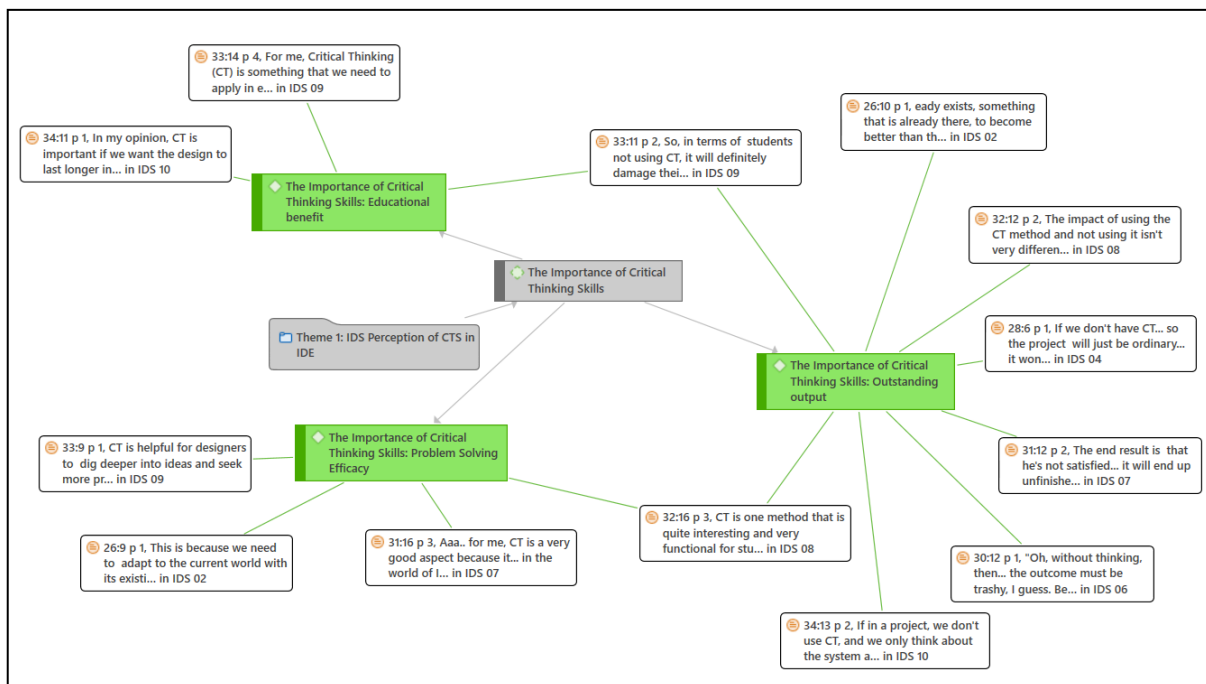
[...] I think critical thinking involves asking a lot of questions, reading a lot, and going beyond the comfort zone, like thinking why... why... why am I doing this project? For whom? What's the benefit? And what's the benefit for these people, and what happens in this country, in this local area? [...] (IDS 06).

[...] as in critical thinking, we need to think about what the client wants. So, think about what... what can save, like... how to save costs for the

client using what materials? For example, expensive furniture... if we want to save, what can we use? However, if we want to save but the space is small, it may not be efficient... we need to think, we need critical thinking [...] (IDS 09).

Sub-theme 1.2: Students' Perception on The Benefit of Critical Thinking in Interior Design Education

The figure below shows the second sub-theme that appeared from the student's interview. It displays the student's perception of the importance of applying critical thinking in interior design education.



a. Outstanding Output

It can be seen clearly in the above figure that most participants, where about seven out of ten students, emphasise that the benefit of critical thinking being integrated into interior design education is to produce quality and outstanding output. They see that the existence of critical thinking during the designing phase would help them produce out-of-the-box ideas and meet the criteria. The outcome from the process of thinking critically will also reduce the problem of the result and serve the function. They believed once critical thinking is considered, the result of the project will not become trashy, ordinary, and unfinished works.

[...] If we don't have critical thinking... so the project will just be ordinary... [...] people will just see the project as ordinary. (IDS 04).

[...] It allows you to generate designs and ideas that are truly out of the box. So, you need to have critical thinking to come up with designs that are different from others. (IDS 08).

[...] When creating something, critical thinking is essential; it truly serves its function. (IDS 09).

[...] If in a project, we don't use critical thinking, and we only think about the system and aesthetics. Basically, the project won't meet its criteria. (IDS 10).

b. Problem-solving Efficacy

About four out of ten participants emphasised that critical thinking helps their problem-solving efficacy. There is a student who perceives that critical thinking is an essential tool for a designer to solve the problems that arise. Besides, it also helps them to speed up their problem-solving process.

[...] So, as a designer, it's essential to have critical thinking to find solutions—not just blindly following technology without addressing any problematic issues—hence the necessity of critical thinking. (IDS 02).

[...] already have the knowledge and everything. So, it becomes easier... to solve the problem or face the problem. (IDS 07).

[...] very functional for students to solve complex design problems [...] (IDS 08).

c. Educational Benefit

Several participants highlighted that the absence of critical thinking skills in the design process would decrease the quality of design decisions, affecting their grade points. Some of the participants indicated that critical thinking educates them to be good critical thinkers and prepares them for future challenges in life.

[...] if students do not use critical thinking, it will damage their grade points. For instance, if we want to present a SUBJECT matter but lack critical thinking, it becomes pointless. (IDS 09).

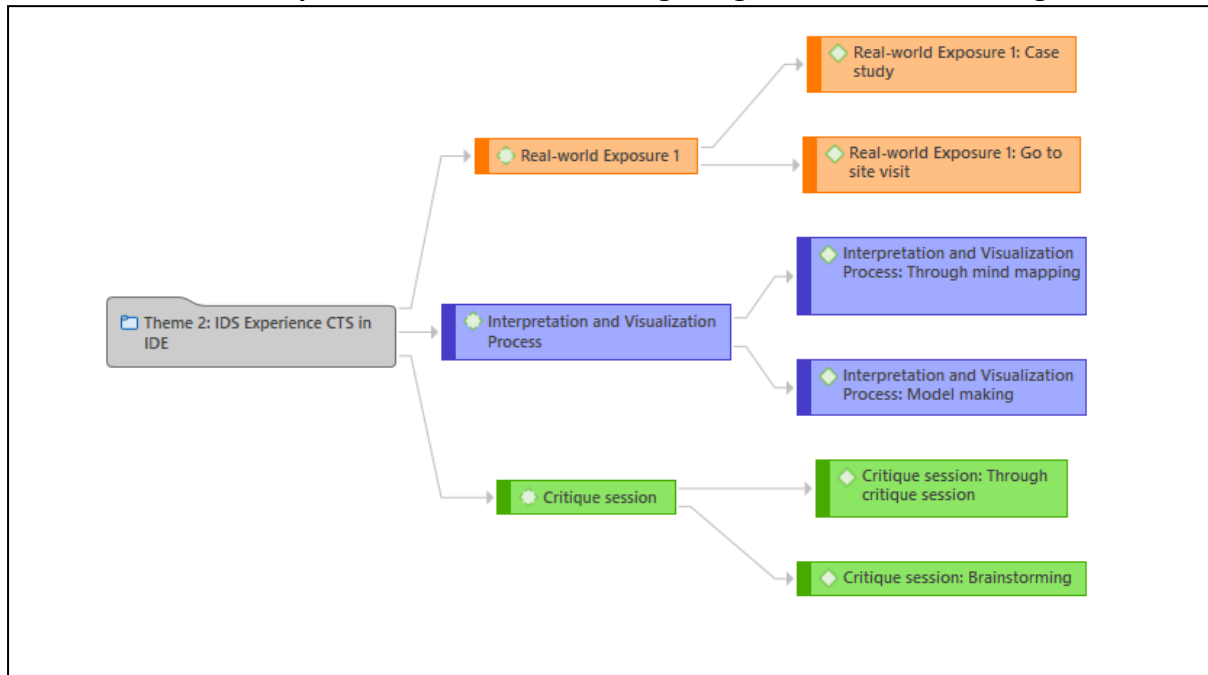
[...] Without critical, things might feel unresolved. It's something that should be part of every aspect of our lives. (IDS 09).

[...] We, in a way, educate our minds to think more deeply, and we consider what's the cost... what are the consequences that will come...

Just to prepare for the current situation and the future. (IDS 10).

In summary, students see the incorporation of critical thinking into interior design education as a crucial part of problem-solving, multi-factor consideration, and questioning. Critical thinking is regarded as essential for comprehending customer objectives, assessing different design components, and generating results that are of the highest calibre. Students understand that critical thinking helps them think flexibly and adjust to changing circumstances, two skills that are essential for success in interior design.

Theme 2: Students' Experience Of Critical Thinking Integration In Interior Design Education



These two emerged from the interview session with student participants discovering four sub-themes. There are three sub-themes under this theme, as shown in the figure above. The following sub-themes are i) interpretation and visualisation, ii) real-world exposure, and iii) critique session. Participants share their experiences of using critical thinking skills during the implementation of their interior design project. Students believed the activities provided by lecturers in the interior design classroom encouraged critical thinking skills to be practiced.

Sub-theme 2.1: Interpretation and Visualisation Process

The first sub-theme under the student's experience is the interpretation and visualisation process. Students express their experience on interpretation and visualisation tasks asked by lecturers, making them think critically about the topic. The interpretation is carried out through mind mapping, while the visualisation is through model making. They are required to do both activities in the classroom to make sure they can interpret and visualise things ahead. The practice of combining mind maps and model-making enhances comprehension of concepts by utilising various cognitive skills.

a. Mind Mapping

Students express their expressions while doing mind mapping and model making, which helps them to think critically about the ideas and decision-making of their project. They experience doing the mind map during the analysing and synthesising of the information. They can conceptualise complicated ideas due to the mind map's clear visual form.

[...] I've noticed that before starting any project, when they already know what our project is about, they ask us to create a mind map to extract all the information we've gathered based on research about the project. This makes it easier for us to avoid any problems in the future based on that mind map [...] (IDS 03).

[...] That's another method the lecturer used when I was studying, teaching us to create a mind map because it's easier for us to see those keywords and what relates to the

main topic. I think that's one effective method. When we start designing, we first extract any ideas or anything related to that topic. (IDS 07).

[...] From the critical thinking subject matter, we need to think about how to proceed. For example, the first thing is to create a mind map; to study it, you need to study the mind map first. Once you have the keywords, you can develop the concept. That requires critical thinking, so if you don't think about it, it's like we just take the keywords, but we don't know how to explain it because we haven't studied it. (IDS 09).

b. Model-making

Students shared their experiences of practicing critical thinking through the model-making process. They mentioned that their lecturers asked them to do model-making to visualise the concept of the project and to understand the site condition better.

[...] We are often asked to create a conceptual model. Creating a conceptual model itself already involves using critical thinking – figuring out how to transform the project's name alone into a model to establish a concept. So, just by doing that, we are already using critical thinking to analyse the contents of the project title and create a model. We then analyse what we obtain from the model to incorporate into the space. (IDS 03).

[...] By using the method of creating a physical model, it can provide a lot of out-of-the-box thinking. It means we're not just thinking at a low level; we're thinking at a higher level by using that thing. (IDS 08).

I learned idea development from him, meaning, for example, he asked us to create a model of the site. So when he told us to choose a site, we created a model, and when we made the model, at first, I didn't understand why I had to make a model first. Then, we had to place it on the actual site. (IDS 10).

Sub-theme 2.2 : Real-world Exposure

Furthermore, they experience critical thinking through real-world exposure. Students convey that they experienced critical thinking when the lecturer asked them to go out into the real world and make some observations. They were asked to do a case study and site observation at a real place before they started the project. As the interior design project requires the designer to understand the user's behaviour, this task helps students to get a better picture of the real scenario to produce a good design idea in the future.

"She wants us to experience it firsthand. That means we need to go to one of the places. For example, if I'm designing a café, don't just look at Pinterest... She wants us to go out and observe and see the human behaviour in that place. That's Mdm X approach." (IDS 01).

"Another thing is I feel the lecturer really emphasises doing case studies. If possible, they require a minimum of three case studies." (IDS 03).

Sub-theme 2.3: Critique Session

Student participants shared that they have experience in critique, which encourages them to think critically about the interior design project. They noted that brainstorming sessions with peers and critique with lecturers stimulate their critical thinking process. During these sessions, the questioning approach used by both lecturers and peers challenges their ideas. As a result, their thinking is activated, prompting them to consider and refine their concepts thoroughly.

"We will sit together in one place and pin up all our work, from the beginning to the end. Our work stays pinned up until the end of the semester. The critique will be based on what we have pinned up. So, every time we have a critique, we will present everything we've done. Then, she gives our classmates the opportunity to give their opinions and feedback." (IDS 04).

"Um... I think, during the critique session, the way... one by one... the one-by-one session, [...] Ha, so I think, in that case, the method that the lecturer provides, which is a critical session, helps a lot." (IDS 05).

[...] During the critique, he would make us think... [...] (IDS 06).

In conclusion, students experience the integration of critical thinking skills in interior design education through the interpretation process, real-world exposure, and critique sessions. Those classroom activities provided by lecturers prepare them to analyse, evaluate, and improve their designs, preparing them to tackle complex design challenges in their professional careers.

Discussion

This study is guided by the following research questions:

1. How do students conceptualise critical thinking in interior design education?
2. How do students experience the integration of critical thinking in the interior design process?

Investigating students' perception of the conceptualisation of critical thinking in interior design education discovered that students are knowledgeable about the existence of the critical thinking process in the interior design process. The study on students' perceptions of critical thinking in interior design education revealed that they acknowledge its significance in their design activities and consider it a fundamental aspect of their education, integral to various stages of the design process. They believed that critical thinking was integrated into the problem-solving process, interpretation and visualisation, and critique sessions.

Students emphasise the importance of critical thinking in problem-solving in the design project. It involves analysing problems from multiple angles, considering factors like functionality, aesthetics, and sustainability, and evaluating potential solutions. This process helps students gain a deeper understanding of design issues and enhances their ability to create innovative solutions. Similarly, the study by Folić, Kosanović, Glažar, & Fikfak, (2016) indicates that design-build projects aim to enhance critical thinking, problem-solving, and decision-making skills in architecture students from a pedagogical standpoint.

Furthermore, students emphasise the importance of critical thinking in the interpretation and visualisation stages of the design process. They emphasise the need for careful analysis and evaluation of client needs, contextual factors, and design constraints. Visualisation techniques like sketching, modelling, and digital rendering help students refine their ideas and consider spatial relationships, material choices, and design coherence. This is aligned with the study by Afify et al (2020) stressed that students' ability to think critically is enhanced by model-making technique.

Interior design education strives to cultivate cognitive and emotive skills to create critical designers who can solve problems. It is imperative that students acquire the skills of comprehension, open-mindedness, and critical thinking growth. They should also assess design concepts, convey concepts graphically and swiftly, and translate abstract concepts into appealing visual solutions. Through this method, students improve their ability to solve problems in the field of design (Vaikla-Poldma, 2003).

Critique sessions are crucial for promoting critical thinking, as they involve students presenting their work and receiving feedback from peers and instructors. In desk crit sessions, teachers listen, encourage, provide advice, and ask questions, fostering critical thinking and problem-solving skills in students, thereby providing a conducive learning environment (Graham, 2003). In addition, during a critique session, students could assess their designs and cultivate targeted, analytical thinking abilities that facilitate the understanding and adjustment of the projects they are creating (Megayanti, Aryanti, & Dewi, 2019). The questioning approach encourages students to justify their decisions, explore alternative perspectives, and reflect on their work, enabling informed improvements. Students also understand the significance of utilising critical thinking in real-world design problems through field studies, site visits, and case studies, which help them understand and analyse real environments, thereby bridging the gap between theoretical knowledge and practical application.

The current interior design curriculum integrates critical thinking skills across all courses, from foundational to advanced studios, with assignments and projects designed to challenge students' analytical and creative abilities, encouraging them to apply critical thinking throughout their education.

Conclusion

Findings show that students' comprehension of how to integrate critical thinking is aided by problem-solving techniques, stages of interpretation and visualisation, and critique sessions. Students did experience critical thinking in their design classroom. They understand the significance of utilising critical thinking in real-world design problems through field studies, site visits, and case studies, which help them understand and analyse real environments, thereby bridging the gap between theoretical knowledge and practical application. The interior design program equips students with these abilities so they may take on challenging design projects and excel in their future professions. Students who focus strongly on critical thinking become not just adept designers but also considerate and introspective professionals. Graduates of the interior design program are prepared to take on challenging design projects and excel in their future employment thanks to their acquisition of critical

thinking skills. Focusing on critical thinking helps students develop into professional designers who are also reflective and thinking thinkers.

References

- Afify, H. M. N., Alhefnawi, M. A., Istambouli, M. J., Alsayed, A. H., & Elmoghazy, Z. A. A. E. (2021). An evaluation of physical model-making as a teaching method in the architectural design studio—A case study at Imam Abdulrahman Bin Faisal University. *Ain Shams Engineering Journal*, 12(1), 1123-1132.
- Al-Ghadouni, A. M. (2021). Instructional approaches to critical thinking: An overview of reviews. *Revista Argentina de Clínica Psicológica*, 30(1), 240.
- Apsari, N. P. A. N. (2016). Teacher's Way To Foster Critical Thinking In The Classroom (Doctoral dissertation, Universitas Pendidikan Indonesia).
- Bağ, H. K., & Gürsoy, E. (2021). The effect of critical thinking embedded english course design to the improvement of critical thinking skills of secondary school learners☆. *Thinking Skills and Creativity*, 41, 100910.
- Behar-Horenstein, L. S., & Niu, L. (2011). Teaching Critical Thinking Skills In Higher Education: A Review Of The Literature. *Journal of College Teaching & Learning (TLC)*, 8(2), 25–42. <https://doi.org/10.19030/tlc.v8i2.3554>
- Bowen, R. S. (2022). Student perceptions of “critical thinking”: insights into clarifying an amorphous construct. *Chemistry Education Research and Practice*, 23(3), 725-741.
- Darby, N. M., & Rashid, A. M. (2017). Critical Thinking Disposition: The Effects of Infusion Approach in Engineering Drawing. *Journal of Education and Learning*, 6(3), 305-311.
- Deutsch, R. (2020). *Think Like An Architect: How to develop critical, creative and collaborative problem-solving skills*. Routledge.
- Dodsworth, S., & Anderson, S. (2015). *The fundamentals of interior design*. Bloomsbury Publishing.
- Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking skills and Creativity*, 12, 43-52.
- Ennis, R. H. (1985). A Logical Basis for Measuring Critical Thinking Skills (pp. 45–48).
- Eze, I. F., Iwu, C. G., & Dubihlela, J. (2022). Students' views regarding the barriers to learning critical thinking. *International Journal of Research in Business and Social Science* (2147-4478), 11(4), 355-364.
- Folić, B., Kosanović, S., Glažar, T., & Fikfak, A. (2016). Design-Build Concept In Architectural Education. *Architecture and Urban Planning*, 11(1), 49–55. <https://doi.org/10.1515/aup-2016-0007>
- Goldsmith, R. E. (2013). Encouraging Critical Thinking Skills Among College Students. June, 8–
- Hildebrandt, H. (2004). The gaps between interior design and architecture. *Design intelligence*, 10(3).
- Graham, E. M. (2003). *Studio design critique: student and faculty expectations and reality*. Louisiana State University and Agricultural & Mechanical College.
- Hildebrandt, H. (2004). The gaps between interior design and architecture. *Design intelligence*, 10(3).
- Kareem, A. T., & Hameed, S. H. (2021). The intellectual luxury in the interior design.... Review of International Geographical Education Online, 11(2), 92-104.
- McAdam, J. (2020). An investigation of the relationship between student critical thinking skills and professional development (Doctoral dissertation, Northwest Nazarene University).

- Megayanti, T., Aryanti, T., & Dewi, N. I. K. (2019). PEER DESIGN JURIES: The Implementation Of Group Pin-Up In Architecture Design Studio. 1(1), 68–74. <https://doi.org/10.17509/jare.v1i1.15808>
- Merriam, S. B., & Tisdell, E. J. (2015). Qualitative research: A guide to design and implementation. John Wiley & Sons.
- Piotrowski, C. M. (2011). Problem Solving and Critical Thinking for Designer. John Wiley & Sons.
- Rodzalan, S. A., & Saat, M. M. (2015). The perception of critical thinking and problem-solving skill among Malaysian undergraduate students. *Procedia-Social and Behavioral Sciences*, 172, 725-732.
- Sughra, U., & Usmani, A. (2022). Comparison of Critical Thinking among undergraduate medical students of Conventional and Integrated curricula in Twin Cities. *Pakistan Journal of Medical Sciences*, 38(6), 1453.
- Sternberg, R. J. (1986). Critical Thinking: Its Nature, Measurement, and Improvement.
- Talentcorp. (2014, August 9). MATCHING TALENT TO JOBS-Trends in Graduate Employability. August, 2014. https://www.talentcorp.com.my/clients/TalentCorp_2016_7A6571AE-D9D0-4175-B35D-99EC514F2D24/contentms/img/publication/Matching-Talent-to-Job-1.pdf
- Ucar, O., & Kandemir, O. (2011). A constructivist studio environment for interior design education. *Design Principles & Practice: An International Journal*, 5(6), 65-79.
- Vaikla-Poldma, T. (2003). an Investigation of Learning and Teaching Processes in an Interior Design class. March.
- Yin, R. K. (2014). Case Study Research; Design and Methods (5th Edition) SAGE Publication
- Yoke, S., Ahmad, S., Yunus, R., Amin, J., Sulaiman, N., & Majid, F. (2020). Educator's Readiness for 21st Century Education. *Journal of Engineering and Applied Sciences*. <https://doi.org/10.36478/jeasci.2019.10687.10692>.