ASSOC PROF TS
DR MOHD ZAIRUL
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# PORTFOLIO

"There are no wrong turnings. Only paths we had not known we were meant to walk."

Gavriel Kay


# 1ST MALAYSIAN G.O.T IN THE NETHERLANDS FOR PHD

# Recognitions

## BEST TEACHING PRACTICE

## 2022


UPM
i-PiCTL 2022
CERTIFICATE
OF AWARD
This is to certify that
MOHD ZAIRUL MOHD NOOR & REFI RIFALDI
with poster title:
STUDIO ORIENTED LEARNING ENVIRONMENT (S.O.L.E)
FOR STUDIO TEACHINGIN INDONESIA
has been awarded the
GOLD MEDAL
at the Putra InnoCreative Poster Competition
International PutraInnoCreative Carnival in Teaching and Learning 2022
25th – 28th October 2022 | Universiti Putra Malaysia
i-PiCTL
2022

# AWARDS


UPM
i-PiCTL 2022
CERTIFICATE
OF AWARD
This is to certify that
MOHD ZAIRUL MOHD NOOR
with poster title:
ASSESSMENT FOR FUTURE PROOF ARCHITECTURE GRADUATES
has been awarded the
GOLD MEDAL
at the Putra InnoCreative Poster Competition
International PutraInnoCreative Carnival in Teaching and Learning 2022
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i-PiCTL
2022

In my present capacity, I've focused on two key areas: firstly, advancing innovative educational technologies and creating dynamic smart classroom ecosystems, and secondly, contributing significantly to building technology, emphasizing science-driven design, construction, and operational approaches for enhanced performance, resource efficiency, occupant wellbeing, and equity in construction. My adoption of the Studio Oriented Learning Environment (S.O.L.E) methodology in architectural education reflects my commitment to pioneering pedagogy and addressing multifaceted architectural challenges.

My achievements in architectural education, marked by several prestigious awards including the 1st Prize for Teaching Innovation and numerous Gold Medals, demonstrate my dedication to pedagogical innovation. In the realm of building technology, my research on prefabricated mass housing in Malaysia and my contributions to the Malaysian Construction Research Journal highlights my interdisciplinary approach to sustainability in architecture. Joining MIT's Department of Architecture would be an exceptional opportunity to leverage my expertise in these areas, contributing to the institution's goals of addressing the population crisis through transformative architectural solutions.

# Innovation in architecture pedagogy

This particular Portfolio will be focused exclusively on one of the courses I have been teaching for several years now. The courses selected are ARC5001 & and ARC5002 (Architecture Design Studio), which is a mandatory component of the Master of Architecture program offered by Universiti Putra Malaysia. Over the years, this course has been attended by an average of 30 to 40 students per year. It is worth noting that, to complete this course, students are required to achieve a minimum grade of B. Furthermore, it is important to mention that ARC5001 serves as a prerequisite to ARC5002, meaning that students must successfully pass the former before they can progress to the latter.

As an instructor, I have had the privilege of teaching this course for several years now, and have had the opportunity to refine and develop my teaching methods over time. Through this Teaching Portfolio, I aim to provide a comprehensive overview of my teaching approach for this course, which includes my teaching philosophy, instructional strategies, assessment methods, and student outcomes. This portfolio not only demonstrates my commitment to excellence in teaching but also highlights my ability to adapt and improve my methods to meet the changing needs of students over time. Ultimately, my goal is to help students develop the knowledge, skills, and critical thinking abilities necessary to succeed in the field of architecture and beyond.

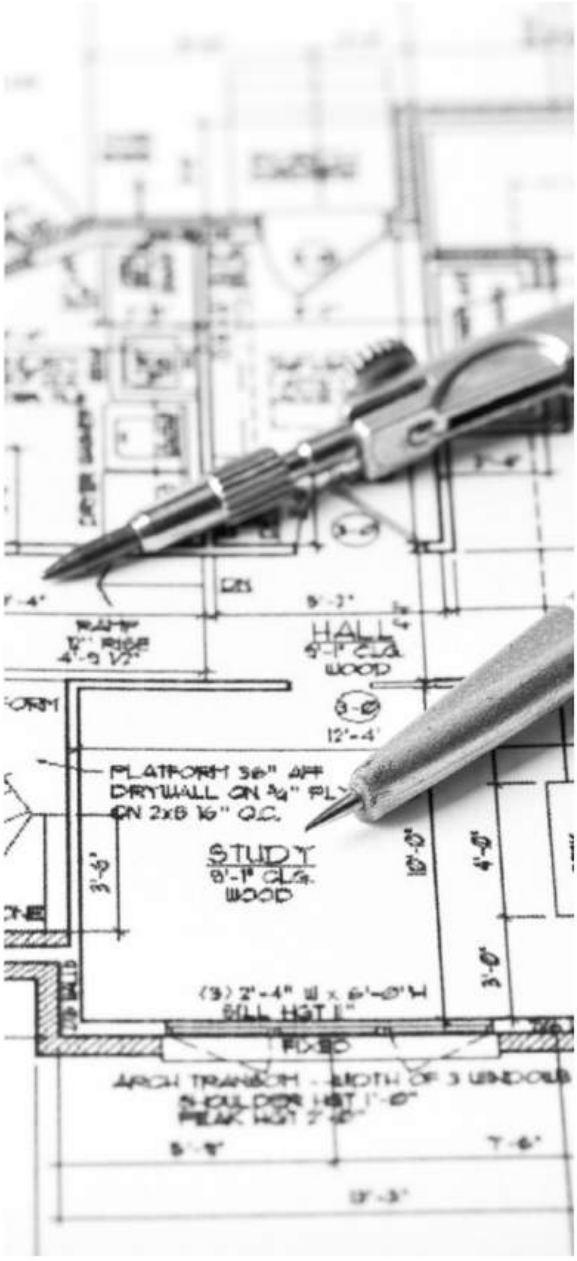
The Board of Architects Malaysia has outlined several program education outcomes that are expected of students who complete the Master of Architecture program in Malaysia. These outcomes are intended to ensure that graduates are well-prepared to enter the workforce and make significant contributions to the field of architecture. Some of the key program education outcomes that have been identified by the board include:

- **Knowledge and Understanding**: Graduates should have a strong grasp of the fundamental concepts and principles of architecture, including design, construction, technology, history, and theory.
- **Design Abilities:** Graduates should be able to apply their knowledge of architecture to the development of innovative and effective design solutions that address a wide range of challenges and contexts.
- **Communication Skills**: Graduates should be able to communicate their design ideas and solutions effectively using a variety of media, including drawings, models, and presentations.

- **Professional Ethics and Responsibility:** Graduates should be aware of the ethical and professional responsibilities of architects and be committed to upholding the highest standards of integrity and accountability.
- **Critical Thinking and Problem-Solving**: Graduates should be able to think critically and analytically, identify problems, and develop effective solutions to complex design and construction challenges.
- **Teamwork and Collaboration**: Graduates should be able to work effectively in teams and collaborate with other professionals to achieve common goals.
- **Lifelong Learning:** Graduates should be committed to lifelong learning and professional development, and be able to adapt to changing technologies, societal needs, and design practices over time.

# 01# Philosophy
## of teaching methodology

The field of architecture and its corresponding education is facing numerous challenges, including societal changes, environmental issues, globalization, urbanization, degradation of natural environments, and increased demand for public services, infrastructure, and housing.



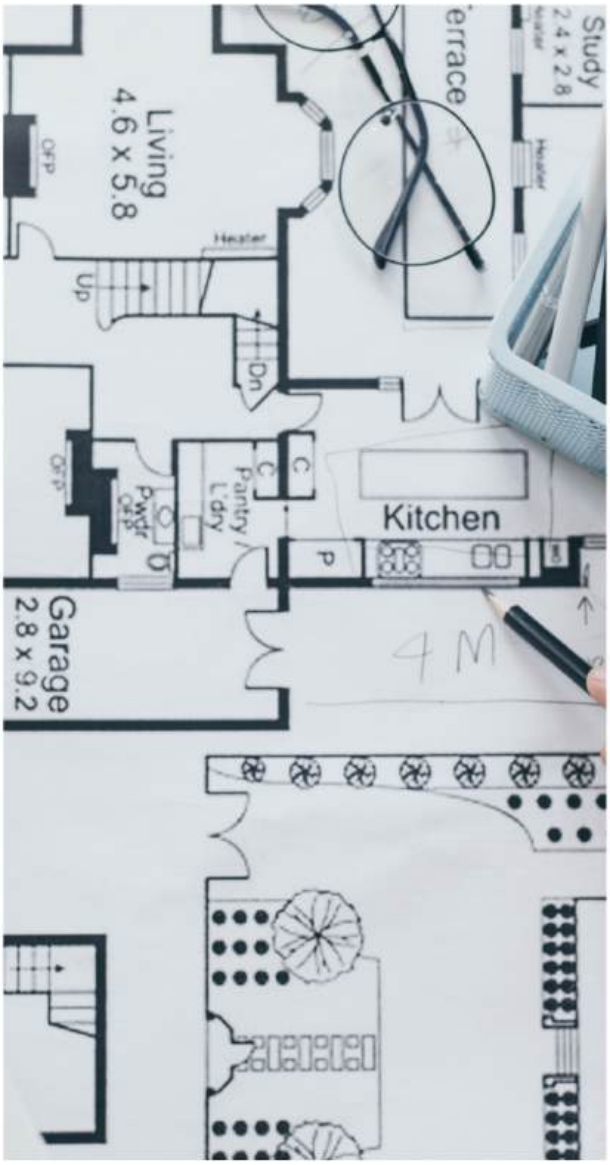

To effectively address these challenges, students in higher education must be equipped with the knowledge and skills necessary to develop innovative solutions. This requires a new approach to architectural and urban design that aligns with the sustainability goals outlined in the 2030 Agenda for Sustainable Development. With this in mind, students must be trained to create spatial scenarios and solutions that address contemporary sustainability issues.

The education of architects must adapt to address the pressing challenges of social transformation, climate change, globalization, and urbanization, which have significant impacts on existing environments and public services. This requires equipping students with the knowledge and skills to design inclusive, safe, resilient, and sustainable cities and settlements, in alignment with Sustainable Development Goal 11. Additionally, education must strive for inclusivity and equity, in line with Sustainable Development Goal 4.

Architects have a vital role in contributing to the built environment and making choices that positively impact the world through sustainable design practices.

The recent SDG Dhaka Declaration further emphasizes the importance of architects in achieving all 17 of the UN Sustainable Goals. Considering the COVID-19 pandemic, it is crucial to re-evaluate current approaches to architectural education, curricula, and learning environments to ensure they effectively prepare future architects for the challenges ahead especially post-COVID-19 (Architects, 2020).The studio-based learning, S.O.L.E (Studio Oriented Learning Environment), combines the 'peeragogy' and 'cybergogy' approaches to propose a new way of designing learning that emphasizes both peer-to-peer discussion and assessment with the use of technology. This approach represents a significant departure from traditional pedagogic methods and focuses on creating a learning environment that mirrors the conditions in which professional architects work.

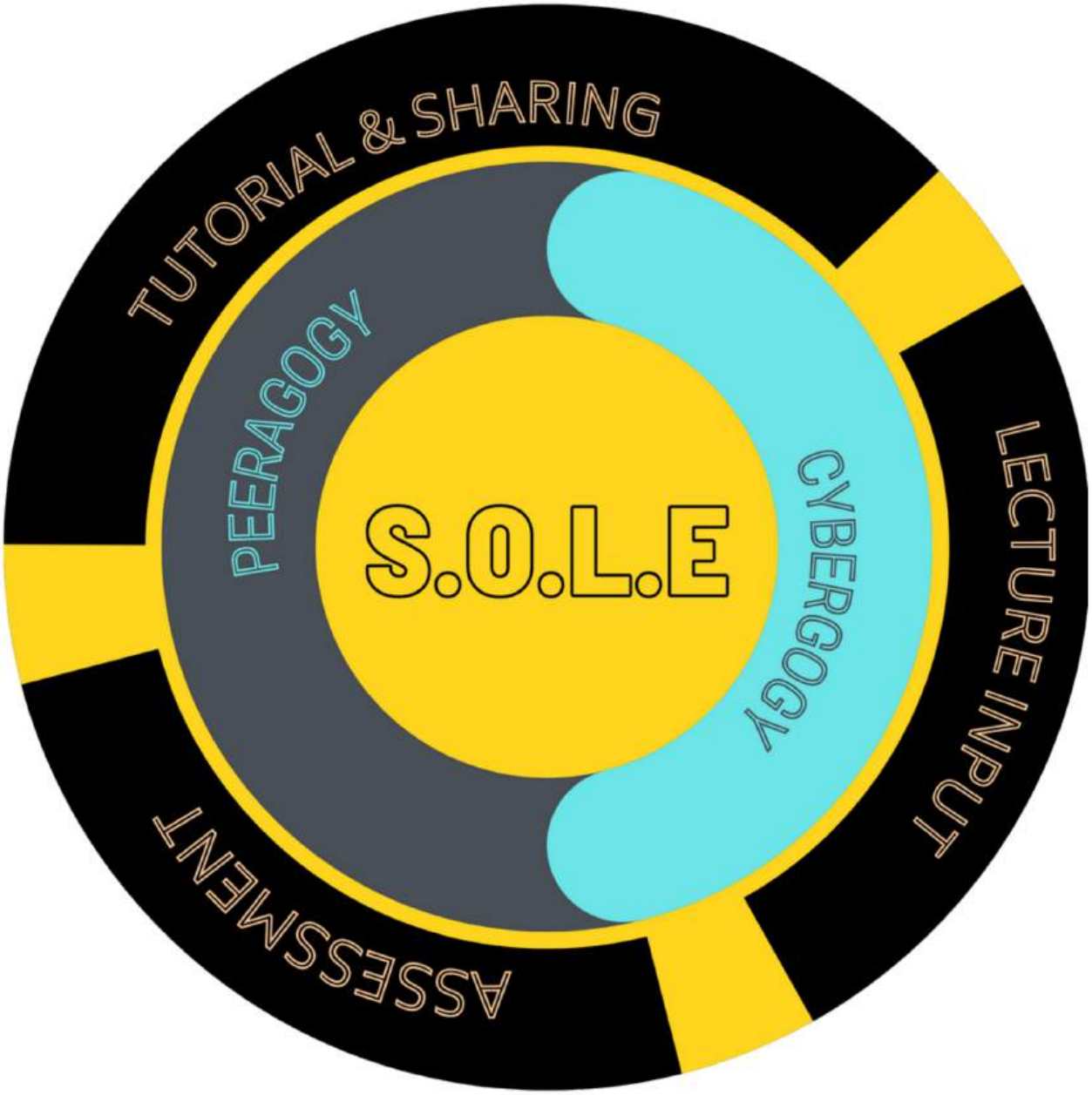
The design studio is a crucial component of architecture education, and it plays a central role in fostering the knowledge, skills, values, beliefs, and habits necessary for success in the field. A studio education is a collaborative process that involves both educators and students, and it should reflect a shared set of understandings, meanings, and assumptions. This collaborative approach helps students to develop a comprehensive understanding of the design process, and it provides them with opportunities to engage with the material and apply their knowledge in real-world settings.




The COVID-19 pandemic has presented significant challenges to architecture schools, particularly in terms of providing traditional architecture education. However, the pandemic has also led to a reconsideration of existing teaching methods, and there are now discussions about how best to move forward in the post-pandemic world. Despite the challenges posed by the pandemic, the design studio remains a critical component of architecture education, and it continues to play a crucial role in shaping the future of the field. The teaching theory behind the S.O.L.E program is a combination of two approaches, namely 'peeragogy' and 'cybergogy'. The term 'peeragogy' refers to a style of learning that emphasizes the role of peers in the learning process. It views students as active participants in their own learning and encourages collaboration, dialogue, and mutual support among peers. On the other hand, 'cybergogy' refers to the use of technology to support and enhance learning.

# Statement of teaching model / theory

The S.O.L.E methodology integrates two approaches to develop a novel approach to designing learning in the studio. This approach equally emphasizes peer discussion and assessment, as well as the use of technology. The program creates an environment that encourages active and collaborative learning and motivates students to be actively involved in their own education. The figure below depicts the conceptual framework of the S.O.L.E model, which is built upon the fundamentals of studio education such as tutorial and sharing, lecture input, and assessment. These fundamentals are used to guide the approach in the studio, which is based on the principles of 'peeragogy' and 'cybergogy'.



The use of technology in the S.O.L.E methodology serves several purposes. It helps to facilitate communication and collaboration among students, as well as providing students with access to a wide range of resources and tools that can support their learning. Additionally, technology is used to provide students with immediate feedback on their work, allowing them to learn from their mistakes and make improvements in real time. In summary, the S.O.L.E program is based on a teaching theory that emphasizes the importance of active, collaborative learning and the use of technology.

My teaching philosophy is based on the belief that education should foster both critical thinking and character development. I acknowledge that traditional teaching methods, such as those commonly used in design disciplines, often rely on a "folk pedagogy" that reinforces existing views and techniques through personal experience and cultural tradition. While these pedagogies are important for preserving shared ideas and practices, they can also perpetuate unproductive behaviors and false beliefs, leading to misalignment between teachers' beliefs about learning and the actual learning process.

To avoid these potential pitfalls, I believe it is crucial to engage in critical inquiry and to question traditional practices. This requires a deep understanding of the relationship between teaching and learning, and a willingness to explore new methods and techniques that may be more effective. By doing so, I aim to create an environment where students are encouraged to think intensively and critically, and where they can develop the intelligence and character necessary to achieve their goals.

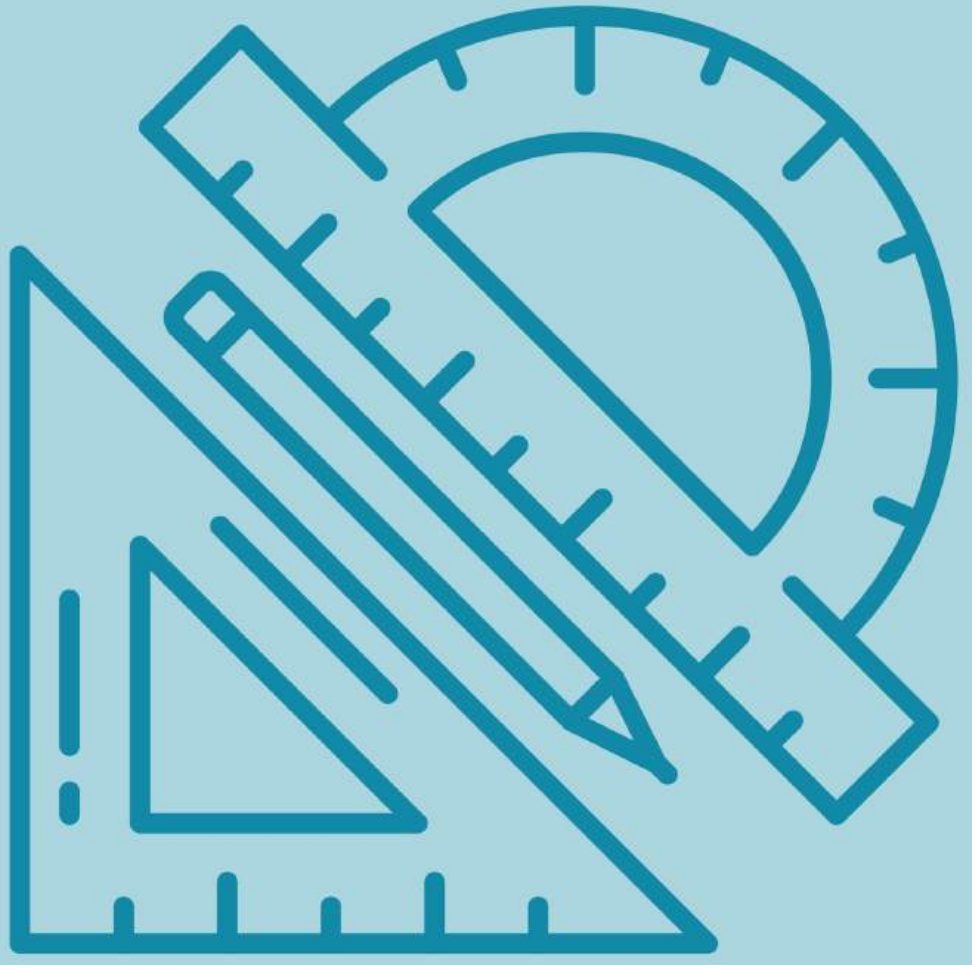

Before COVID-19 hit the entire world, I highlighted the importance of 'peeragogy' and 'cybergogy' in studio teaching. The studio is a casual environment where meeting times are stated, yet students assemble and disperse haphazardly; they come and go 24 hours a day; and maintain complete and spacious work areas (Powers, 2016). This is where S.O.L.E methodology mimics the real studio environment by introducing several apps and technology readily available such as Padlet and Trevo. I also described how architecture students can collaborate on the technology platform without needing to meet face-to-face all the time. Nonetheless, changing the way a studio has been managed for generations is unusual, and changing to a new manner of teaching means disrupting the entire learning process( figure 1). Thus, it was easier for theoretical subjects to shift to online platforms than architectural studio design courses (Gillett-Karam, 2020).

Since COVID-19 struck without notice, studio teaching had to be redesigned so that it could be organized completely online. The COVID-19 pandemic in 2020 caused a significant upheaval, necessitating a significant adjustment in the entire process of teaching and learning at design studios (Komarzyńska-Świeściak et al., 2021). Formal components of face-to-face interactions tied to physical content were supplanted by digital content overnight. This replacement necessitated the adaptation of these physical formats to new user profiles and technology (Fonseca et al., 2021b). COVID-19, a blessing in disguise, opened new potential in studio teaching through innovative pedagogy. However, compared to the huge growth in online education in all disciplines across the globe, architectural schools were somewhat slow in offering design studios online (Fleischmann, 2021).

The originality of this innovation is in discovering what has been discussed following COVID-19 and how to proceed after the pandemic impacted studio education. The big dilemma is whether to move forward or return to the status quo. There are unavoidable needs and opportunities for pedagogical adjustments and methods by employing online learning to supplement in-person or face-to-face learning. It is acknowledged that such transformations present both obstacles and possibilities.

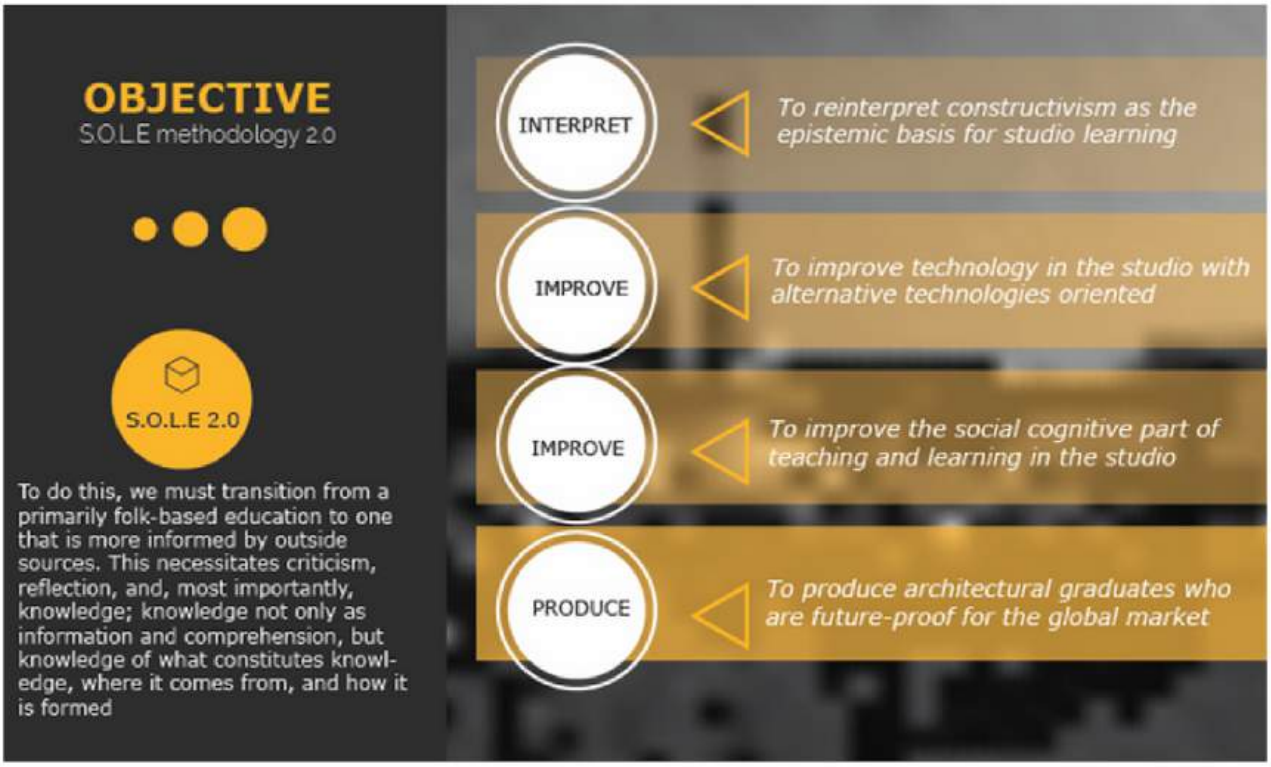
# 02# Overall

## teaching strategies



# Teaching strategies

The teaching strategy mentioned is to transition from folk-based education to one that is more informed by outside sources, which requires criticism, reflection, and knowledge, including knowledge of what constitutes knowledge, where it comes from, and how it is formed. The objective of the S.O.L.E methodology is to reinterpret constructivism as the epistemic basis for studio learning, improve technology in the classroom with 'cybergogy' approaches, improve the social cognitive part of teaching and learning in the studio, and generate architectural graduates who are future-proof for the global market.

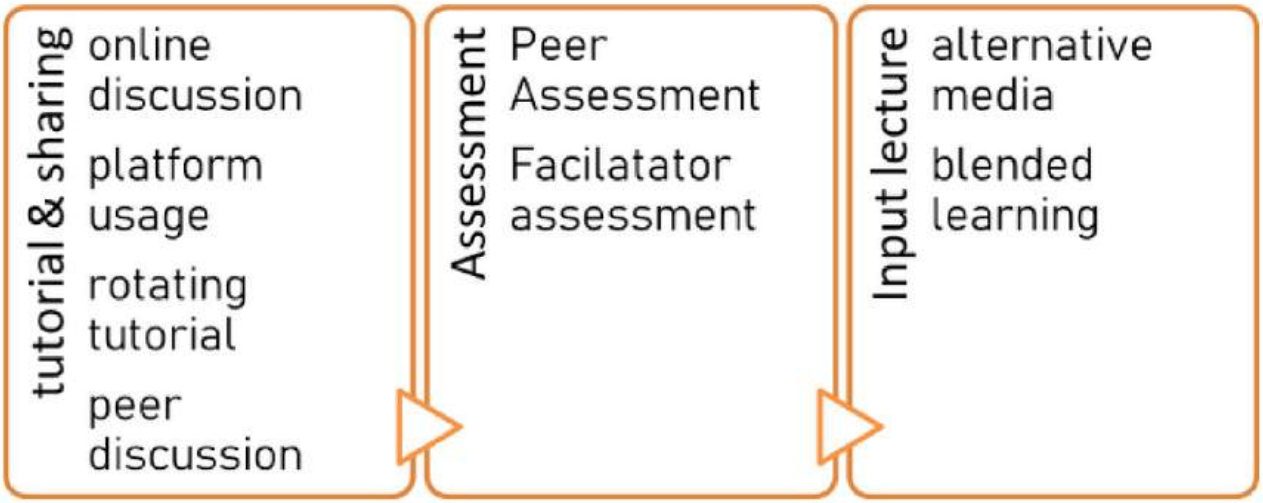



I proposed the use of the S.O.L.E. methodology in the design studio for M Arch students (ARC5001 & ARC5002). The group for this proposal was chosen based on the maturity and readiness of these master students to make decisions and participate in the peer assessment process. In addition to being evaluated by the tutors, I also proposed that a second assessment be conducted, with students being given a percentage of their studio marks based on their participation in the peer feedback and assessment process. As a means of motivating students to take this process seriously, we implemented a system of incentives and merits for students who put effort into their assessments and feedback. According to our report, these incentives were effective in motivating students to strive for excellence in this area.

The S.O.L.E. methodology began with input lectures from the tutors. Prior to these lectures, students were required to engage in pre-class reading and research. The students were then divided into small groups, and design critiques were facilitated by the assigned tutor. During this step, students shared books and reference materials with their group. Next, the students participated in peer feedback and assessment, evaluating their peers' work and designs within their groups. This process is supported by the view of Lee and Hannafin (2016), which emphasizes the importance of student participation in cultivating and developing their design ideas with the support of peers and tutors.


The students in this project were given the freedom to discuss and present their thoughts in a systematic way, working together with their peers to support a constructivist learning approach. This approach involves scaffolding, in which students actively construct their own knowledge from primary and secondary sources rather than passively receiving and processing information. Research has shown that involving peers in assessment can be beneficial, as it engages students more actively and helps them become familiar with the rubrics and criteria used to evaluate their work (Liu & Carless, 2006).

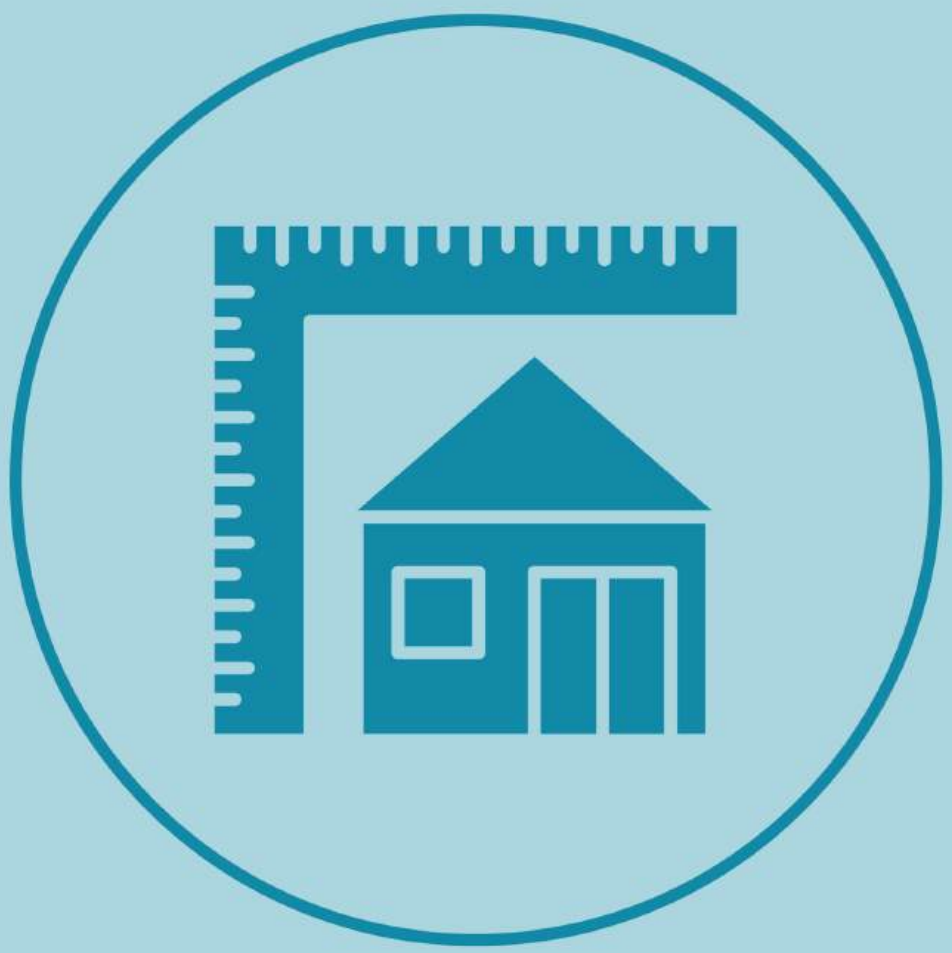
# Assessment strategies




The assignment for each week was provided in the project brief. In this scenario, the assessment process is designed to be more transparent and beneficial to the students. It involves increased participation from the students and the development of skills related to evaluation (Liu & Carless, 2006). The tutor will act as a facilitator during studio hours and evaluate the students' performance, leadership, and commitment throughout the semester program. The facilitator plays a crucial role in helping students stay focused and involved in decision-making, rather than just participating in class (Kim & Davies, 2014). To ensure that the objectives of the S.O.L.E are met, the students were thoroughly briefed about the project at the start and the project brief was carefully described and debated. This ensures that the learning objectives are clearly captured in the studio design output.

# 03# Creativity

## and Innovations in T&L



# Statement of creativity and innovation in T&L

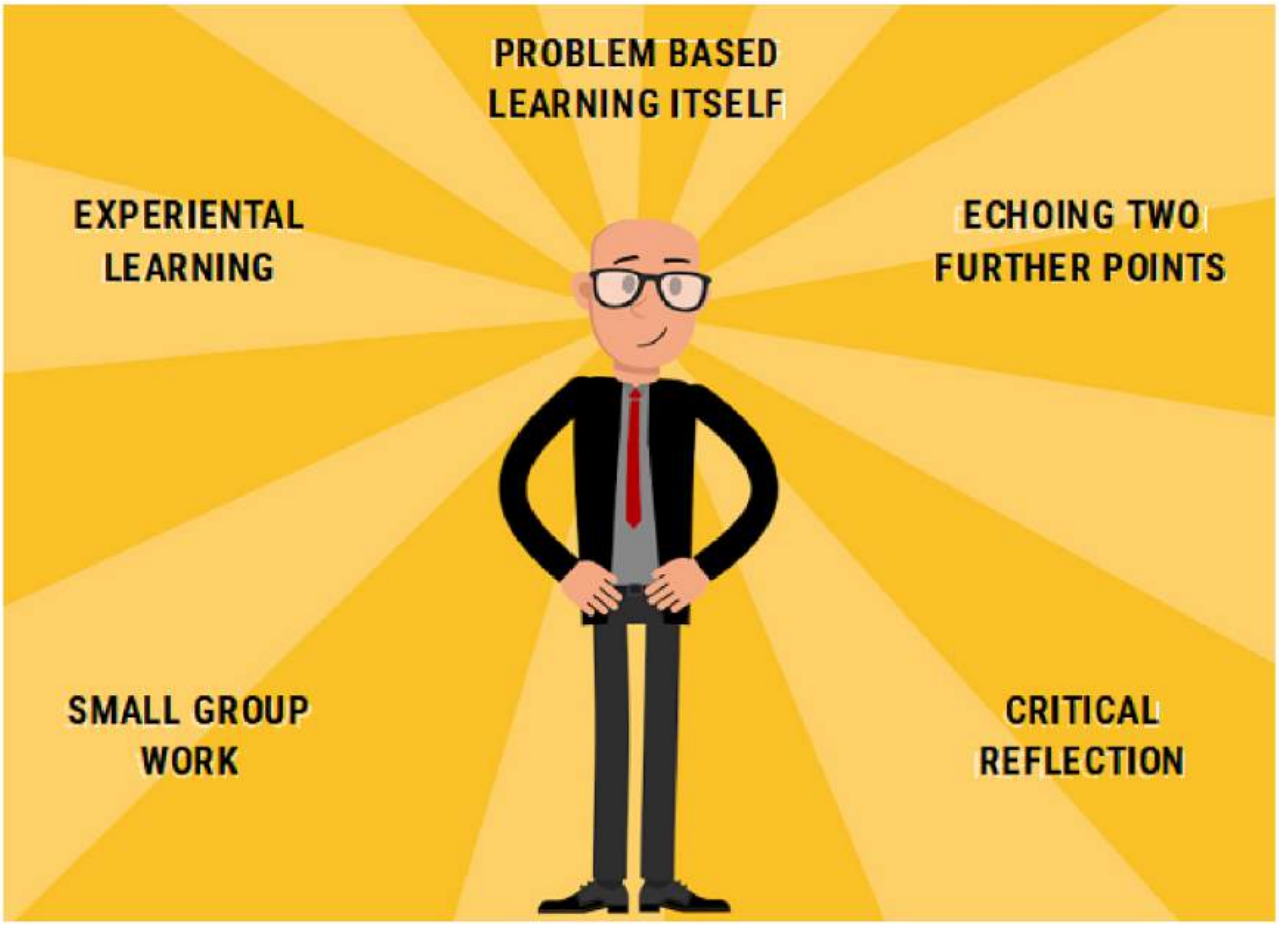
The S.O.L.E methodology is unique in that it provides a system for teaching and learning for design studios. It is founded on a solid theoretical framework that includes design studio, problem-based learning (PBL), constructivism, social-cognitive theory, and self-regulated learning (SRL) Within this context, the S.O.L.E module proposes that meaningful and long-term improvements in design thinking and behavior emerge as individuals work on a project and personal goals focused at learning and building mastery. The following goals are pursued by the S.O.L.E module:

- Combining peeragogy + cybergogy (peers + technology)
- Problem-based learning (PBL)
- Experiential Learning (EL)
- Echoing two further points (Problem-solving)
- Critical reflection (evaluation)
- Small group work (leadership)

**How is it being implemented?**

- Combining' peeragogy' and 'cybergogy' refers to leveraging the benefits of peer-to-peer collaboration and technology in the learning process. Peeragogy involves learners working together in a collaborative, self-organizing manner, while cybergogy involves using technology to support learning. By combining these two approaches, students can work together online to share knowledge and learn from each other using digital tools, thereby promoting collaborative learning and increasing engagement.
- Problem-based learning (PBL) through teaching approach that involves students working in groups to solve real-world problems. This approach encourages students to think critically, apply knowledge to practical situations, and develop problem-solving skills.
- Experiential learning (EL) through an approach that emphasizes learning by doing, and encourages students to reflect on their experiences to deepen their understanding. This approach helps students to connect theoretical knowledge to practical experience and to develop skills such as critical thinking, communication, and problem-solving.
- Problem-solving encourages students to identify problems and come up with solutions, they develop critical thinking and analytical skills that will help them in their future careers.

- Critical reflection involves evaluating and reflecting on the learning experience, including the process and outcomes. This approach helps students to identify areas for improvement and to develop metacognitive skills that will help them become self-directed learners.
- Small group work in the studio approach involves dividing students into smaller groups to work on collaborative projects. This approach encourages leadership and teamwork skills and allows students to work more closely with their peers to learn from each other.




- The S.O.L.E Methodology for introducing SCL in the architecture studio is based on three influential theories: Deci and Ryan's self-determination theory, Grabinger and Dunlap's REAL model, and Lee and Hannafin's OLSit framework. It focuses on involving students in their own learning, providing support, scaffolding, and direction to produce a comprehensive studio experience. This approach challenges traditional perceptions of studio instruction, feedback, and project design, and deconstructs the design learning process to uncover hidden relationships that influence student learning. The result is a new understanding of what makes design learning effective and which factors are most critical for achieving positive learning outcomes.

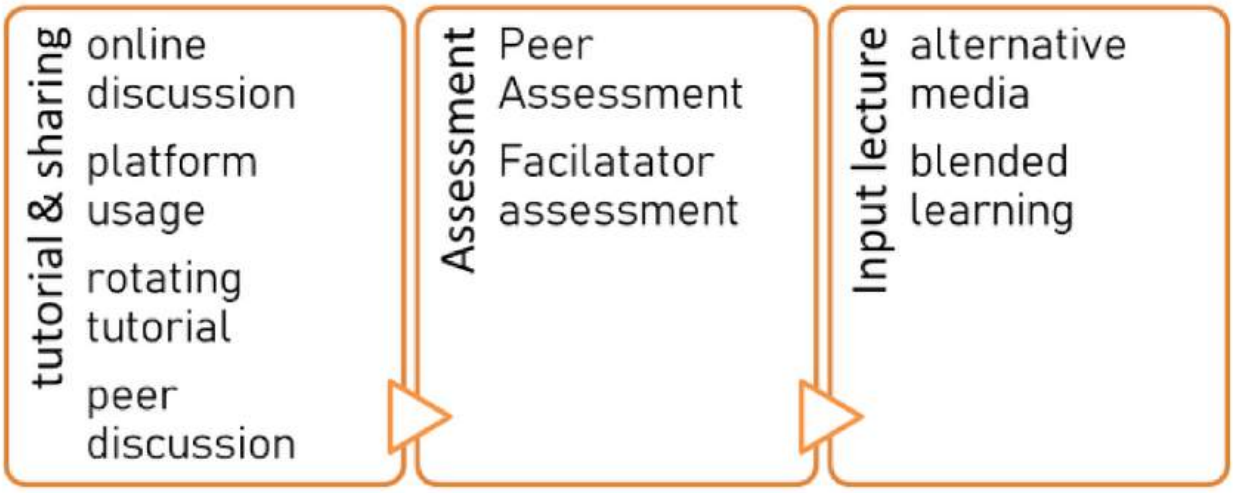
## ARCHITECTURAL DESIGN ASSESSMENT

Peer assessment criteria

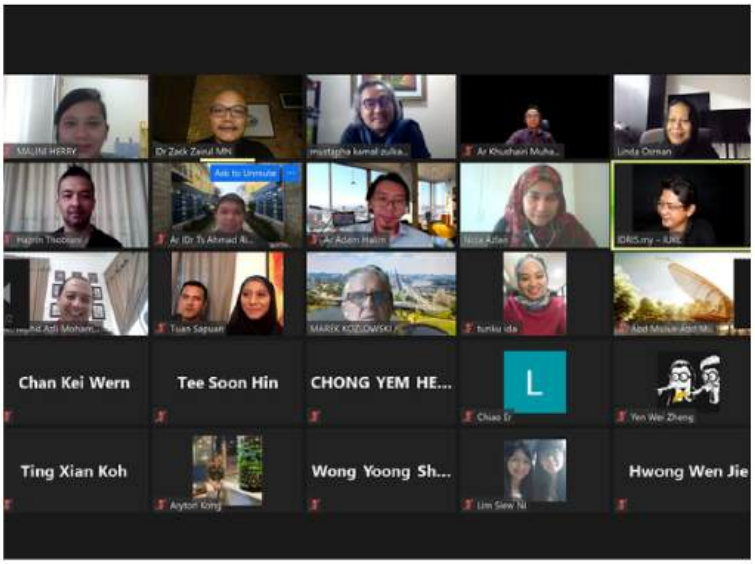
| 01 | Inadequate<br>1 pts<br>D | Adequate<br>2.5 pts<br>C |
|---|---|---|
| **Name of peer:** | | |
| **Design Process**<br>40 % Originate successful design solutions to fundamental architectural problems by integrating concepts, formal/visual principles and techniques. Integrating site synthesis as part of the site solutions | **Inadequate**<br>Does not attempt or is unable to complete design solutions. Unsuccessful design solution due to lack of creative use of concept, limited exploration of technique and/or application of principles. Little effort to challenge creative boundaries resulting in obvious or poorly developed solution. | **Adequate**<br>Fundamentally sound design solution with moderately creative use of concept, fundamentally appropriate technique, and adequate application of principles. Solution shows some effort to challenge creative boundaries with limited or uneven success. |
| **Formal & Spatial Principles**<br>20 % Demonstrate fundamental understanding and application of architectural formal + spatial principles as they relate to human experience. | **Inadequate**<br>Does not attempt or is unable to complete design solutions. Limited understanding of experiential quality of architectural form and space resulting in largely unsuccessful architectural solutions. Significant problems with scale, materiality, sequence, circulation, enclosure or visual perception. | **Adequate**<br>Basic functional understanding of experiential quality of architectural form and space resulting in fundamentally sound architectural solutions. Moderate problems with scale, materiality, sequence, circulation, enclosure and or visual perception. |
| **Design Process**<br>20 % Demonstrate a rigorous design process through critical iterative production. | **Inadequate**<br>Does not attempt or is unable to complete critical iterative production. Inconsistent levels of critical iterative production resulting in a flawed and uneven design development process. Regularly fails to meet daily progress, attendance and participation requirements. Does not document or respond to critical input from class presentations in design iterations. | **Adequate**<br>Consistent levels of critical iterative production resulting in a basic design development process. Regularly meets daily progress, attendance and participation requirements. Usually shows evidence of critical response through basic level of continued research, sketchbook documentation and iterative design development. |
| **Communication**<br>20 % Communicate design solutions effectively using architectural presentation materials and techniques. | **Inadequate**<br>Does not attempt, or is unable to complete design solutions. Significant problems with presentation materials and/or techniques resulting in unsuccessful level of design communication. Major errors, omissions, consistency or quality problems in drawings, process and models. Poor verbal communication inhibiting discussion beyond rudimentary level. | **Adequate**<br>Basic competence in presentation materials and techniques resulting in an acceptable level of design communication of general completeness. Presentation materials showing basic elements of design organized and comprehensible. No major errors, omissions, consistency or quality problems in drawings, process or models. Verbal communication understandable resulting in basic discussion of design solution. |
| **Sketch / comments** | | |

| **Leadership & entrepreneurship** How the student take charge of his/ her own education? | **Participation** How the student actively participate in their own education? |
|---|---|
| •Always takes initiative & accepts responsibility for own actions. •Flexible, resilient learner who often helps others.<br>•Self-motivated learner who is always prepared, on time, respectful & follows class rules<br>• Regularly helps motivate others get the best possible education.<br>•Assignments on time, above standard work in quality and quantity.<br>•Emphasizes threat and opportunity of the schemes and adopt aggressive posture with potential competition | •Positive influence who always actively & passively partici-pates.<br>•Often encourages others to participate in class & team discussions.<br>•Able to explain purpose & content of labs & lessons to otl<br>•Contributes ideas to help improve class discussions.<br>•Focused on task at hand, changes between tasks easily, always helps others refocus on task. |
| •Shows initiative often; takes responsibility for own actions.<br>•Self-motivated learner who often helps others.<br>•Always prepared, on time, on task, & asks for help when needed.<br>•Assignments on time, always redoes work to standard when needed.<br>•Respects others and class rules<br>•Strong inclination for competitive program in the UTC | •Actively & passively participates in class & team discussic takes notes without prompting.<br>•Encourages others to participate<br>•Always knows purpose & content of labs & lessons.<br>•Volunteers information appropriately.<br>•Always on task, encourages others stay on task.<br>•Listens well & respects others |
| •Sometimes shows initiative<br>•Takes responsibility for own actions most of the time.<br>•Motivated most of the time<br>•Completes work redo's, but not always to standard.<br>•Mostly respects others & class rules.<br>•On time / Prepared most all the time. | •Engages in class/team discussions, takes notes when prompted.<br>•Often knows purpose & content of labs & lessons.<br>•Rarely needs reminder to be on task.<br>•Listens to & respects others most of the time.<br>•Asks questions once in awhile |

# Teaching methodology

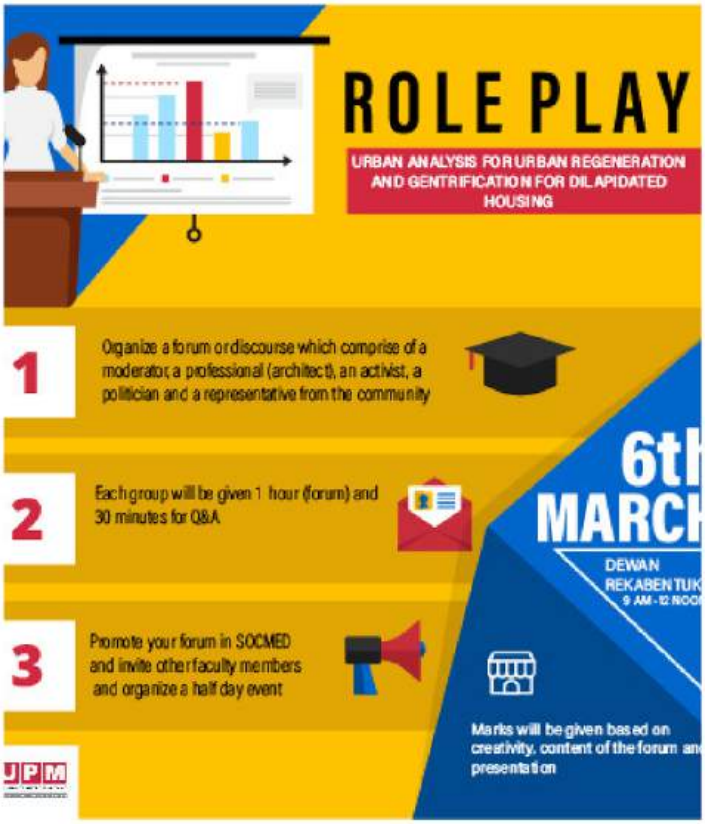



**Step 1 : Lecture Input**




During the first three weeks of the semester, the lectures focused on idea generation and conceptual development based on precedent studies. Precedent studies can help students find existing solutions to design problems, but they should use them as a reference rather than copying them directly. The students were given the topics for the lectures in advance, and the assigned tutors had the freedom to choose the method of presentation that best suited their needs. This could include media such as videos or YouTube videos, which were made available to the students through the portal. In the following week, the lectures will focus on the technical, structural, and service aspects of building design. One of the strengths of the studio module is its ability to support multi-disciplinary and integrated education. Technical topics may include the structural integrity of the building, passive and mechanical systems, and sustainability elements.


The studio can serve as a forum for debate and discussion of various issues that arise in the design process, such as fire safety requirements and mechanical engineering services. The studio master is responsible for ensuring that the most important topics are covered during the course of the semester. This may involve coordinating with other instructors and subject experts to provide relevant lectures and resources for the students. The goal is to provide a well-rounded education that prepares students for the challenges they will face in their professional careers.

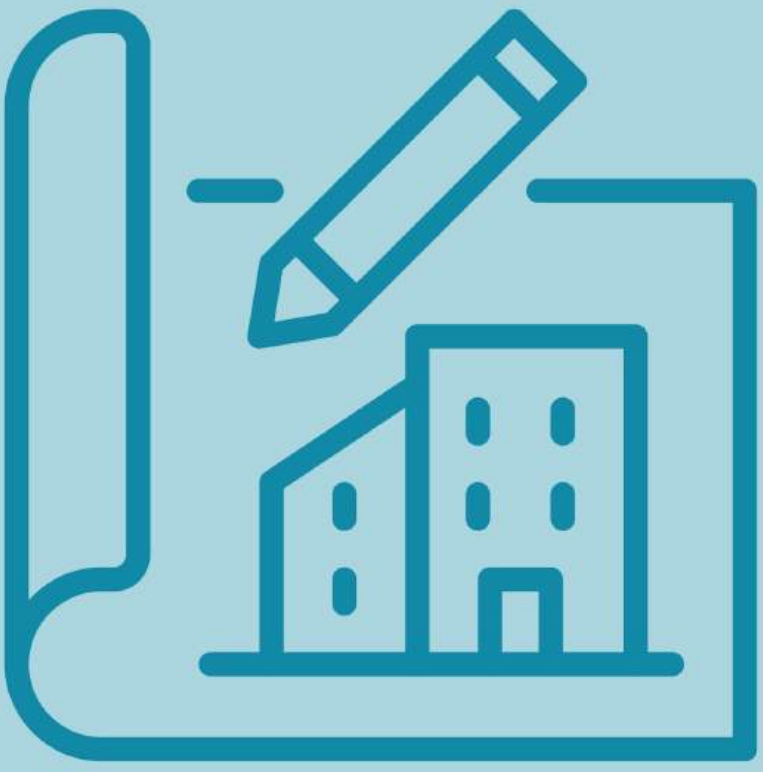


**Step 2 : Tutorial & Sharing**

The group meets for 4-5 hours twice a week to discuss their progress and share any materials they have found online or in print. The tutor observes the student's participation in the class, including their feedback to each other and their level of intellectual engagement and dialogue related to the rubrics and project brief requirements.The sharing and peer feedback sessions are designed to empower students to take a more active role in their own learning. These sessions help students to better self-assess and make judgments about what they have learned (Liu & Carless, 2006). Based on feedback from the student portal, this approach has been effective in encouraging students to actively engage with and articulate important issues related to their projects and tasks. Peer feedback can therefore provide the enhanced understanding and critical assessment skills, which are beneficial for students in a design course. Another advantage of sharing and peer feedback is that students receive prompt feedback from their peers, rather than waiting for comments from the tutor. However, we still encourage students to verify their discussions with the tutor during separate tutorial sessions.

# 04# Publications

in top tier journals



# Publication on teaching methodology

**Defying tradition or maintaining the status quo? Moving towards a new hybrid architecture studio education to support blended learning post-COVID-19**

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Received 9 November 2022
Revised 21 December 2022
28 December 2022
15 January 2023
22 January 2023
Accepted 1 February 2023

**Abstract**

**Purpose** – This study aims to provide insight into the patterns and trends in the literature on the direction of future studio education in architecture schools, and can be useful to architecture schools, researchers and boards of studies in making decisions on how to move forward post-COVID-19.

**Design/methodology/approach** – This study conducted a thematic review (TR) from SCOPUS and WoS that discuss the direction of future architecture studio education in the post-COVID-19 era and their recommendations for how to move forward.

**Findings** – The final theme is feedback studies, innovation in studio teaching, and a new model for post-COVID-19 studio education.

**Research limitations/implications** – Due to the temporal constraints of the data investigated between 2020 and 2022 based on the post-COVID period, only 13 publications were assessed based on the search strings utilized in this study, considering the decision and efforts made after COVID-19 among the participating architectural schools.

**Practical implications** – This study will prove helpful to architecture schools, studio education researchers and the architecture board of studies.

**Social implications** – This study intends to promote blended learning and enables the student to access the materials from anywhere at any time while enjoying the benefits of face-to face (F2F) support and instruction.

**Originality/value** – This is the first review paper for architecture studio education post-COVID-19, as well as the first to use a TR approach to analyze the available literature on the subject. The focus on the post-COVID-19 period and the use of TR allow for a comprehensive understanding of the trends and patterns in the literature on the direction of future studio education in architecture schools. Additionally, this research aligns with the United Nations Sustainable Development Goal 4 on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all, as it seeks to address the challenges and opportunities presented by the pandemic to support the learning and development of architecture students.

**Keywords** Studio education, Post-COVID-19, Hybrid studio, Higher education, Blended architecture education

**Paper type** General review

1. **Introduction**

The field of architecture and its corresponding education are facing numerous challenges, including societal changes, environmental issues, globalization, urbanization, degradation of natural environments, and increased demand for public services, infrastructure, and housing. To effectively address these challenges, students in higher education must be equipped with

Archnet-IJAR: International Journal of Architectural Research
© Emerald Publishing Limited
2631-6862
DOI 10.1108/ARCH-11-2022-0251

The paper, "Defying Tradition or Maintaining the Status Quo? Moving towards a New Hybrid Architecture Studio Education to Support Blended Learning Post-COVID-19," examines the evolution of architectural studio education in response to the COVID-19 pandemic. It explores the shift towards hybrid learning models, combining traditional in-person instruction with online methods. The study utilizes a thematic review to analyze literature on the subject, identifying key themes like the feedback from COVID-19, new models for post-pandemic education, and pedagogical innovations. The research highlights the challenges and opportunities presented by this transition, emphasizing the need for flexible, technology-integrated approaches to effectively prepare students for contemporary architectural challenges. The paper aims to guide future architectural education by aligning with the United Nations Sustainable Development Goal 4, promoting inclusive, equitable quality education and lifelong learning opportunities.

# Publication on sustainable architecture


**Life Cycle Assessment & Circular Economy** pp 69–85 | Cite as



## Building a Sustainable Future: A Circular Economy–Based Leasing Model for Affordable Housing in Malaysia, Evaluated by Life Cycle Assessment

Mohd Zairul

Chapter | First Online: 09 August 2023

**140** Accesses

Part of the Environmental Footprints and Eco-design of Products and Processes book series (EFEPP)

### Abstract

The innovative leasing strategy for affordable housing based on the circular economy offers a promising solution for sustainable housing that can minimize the environmental impact of the construction industry. To evaluate the environmental impact of this model and the housing units it provides, the authors suggest the use of life cycle assessment (LCA), which can identify potential environmental impacts across the entire life cycle of the building materials. By applying LCA, the leasing model can ensure that the housing units are genuinely sustainable from the extraction of raw materials to the end-of-life disposal or recycling. The authors propose an innovative leasing model based on the circular economy, which maximizes the value of materials in products through reuse, remanufacturing, and recycling. The study presents a conceptual framework for a new flexible housing business model, called flexZhouse, which aims to provide more affordable and adaptable housing options in the future housing market. Although still in the early stages of conceptual development, flexZhouse serves as a proof of concept for the new business model. However, the study does not cover the process of acquiring land or requesting planning approval, focusing instead on the lifecycle chain of mass home building.

The paper discusses an innovative leasing strategy for affordable housing based on the circular economy. This approach aims to minimize the environmental impact of construction by maximizing material value through reuse, remanufacturing, and recycling. The authors suggest using life cycle assessment (LCA) to evaluate the environmental impact of housing units throughout their lifecycle, from material extraction to end-of-life disposal or recycling. The study introduces a conceptual framework for a flexible housing business model, flexZhouse, designed to provide affordable and adaptable housing options. While focusing on the lifecycle chain of mass home building, it doesn't address land acquisition or planning approval processes. FlexZhouse serves as a proof of concept for this sustainable housing model.

# Publication on sustainable architecture

*Review*

## Thematic Trends in Industry 4.0 Revolution Potential towards Sustainability in the Construction Industry

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**Abstract:** The construction industry is currently facing challenges because of the massive waste generated by its production processes. The climate agreement also requires the industry to meet the increasing demand for sustainable building materials to achieve the energy transition. As a result, the construction industry is looking for alternative ways to meet these sustainability challenges. The implementation of the fourth industrial revolution (IR4.0) can be an opportunity for the construction industry to become more sustainable. Therefore, this paper aims to (i) ensure a detailed assessment of the existing challenges and (ii) identify the potential implementation of IR4.0 technologies in the construction industry. A set of criteria was established for searching and screening papers from three major databases (Scopus, WoS, and Mendeley), and 58 eligible articles were included in the current study. Using ATLAS.ti 22 software, a thematic analysis was conducted, and the final six themes were determined based on problems and challenges, technology and tools, information technology, consulting and business, construction management, and education. In addition, this paper identified potential prospective study paths. It is expected that the results will be useful for the future direction of the industry in addressing the challenges of IR4.0.

**Keywords:** construction industry; industry 4.0 revolution; thematic approaches; sustainability challenges



**Citation:** Zairul, M.; Zaremohzzabieh, Z. Thematic Trends in Industry 4.0 Revolution Potential towards Sustainability in the Construction Industry. *Sustainability* **2023**, *15*, 7720. https://doi.org/10.3390/su15097720

Academic Editor: Choongwan Koo

Received: 5 April 2023
Revised: 29 April 2023
Accepted: 4 May 2023
Published: 8 May 2023



### 1. Introduction

The construction industry is one of the largest users of global resources and polluters [1]. It, therefore, has a major responsibility to promote sustainability. The building sector consumes a large quantity of capital, which has a detrimental influence on both the environment and socio-economic aspects [2]. As a result, it is critical to mitigate these detrimental effects and guarantee sustainable development (SD). Historically, the industry has depended significantly on artisanal procedures, which have been linked to low performance and quality [3]. The sluggish rate of invention and creativity in the sector is a result of the adverse economic, social, and environmental effects of the sector, including low margins of profit, expense overruns, and considerable project delays, as well as high accident rates and unfavorable job conditions. According to research, integrating IR4.0 (also identified as Construction 4.0 (C4.0) in the construction sector) with SD can assist in addressing these difficulties [4].

The world is now advancing toward IR4.0, which focuses on industrial digital transformation, including the development of automation, intelligent systems, digitalization, artificial intelligence (AI), Big Data analytics, and Internet-of-Things (IoT). Germany originally announced IR4.0 at the Hannover Messe as a concept of a technology-driven manufacturing process combined with information and communication technologies to increase its national competitiveness in manufacturing [5]. Several research initiatives were covered in a study on the integration of Industry 4.0 to increase sustainability performance [6]. Prior research revealed that IR4.0 might assist construction organizations in increasing productivity [7]. As mentioned by the World Economic Forum [8], full digitalization in nonresidential



"Thematic Trends in Industry 4.0 Revolution Potential towards Sustainability in the Construction Industry." It examines the impact of the fourth industrial revolution (IR4.0) on the construction industry's sustainability. It evaluates how IR4.0 can help address environmental challenges caused by the industry's waste production processes and the demand for sustainable building materials. Using the thematic review methodology by Zairul, the paper identifies key areas such as technology, business consulting, and education as potential paths for integrating IR4.0 into sustainable construction practices.

# Publication on equity architecture

## Evaluating the Impact of Housing Interior Design on Elderly Independence and Activity: A Thematic Review

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**Abstract:** Concerns about a rapidly increasing elderly population mostly relate to the need for adequate housing and welfare for the aged. The poor design of housing for the elderly has led to the charge that the needs of aging people have not been adequately anticipated. There is little focus on design features that facilitate aging in place, hence improving the quality of life for the elderly, for example. This study examines the impact of interior housing design on the lives of the elderly, through a review of research on the subject and an evaluation of current design trends. Using a keyword search, 51 empirical studies from 2013 to 2022 that focus on housing for the elderly were identified and analyzed in terms of architectural features, home environment, and energy efficiency. The review found minimal connections have been made between interior design efforts and the actual housing needs of the elderly. This thematic review provides a summary of this literature for use by researchers and designers and recommends future studies for the use of inclusive designs in housing interiors in order to better meet the needs of elderly individuals.

**Keywords:** elderly; buildings design; housing designs; elderly housing; interior design



**Citation:** Mnea, A.; Zairul, M. Evaluating the Impact of Housing Interior Design on Elderly Independence and Activity: A Thematic Review. *Buildings* **2023**, *13*, 1099. https://doi.org/10.3390/buildings13041099

Academic Editor: Antonio Caggiano

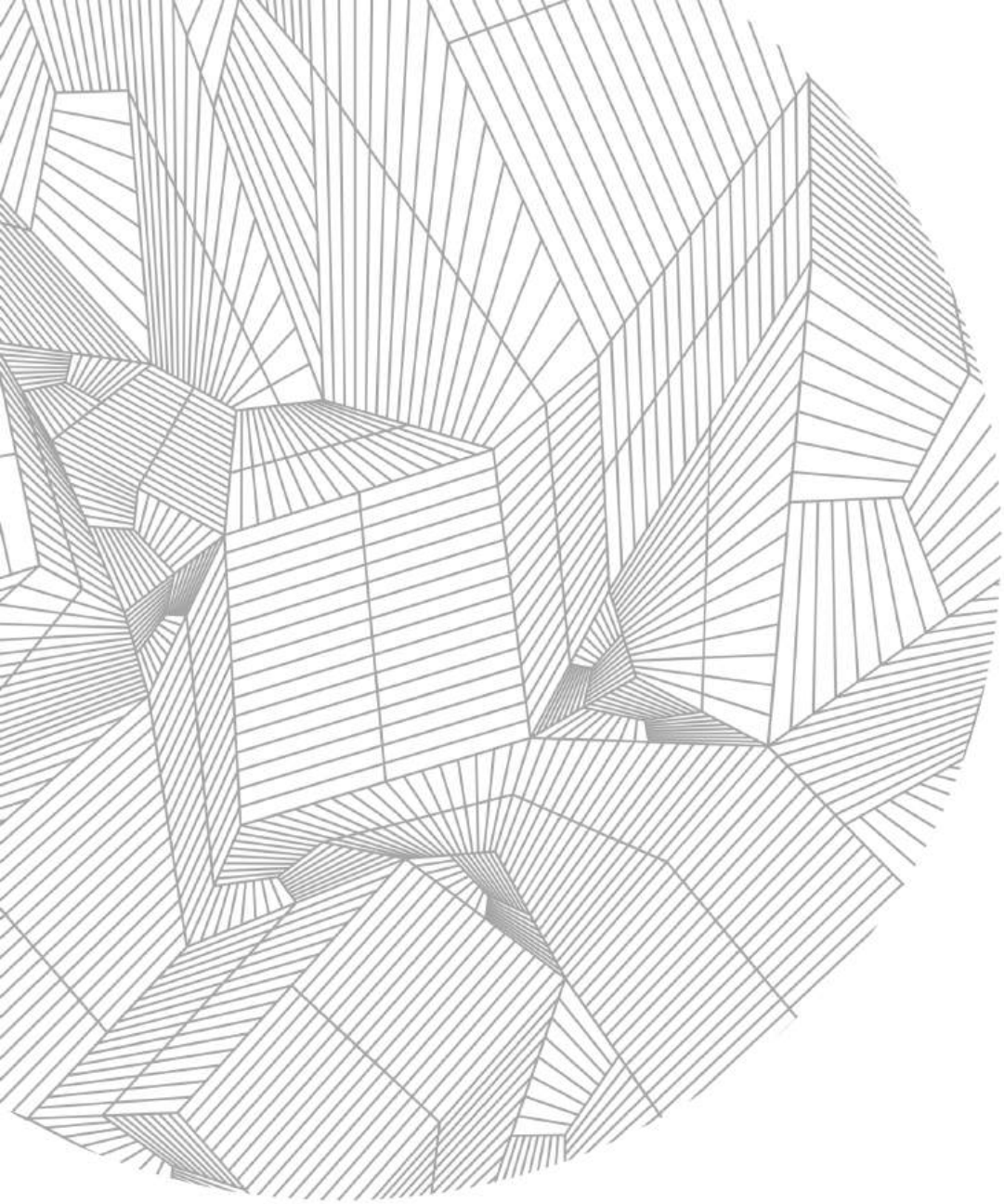
Received: 6 March 2023
Revised: 15 April 2023
Accepted: 18 April 2023
Published: 21 April 2023



### 1. Introduction

In the Housing and Health Guidelines report, the World Health Organisation (WHO) declared that "Poor housing conditions are one of the mechanisms through which social and environmental inequality translates into health inequality, which further affects the quality of life and well-being" [1]. Most residents in unsuitable housing are those on minimum incomes, minorities, indigenous people, women, single-parent families, and the elderly with functional limitations, making them susceptible to inequality and inequity. An ageing society faces tremendous challenges in terms of housing. A better understanding and provision for senior citizens' diverse housing requirements are urgently needed [2]. An inclusive and cost-effective house design is vital to preclude the need to change housing designs with age and lifestyle changes. Such a strategy is essential to accommodate citizens and prevent the issue of spending related to changing home interiors [3]. An ageing population is a major political issue, as it places financial pressure on countries to provide appropriate housing and services for their elderly citizens. A living environment suited to the elderly's needs, wishes, and habits is critical to offer a good life quality for the aged because they are more house-bound than other age groups, and are highly affected by unsuitable housing [4]. Developed and developing countries contain individuals from ageing populations who live alone, such as couples or those in care settings, due to the change from extended to nuclear families [5]. The elderly may live for many years in houses that are intended for younger individuals. However, houses constructed with new concept designs may confuse residents who are unfamiliar with these novel design features [5]. Elements supporting health, independence, and autonomy should be the focus of interior

The paper titled "Evaluating the Impact of Housing Interior Design on Elderly Independence and Activity: A Thematic Review" examines how the design of housing interiors affects the lives of the elderly. It reviews 51 empirical studies from 2013 to 2022, focusing on architectural features, home environment, and energy efficiency. The study finds that interior design efforts often do not align with the actual housing needs of the elderly. The thematic review aims to provide a literature summary for researchers and designers and suggests the use of inclusive designs to better meet the needs of elderly individuals.



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