ETHICAL DILEMMAS IN FIRST-YEAR ARCHITECTURE EDUCATION: THE JOURNEY TOWARDS A SUSTAINABILITY MINDSET

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The inculcation of sustainability principles into architecture education a sustainability mindset amongst architecture students is increasing in urgency. Despite the potential of integrating elements of the United Nations Sustainable Development Goals (UNSDGs) into the curricula, and the growing recognition of sustainability as a professional obligation, architecture education continues to prioritise aesthetics over critical sustainability-related content. This study explores first-year architecture students' perceptions of ethical dilemmas related to sustainability and their readiness for ethical advocacy following learning tasks on sustainable architecture at Singapore Polytechnic. Transformative learning pedagogies, including reflective practices, were employed to deepen students' understanding of sustainability challenges, fostering critical thinking, self-awareness, and the ability to navigate complex, real-world ethical dilemmas in design. With a sustainability mindset conceptualised as a latent construct, this study aimed to initiate the development of students' intrapersonal skills through self-reflection, which provides insights into their evolving mindset and future potential for sustainability advocacy. Two research questions were conceived to guide the study: RQ1 examined how students distinguished ethical dilemmas in sustainability, while RQ2 assessed their preparedness for ethical advocacy after the learning task. Students were invited to participate, while their responses were collected anonymously through an online portal. Thematic analysis revealed two main themes for each research question. For RQ1, 'Deeper Understandings' were identified, with 'Critical Perspectives on Sustainability', reflecting scepticism about sustainability efforts, and 'Shared Responsibility and Balance', emphasising collaboration among architects, users, and clients. For RQ2, 'Ethical Advocacy Preparation' includes 'Disillusionment with Sustainability and Ethical Dilemmas', echoing the internal conflicts students face, and 'Prioritising Adaptive Reuse and Practical Solutions', stressing the importance of adaptive reuse in sustainable design. The findings suggest that reflective exercises enhance students' awareness of sustainability issues and prepare them for the complexities of architectural practice. The study lies in its potential to influence both pedagogy and practice by demonstrating how transformative learning approaches can foster ethical awareness and advocacy among future architects. By addressing gaps in sustainability education, this study offers a framework for cultivating future professionals who are not only adept at identifying ethical dilemmas but are also equipped to champion sustainable solutions.

Keywords: *Architecture Education, Sustainability Mindset, Transformative Learning, Reflective Practices, Ethical Advocacy*

Introduction

Despite the growing importance of the United Nations Sustainable Development Goals (UNSDGs) in architecture education (Akgün et al., 2023), especially UNSDG No.13 (Climate Action), efforts to incorporate SDGs into the architecture curriculum and pedagogy remain limited and sporadically examined (Burton & Salama, 2023). However, architecture education's obsession with building aesthetics (Till, 2009) has reduced the rightful focus on the 'critical content' – the holistic understating of the building's inner workings and spatial, operational, maintenance and energy consumption considerations. A sustainability mindset—comprising values, knowledge, and attributes that guide individuals toward environmentally responsible decision-making (Rimanoczy, 2020) is essential for fostering innovative and sustainable design solutions. However, the integration of sustainability principles into architectural curricula remains underexplored (Burton & Salama, 2023). Transformative learning pedagogies can bridge this gap by prompting students to critically analyse their beliefs and viewpoints, thus fostering a more profound comprehension of sustainability issues (Mezirow, 2000). Activities designed to enhance knowledge and skill sets, along with the development of sustainability-oriented attitudes, can be evaluated through self-reflective exercises that utilise intrapersonal skills as a means to achieve these goals. This study aims to explore the effectiveness of transformative and

reflective learning activities designed to cultivate a sustainability mindset among first-year architecture students at Singapore Polytechnic. As students engage with ethical dilemmas and develop critical skills essential for advocating sustainable practices in their future professional roles, their reflections will provide us with a glimpse of their development of sustainability mindset for their future advocacies.

Sustainability Mindsets in Architecture Education

A sustainability mindset, encompassing values, knowledge, and attributes that guide individuals to address challenges and make decisions aligned with sustainability principles (Rimanoczy, 2020), is becoming crucial for fostering environmentally responsible choices. Cultivating this mindset can encourage alternative perspectives (Rieh et al., 2017), enabling students to develop innovative and sustainable design solutions.

Buildings are significant contributors to global environmental concerns, responsible for up to 19% of greenhouse gas emissions (Mohkam et al., 2022) and between 30% and 45% of worldwide energy consumption (Zamorano, 2022). While advancements in technology have enhanced the energy efficiency of mechanical heating and cooling systems, architects with a sustainability mindset would arguably first consider incorporating passive design strategies further reduce buildings' environmental impact.

Building Mindsets through Transformative Pedagogies

Transformative Learning is an approach that facilitates learners to critically examine their current perspectives and beliefs, and transform them into new ways of understanding with alternative perspective of framing issues and/towards problem solving (Mezirow, 2000). Mezirow's theory posits that learners experience' *disorienting dilemmas*' as critical incidents that prompt reflection and re-evaluation of one's beliefs. As Sinclair et al. (2022) implied, architecture education faces challenges of not having a curriculum that encourages questioning and critical analysis of the built environment. Consequently, students miss opportunities for personal and societal transformation through their education. With an excessive focus on the 'design studio', with the pervasive disconnection from contemporary societal demands, limited experiential learning opportunities have resulted in the lack of transformative learning opportunities.

Reflective Practices as Intrapersonal Skills Guiding Attributes for Sustainability Mindset

Intrapersonal skills are often defined as being associated with metacognition, conscientiousness, self-direction (Hilton & Pellegrino, 2012), change management, transforming beliefs, character and life purpose (Mahmudah, 2016). Intrapersonal capacities are crucial for change agents to navigate the challenges of sustainability work (Ayers et al., 2023; Jaakkola et al., 2022) and theoretically support the implementation of other competencies and as potential moderators (Ayers et al., 2023). Ayers et al. (2023) in their work to understand 'Intrapersonal competence' in the context of developing sustainability mindset, have identified (amongst others) to be able to *regulate and manage the self* (Reflective Practice) as an important trait.

Engaging in reflective practice promotes self-regulation by enabling learners to critically assess their performance and make informed adjustments to their future efforts (Balbay, 2021). Reflections deepen learners' understanding and cultivate a preparedness for self-regulated learning, highlighting its critical contribution to building competencies and enriching personal insights into learning experiences (Patel, 2023). Similarly, Sargeant et al. (2008) asserted the importance of reflections as a bridging elements of integrating/synthesising feedback with actionable change in learning practices in facilitating the abilities of learners to synthesise assessment feedback and apply it constructively to their future efforts. Henceforth, this study will capitalise learning activities that scaffold the knowledge, skill of sustainability and through self-reflections, to potentially solidify learners' attitudes (mindset).

Transformative Learning Activities

Moving away from the main design studio, two activities were conceived to scaffold students' knowledge and skills and self-reflection at the end of the activities. For Activity 1, students were tasked with revising an apartment's floor plan, while Activity 2 focused on organising students into groups for debate. Activity 1's background predicates on architectural practices' frequent encounters with client pressures, often resulting in design compromises.

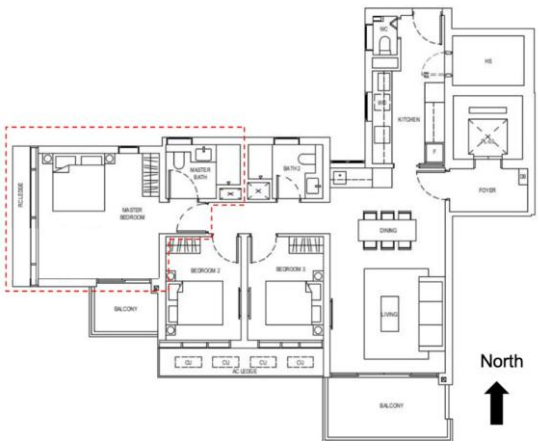

Figure 1: Activity 1's challenge of editing the floor plan

Activity 1 simulated a real-world situation in which a client insisted on positioning the master bedroom to face the western landscape (with the harsh setting sun) as a key-selling feature. While offering a scenic view of the surroundings (with reference from Figure 1), it exposes the master's bedroom to the harsh western sunlight,

escalating energy usage due to increased air conditioning needs. Learners were required to identify and sketch over their solutions in meeting the client's demand for an unobstructed western view by proposing spatial adjustments to mitigate cooling demands through reconfigurations. Figure 2 illustrates the process of which students explore and discuss potential solutions amongst themselves.

Figure 2: Students testing out the different options by over layering and a discussion on their solutions.

Activity 2 extends a similar dilemma in the form of a debate-based learning approach. Such teaching strategies have been reported to boost student engagement, critical thinking, perspective-taking, empathy, and advocacy skills (Mabrey et al., 2021). By navigating through a framework of dilemmas—which demand definitive solutions—to one that embraces paradoxes and coexisting tensions, debates foster transformative learning (Kark et al., 2016). Such exercises theoretically equip students to become active participants in society, preparing them for future civic engagement (Thomas, 2011) and shaping value systems and mindsets through interactive educational experiences (McInnes, 2013). Figure 2 depicts the learning environment of which the debates is carried out. After the session, the tutor then carried out a debrief explaining possible means on meandering the situations.

Figure 3: Students debating in the design studio with an ethical dilemma as the backdrop.

Research Methodology

Hence, the research questions (RQs) guiding this study were **RQ1**: How do first-year architecture students distinguish ethical dilemmas related to sustainability? **RQ2**: How do first-year architecture students perceive their readiness for ethical advocacy in professional settings after participating in a tutorial discoursing sustainability development? First-year architecture students at Singapore Polytechnic were invited to deposit their reflections via an online portal with these reflective questions. To answer **RQ1**, students will reflect upon, '*How has the tutorial on sustainability architecture and energy enhanced your understanding of ethical dilemmas and conflicts in the context of sustainable architecture*?' and aligned to **RQ2**, '*How has the tutorial prepared you for ethical advocacy in professional settings?*' after the lecture and the second learning activity.

The survey, conducted across five studios with 20-21 students each, yielded 130 anonymous responses using Microsoft Forms. Approved by Singapore Polytechnic's IRB (Protocol No. 202407-01). The data analysis process was carried out with Atlas.ti, a qualitative data analysis software, to manage and organise the dataset systematically. The analysis followed an iterative approach grounded with thematic analysis (Braun & Clarke, 2006). Initially, 'Intentional AI Coding' was applied to identify preliminary codes that were concept-specific and reflective of the research questions. These

codes were refined iteratively to ensure relevance and clarity, with the software assisting in highlighting recurring words, phrases, and ideas. Subsequently, the identified codes were manually grouped and regrouped into broader themes by examining patterns, trends, and interconnections within the data and in alignment with the RQs. Each identified theme was critically reviewed to confirm its coherence, distinctiveness, and alignment with the research objectives. Students' direct quotes from survey responses were incorporated to substantiate each theme and provide authentic voices to the analysis.

Results and Discussion

Two main themes were identified for each RQ. For RQ1: *Deeper Understandings*, themes of **Critical Perspectives on Sustainability** and **Shared Responsibility and Balance** were identified. Similarly, for RQ2: *Ethical Advocacy Preparation,* **Disillusionment with Sustainability and Ethical Dilemmas** and **Prioritising Adaptive Reuse and Practical Solutions** were identified.

Under RQ1's Deeper understanding, the first theme of *Critical Perspectives on Sustainability* reflects scepticism about the authenticity of sustainability efforts and emphasises the need for genuine responsibility in addressing environmental concerns. One student remarked: "*(the activities) has made me question that anything done under the name of 'sustainability' is actually be done with the concern of the climate crisis or just under the name of money*". Even as first-year student, this reflection suggests an 'awakening' moment might have been experienced. In the world of architecture education, exemplars are often celebrated for students to implicitly adapt and appropriate (mostly) aesthetic features and exemplar features from these projects into their own work (Goldschmidt, 1998). Perceptions of sustainability were also, unconsciously ingrained into young minds.

Another student echoed: "*Sustainability is not what it seems where it actually benefits the environment a lot, at the same time we should still be responsible when designing, taking into consideration on how it will actually benefit the climate and energy efficiency*". One of the architect's role and responsibility is not only to safeguard the interest of the client, the notion of advising clients of the design's overall impact on the environment will be increasingly paramount. While sustainability is increasingly recognised as important, architects' prioritisation of both aesthetics and cost over environmental considerations when selecting building materials remains pervasive (Conroy et al., 2019). Such reflections were interpreted as positive first steps in instilling sustainability mindsets of their own.

The second theme of *Shared Responsibility and Balance* extended the above discoursed notions whereby students understood shared responsibility between architects, users, and clients, highlighting the importance of collaboration and finding a balance in sustainable practices. As one student reflected, "*Sustainability is not in the form of greenery but in fact in the form of the responsibility of the users"*, two important ideas surfaced: a break away from perception that a green-covered (green walls, vertical plantings) immediately equates being sustainable building and, the role of the end-users of the building will be as important as the architect/client involved in the design process.

It is important that, especially in larger projects, that clients are not necessarily the end-users of the building. Students' awareness that architecture design can extend beyond the field's obsession with aesthetics is critical to inculcate at an early stage. Even though the responsibilities of end-users are critical, Xie et al. (2020) highlighted that green building occupants demonstrated more frequent pro-environmental behaviours compared to those in non-green buildings, further stressing the importance of energy-conscious designs. As echoed by a participant: "*It can be difficult to find the right balance of the clients and architects wants. In order to find balance both sides have to win in terms of the benefits"*, further extends the critical role of an architect. This delicate balancing act requires effective communication, compromise, and a deep understanding of the project's goals and constraints. The debate exercise (Activity 2) was a platform to navigate through difficult sustainability dilemmas of which, the reflective activity could potentially help to crystalise mindsets and value systems.

To answer RQ2: Ethical Advocacy Preparation, the first theme, Disillusionment with Sustainability and Ethical Dilemmas focuses on the internal conflict and confusion students face when idealistic notions of sustainability and ethics clash with the practical complexities of architectural practice. One student reflected: "*I have realised how much I believed the overly glorified idea of "sustainable" buildings and ideas… Knowing that, I'm not sure what I want to accomplish as a future architect now. Everything seems to contradict each other"*. Although such sentiments may seem negative, such unsettling moments may be pivotal in their inculcation of sustainability mindset, thus impacting their future agencies. As Mezirow's (2000) transformative learning theory posits that learners experience 'disorienting dilemmas' as critical incidents that prompt reflection and re-evaluation of one's beliefs, students' the interrogation of the 'accepted' narrative, context, and implications of specific situations to develop skills that are essential for driving and examining sustainability initiatives (Corcoran et al., 2004).

While another student reflected: "*(the activities had) prepared me by showing me how the most ethical way isn't always the* ***easiest way*** *to do thing.* This realisation highlights the complexity of ethical decision-making in real-world scenarios. This underscores the importance of considering multiple perspectives and potential consequences when faced with moral dilemmas. Sustainability mindset will remain as a passive internalised trait unless actively perused and operationalised. One significant aspect of navigating conflict is the necessity for reflective practice in understanding different perspectives. As Griggs et al. (2015) had argued, being engaged in reflective practice fosters a deeper understanding of the dynamics at play in

conflicts and prepares individuals to handle them effectively in the future.

Prioritising Adaptive Reuse and Practical Solutions is the second identified theme for RQ2. This theme focuses on the importance of adaptive reuse, minimal intervention, and considering a building's long-term impact on the environment. As one student remarked: "…*that the first question we should ask as an architect is do we need to demolish the building or can we just break a wall or add a (another) block (Additions or Alternations to existing buildings)*". As clients and developers (and sometimes architecture critics) sought for the spectacle and fresh dynamic forms previously not explored, ideas of retrofitting and conserving existing buildings should be explored. This will, in turn lead to the reduction of construction waste and carbon footprint. Echoing the previous themes of possible friction between clients and architecture regarding sustainability design decisions, students might had come to terms of the difficult road ahead. However, what is critical is that, when students (as future practitioners) prior knowledge and advocacy will prepare them for effective negotiation.

Finally, notions of responsibility reflect the necessity of providing an overview of the different stakeholders, factors and engagements in supporting the development of sustainability agencies. As one student reflected: *"(to) consider about the necessity and responsibilities of the building you are designing which will contribute to climate for some time"*. These holistic overall echoed notions of systems thinking as such holistic understanding to architectural education prepares students for the practical realities of the profession and encourages them to become advocates for environmentally responsible design practices.

Conclusions

This study highlights the essential importance of a sustainability mindset in architecture education, particularly in the early, formative stages of students' academic journey. The findings suggests that first-year architecture students, through focused and well-designed learning activities, can meaningfully construct their ability to identify and navigate ethical dilemmas while developing essential competencies to advocate for sustainable practices. By employing reflective exercises (in supporting intrapersonal skills critical for the inculcation of sustainability mindset and transformative teaching approaches, this research illustrates how students' awareness of sustainability issues can be profoundly deepened.

The thematic analysis revealed that reflective practices not only encourage introspection but also promote active, critical engagement with sustainability challenges, enabling students to explore innovative solutions that balance aesthetic, functional, and ethical dimensions. Furthermore, the study highlights the potential of transformative pedagogies to cultivate a sense of shared responsibility among future architects, empowering them to collaborate effectively with various stakeholders.

Given the urgency of global sustainability challenges, this study reinforces the necessity of embedding sustainability principles into architectural education. Further studies should explore pedagogical strategies towards the integration of sustainability concepts across curricula, examining how theoretical knowledge can be combined with experiential learning opportunities to better prepare students for the real-world complexities of professional practice. This study advances the discussion on transforming architectural education to better reflect global priorities for environmental sustainability and ethical accountability.

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