SUSTAINABILITY 101 (S101): BRINGING SUSTAINABILITY LITERACY TO THE POLYTECHNIC COMMUNITIES

Angela Wee Li Kwang, Lim Bee Ang, Isabel Lee,
Tint Hla Hla Htoo, Karls Tan, Yeo Chern Tat
Ngee Ann Polytechnic, Singapore

ABSTRACT

This paper introduces Sustainability 101 (S101), a strategic initiative by Ngee Ann Polytechnic (NP) to cultivate broad-based sustainability literacy among students. S101 addresses the urgent need for sustainable development by integrating social, economic, and environmental pillars within both global and Singaporean context.

The paper reviews key dimensions of sustainability education – framework alignment, curricula integration, and the evolving role of academic libraries, to inform effective implementation strategies. It then details the conceptualisation, design, and rollout of S101, highlighting pedagogical innovations and reflective practices. Through its E-learning courseware and integration into modules such as "Innovation Made Possible", S101 empowers students to apply sustainable thinking in academic and real-world contexts, equipping them to develop solutions that are socially responsible, environmentally sustainable, and economically viable. The findings underscore the critical role of integrated sustainability education in preparing graduates to advance Singapore's national sustainability agenda and contribute to global efforts.

Keywords:
Sustainability, Environmental Sustainability, Social Sustainability, Economic Sustainability, Sustainability Literacy, Innovation Education, Mindset

LITERATURE REVIEW

Alignment with Sustainability Frameworks: UNESCO, Sterling, and AASHE

The integration of sustainability frameworks into higher education is gaining momentum, with increasing scholarly attention on UNESCO's Education for Sustainable Development (ESD), the Sterling framework, and AASHE's Sustainability Tracking, Assessment & Rating System (STARS). These models offer complementary approaches to embedding sustainability across institutional structures, pedagogy, and learning outcomes.

UNESCO's ESD framework is widely adopted in Institutions of Higher Learning (IHLs), emphasising whole-institution strategies and alignment with the Sustainable Development Goals (SDGs) to equip learners with sustainability competencies[23].

However, implementation remains fragmented, with limited integration of key competencies in teacher training and curriculum design [18], and few programmes aligning with all 17 SDGs[5]. The Sterling framework promotes systemic thinking and interdisciplinary learning, encouraging universities to develop sustainability change agents through curriculum reform[32]. Yet, its transformative principles are only partially adopted, with gaps in creative

pedagogy and deep integration[18]. AASHE's STARS system supports performance tracking and curriculum alignment with sustainability competencies[16], and advocates for integrating sustainability into strategic planning and academic rankings[33]. Still, many institutions underutilise STARS, with assessments often lacking depth[30].

In Singapore, universities align more closely with UNESCO's SDGs and national frameworks like the Green Plan 2030, rather than formally adopting Sterling or STARS. Nonetheless, elements such as experiential learning and community engagement reflect Sterling's influence, and ESD principles are increasingly embedded at both course and programme levels[20]. While these frameworks provide robust guidance, their practical integration remains uneven. Advancing sustainability education requires stronger embedding of competencies, deeper curriculum reform, and more rigorous evaluation.

Key lessons from these frameworks highlight the importance of embedding sustainability competencies, adopting whole-institution approaches, and integrating interdisciplinary pedagogy into educational design. These insights inform the implementation of E-learning on sustainability by emphasising structured competency development, creative and systems-based learning experiences, and performance tracking aligned with strategic goals. While practical adoption remains uneven, these principles offer a strong foundation for designing scalable, locally relevant, and globally aligned E-learning programmes that prepare learners to contribute meaningfully to sustainability efforts.

Integration of Sustainability in Higher Education Curricula

The integration of sustainability into higher education is central to contemporary educational reform, with a growing consensus on embedding sustainability across disciplines to equip graduates for a sustainable economy[34]. Rather than isolating sustainability in niche programmes, scholars advocate for institution-wide integration to foster meaningful competence development[3, 25]. The UNESCO ESD framework encourages holistic strategies over fragmented efforts, with structured curricula shown to outperform ad-hoc approaches in enhancing student knowledge.

In Singapore, universities increasingly emphasise interdisciplinary sustainability learning and real-world application. For example, institutions model sustainable practices at both course and programme levels[31], while NUS integrates sustainability with internationalisation[7]. Digital platforms further expand sustainability education. Hans and Hans[14] explore opportunities and barriers in online integration, while Diamond and Irwin[9] highlight the role of E-learning in fostering social learning and student agency. Hakkarainen et al.[13] position online sustainability education (OSE) as a strategic tool for institutional transformation.

Despite progress, challenges persist – particularly in Singapore, where sustainability research remains broad but fragmented. Leal Filho et al.[17] observe that most efforts are led by individual scholars, limiting systemic change. Globally, barriers include uneven implementation, disciplinary resistance, and lack of educator training[18]. The literature consistently calls for holistic, interdisciplinary approaches, creative pedagogies, and stronger links between policy and practice to deepen ESD integration.

For the development of the S101 E-learning module, these insights suggest designing a

platform that embeds sustainability across diverse disciplines, promotes active and collaborative learning, and aligns with institutional strategies to overcome fragmentation and drive systemic change.

Libraries' Support for Sustainability Education Through E-Learning

Sustainable development is increasingly recognised as a core principle of librarianship, with environmental education emerging as a key domain in library and information science[8]. Libraries play a growing role in advancing sustainability literacy through outreach, instructional programming, and E-learning[6]. By curating green collections and offering digital access to sustainability resources, they foster inclusive educational experiences that promote environmental awareness [9, 10]. Public libraries like Bibliotheca Alexandrina exemplify this role through E-learning platforms that deliver sustainability content, including STEM courses. Academic libraries also support institutional sustainability agendas by embedding sustainability themes into digital learning environments[28].

Collaboration between librarians and instructional designers enhances teaching and learning by integrating diverse expertise, such as sustainability content, into Elearning curricula[4]. Strategic partnerships across departments and technology offices amplify impact[1]. Libraries can further engage users via targeted digital outreach, social media, and data-driven evaluation tools[12]. Despite progress, universities developing online sustainability education must navigate diverse student needs and institutional contexts[13]. Addressing these barriers is essential for expanding the reach and effectiveness of sustainability education through digital platforms.

The literature highlights libraries as pivotal enablers of sustainability education through E-learning, offering curated digital resources, inclusive outreach, and strategic collaborations that embed sustainability into academic environments. Public and academic libraries demonstrate how instructional programming, partnerships with instructional designers, and digital engagement tools can enhance sustainability literacy and foster institutional transformation.

For developing Sustainability 101 E-learning, these insights suggest leveraging library expertise to curate accessible content, co-design interdisciplinary modules, and implement data-driven outreach strategies that address diverse learner needs and institutional contexts – ultimately expanding the reach and impact of sustainability education.

BACKGROUND AND MOTIVATION

Sustainability is about fostering a balanced and resilient future – environmentally, socially, and economically. As the world faces escalating challenges such as climate change, social inequality, and economic volatility, the need for sustainable thinking has never been more urgent. Sustainability influences every aspect of our lives – the health of our planet, the equity of our societies, and the vitality of our economies.

In this context, sustainability education is not just relevant but it is essential. It has become a critical literacy for today's youth, equipping them to address complex, interconnected challenges. Embedding sustainability into education empowers learners with the knowledge

and mindset to build inclusive communities, drive responsible innovation, and contribute to a liveable future for generations to come. However, sustainability is often narrowly perceived as an environmental issue. Many students overlook its broader implications, particularly its relevance to daily decision-making, problem-solving, and innovation. This limited perspective can hinder the development of truly sustainable solutions.

To address this gap, Ngee Ann Polytechnic (NP) launched the Sustainability 101 (S101) initiative—an E-learning courseware designed to instil holistic sustainability literacy. S101 is integrated into the core academic innovation module, *Innovation Made Possible (IMP)*, undertaken by all NP Year 1 students. By embedding sustainability within innovation education, S101 not only aligns with Singapore's national sustainability goals but also empowers students to become proactive, globally minded contributors to a sustainable future.

The development of S101 E-learning courseware emphasises the importance of institution-wide integration of sustainability through core curriculum modules, reaching students across all disciplines to foster meaningful competence development. Furthermore, documented case studies of libraries advancing sustainability education via E-learning platforms[4, 6] reinforce NP's strategic direction. By embedding sustainability into a shared digital learning experience, S101 aligns with global best practices and exemplifies the evolving role of academic libraries in supporting inclusive, interdisciplinary, and future-ready education.

SUSTAINABILITY 101 (S-101)

Overview of the S101 Initiative

Sustainability 101 (S101) is a strategic initiative by Ngee Ann Polytechnic (NP), led by the Lien Ying Chow Library (LYCL), to embed holistic sustainability literacy into the foundational learning of all students. Recognising that sustainability is often narrowly associated with environmental concerns, S101 reframes it as a multi-dimensional concept encompassing environmental stewardship, social equity, and economic resilience within both global and Singaporean contexts.

This initiative addresses the urgent need for future-ready graduates who can think critically and act responsibly in the face of complex global challenges. By equipping students with a comprehensive understanding of sustainability, S101 aims to cultivate a generation of innovators who are not only technically competent but also ethically grounded and socially conscious.

Objectives of S101

S101 is guided by three strategic objectives:

1. **Deepen sustainability literacy** among students by addressing the full spectrum of sustainability, namely environmental, social, and economic – within both global and local contexts.
2. **Integrate sustainability into innovation education** by enabling students to apply sustainable thinking in ideation, design, and problem-solving.
3. **Develop a scalable, modular E-learning solution** that can be seamlessly integrated

into academic modules and adopted by other educational institutions, amplifying its impact across the education ecosystem.

These objectives align with Singapore's national sustainability agenda and the global call for education to play a transformative role in achieving the United Nations Sustainable Development Goals (SDGs).

Holistic Sustainability Framework

At the heart of S101 is a holistic sustainability framework that emphasises the interconnectedness of three pillars [2]:

- **Environmental Sustainability:** Conserving natural resources and reducing ecological footprints.
- **Social Sustainability:** Promoting equity, inclusion, and community well-being.
- **Economic Sustainability:** Encouraging responsible resource management, long-term financial planning, and innovation-driven growth.

The literature review highlights fragmented alignment to frameworks such as UNESCO's ESD, Sterling's transformative model, and AASHE's STARS [5, 18, 30], underscoring the need for coherent integration with broader frameworks—particularly the SDGs.

S101 was intentionally designed to bridge global and national strategies, drawing clear connections between these frameworks and policy anchors such as the SDGs and the Singapore Green Plan 2030. This approach helps students understand how global and national strategies converge to support sustainable development.

S101 E-learning Courseware Design and Development

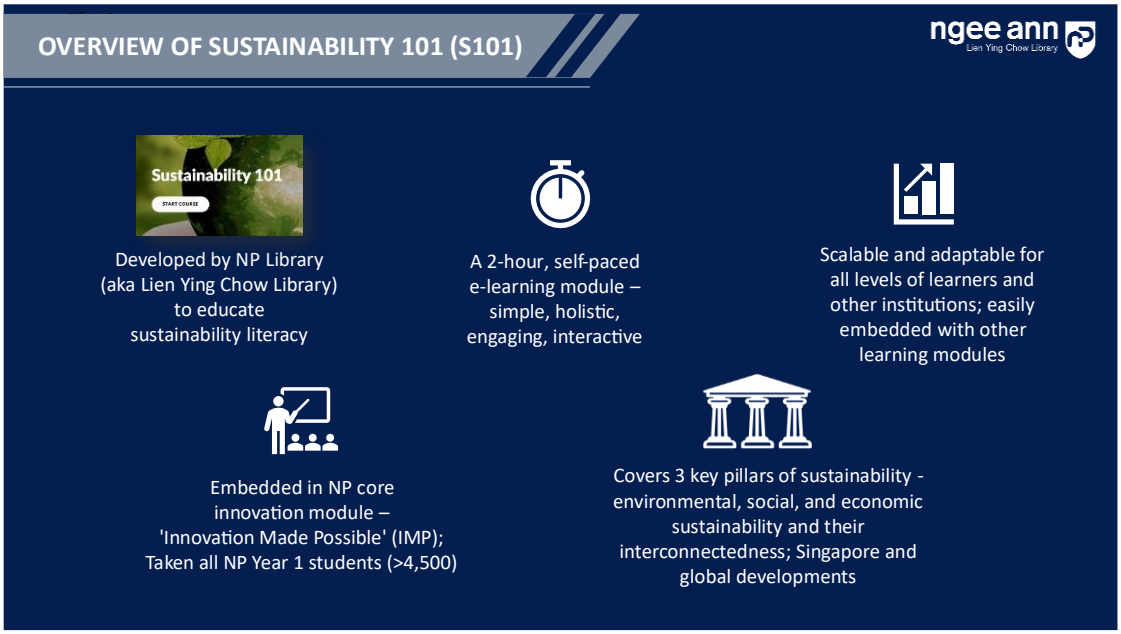
S101 is delivered as a two-hour, self-paced e-learning module designed to be engaging, interactive, and accessible. Developed using Articulate Rise 360, the courseware supports responsive design across devices, ensuring seamless access on desktops, tablets, and smartphones.

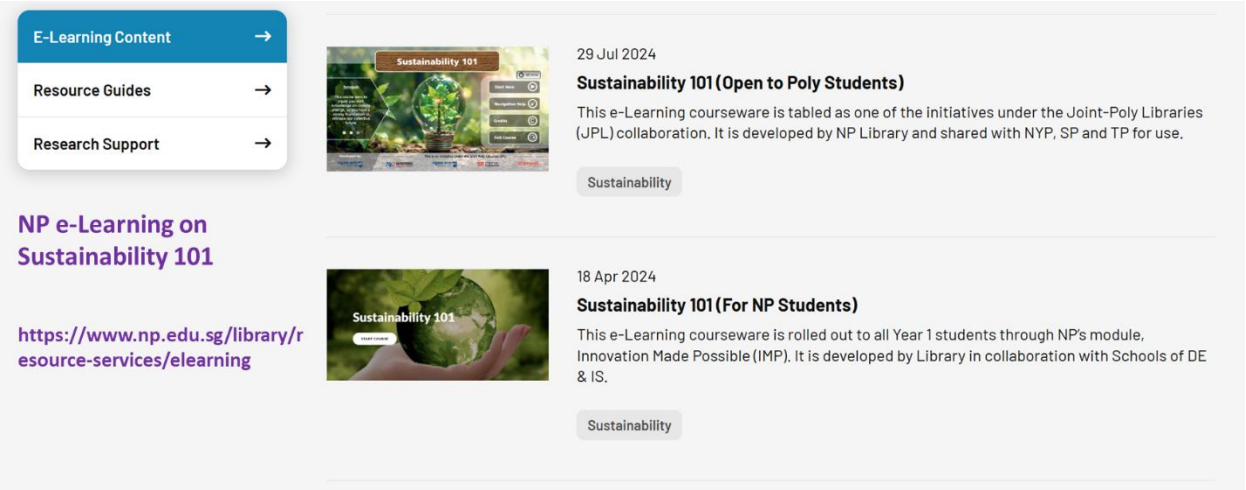
The development process followed an agile, iterative methodology[29], incorporating continuous feedback from students, faculty, and external stakeholders. This approach ensured that the content remained relevant, pedagogically sound, and aligned with the learning preferences of tertiary-level students.

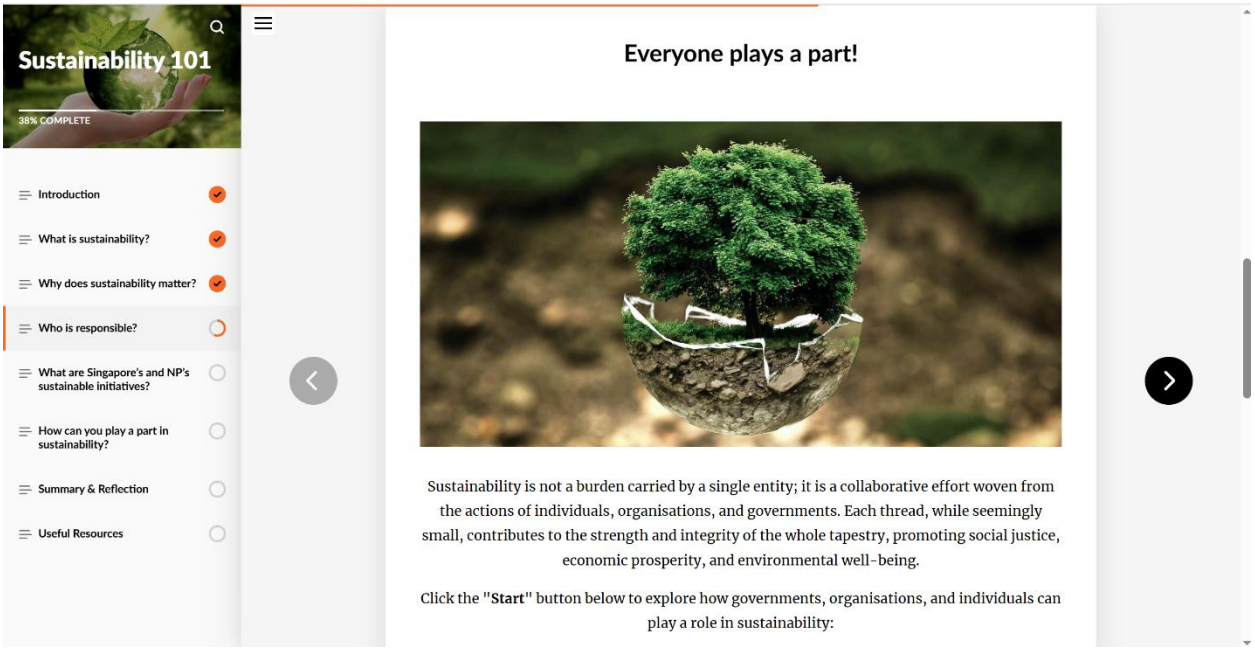
Key features of the courseware include:

- Multimedia content (videos, infographics, animations) to enhance conceptual understanding.
- Interactive quizzes and reflection prompt to reinforce learning and encourage critical thinking.
- Real-world case studies to contextualise sustainability challenges and solutions.

The S101 e-learning courseware is hosted on NP Library's Articulate 360 platform, offering a cost-effective and scalable solution with minimal infrastructure requirements.


OVERVIEW OF SUSTAINABILITY 101 (S101)
ngee ann
Lien Ying Chow Library
Sustainability 101
START COURSE
Developed by NP Library (aka Lien Ying Chow Library) to educate sustainability literacy
A 2-hour, self-paced e-learning module – simple, holistic, engaging, interactive
Scalable and adaptable for all levels of learners and other institutions; easily embedded with other learning modules
Embedded in NP core innovation module – 'Innovation Made Possible' (IMP); Taken all NP Year 1 students (>4,500)
Covers 3 key pillars of sustainability - environmental, social, and economic sustainability and their interconnectedness; Singapore and global developments


E-Learning Content
Resource Guides
Research Support
NP e-Learning on Sustainability 101
https://www.np.edu.sg/library/resource-services/elearning
Sustainability 101
29 Jul 2024
Sustainability 101 (Open to Poly Students)
This e-Learning courseware is tabled as one of the initiatives under the Joint-Poly Libraries (JPL) collaboration. It is developed by NP Library and shared with NYP, SP and TP for use.
Sustainability
Sustainability 101
18 Apr 2024
Sustainability 101 (For NP Students)
This e-Learning courseware is rolled out to all Year 1 students through NP's module, Innovation Made Possible (IMP). It is developed by Library in collaboration with Schools of DE & IS.
Sustainability



INTEGRATION INTO INNOVATION EDUCATION

A distinctive feature of the S101 initiative is its seamless integration into NP's core academic module on innovation – "Innovation Made Possible (IMP)" (NP IMP 2024). As a compulsory module for all NP Year 1 students, IMP is designed to build creative confidence through a human-centred approach to problem-solving. Grounded in the Design Thinking framework and enhanced by the LUMA System of Innovation[19], the module encourages students to tackle meaningful challenges and develop innovative solutions that align with their personal values and societal needs.

By embedding S101 into IMP, students are not only introduced to sustainability concepts but are also empowered to apply these principles in real-world innovation projects. Through design thinking and problem-based learning, students use sustainability as a lens to identify

pressing issues, generate impactful solutions, and prototype innovations that are socially responsible, environmentally sustainable, and economically viable.

Each year, over 4,500 students participate in this integrated experience, producing projects that demonstrate a deep understanding of both sustainability and innovation. This pedagogical approach reinforces the idea that sustainability and innovation are not mutually exclusive, but rather mutually reinforcing drivers of meaningful change.

Ultimately, the integration of S101 into IMP cultivates a generation of changemakers—students equipped to lead sustainable transformation within their communities and industries.

IMPLEMENTATION OUTCOMES

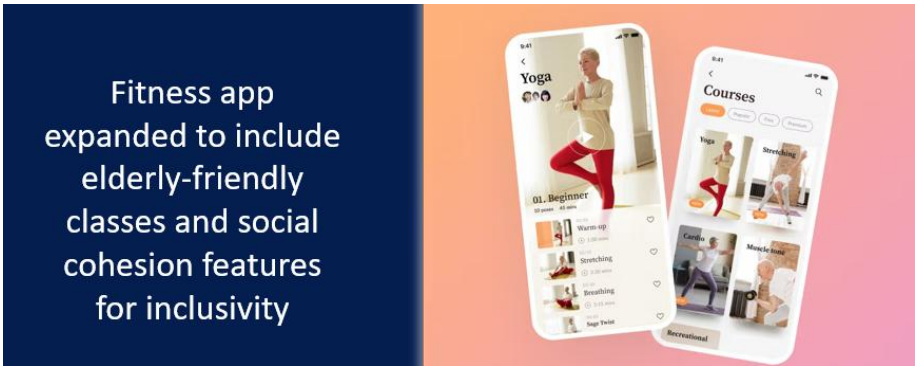
Real-World Impact and Success Stories

By the end of the semester, students participating in the S101 initiative – integrated into the IMP module, demonstrated a clear understanding of the three pillars of sustainability: environmental, social, and economic. This foundational awareness not only shaped their IMP projects but also laid the groundwork for applying sustainability principles in future academic, professional, and personal endeavours.

The following examples illustrate how students translated sustainability literacy into meaningful action:

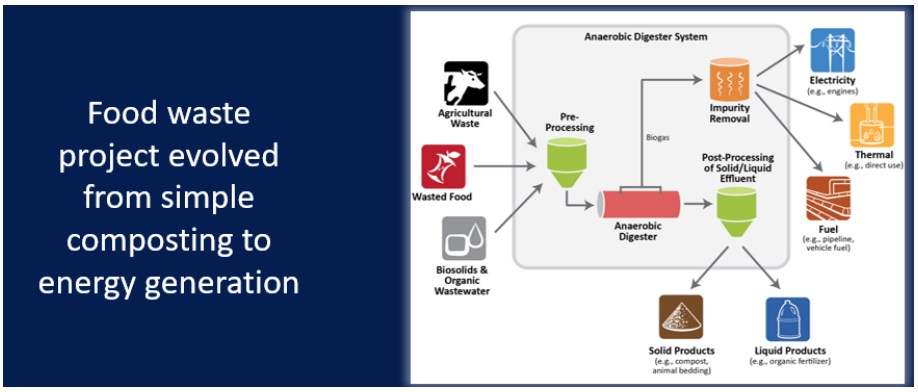
Success Story 1: Inclusive Fitness App

A student team initially designed a fitness app focused solely on exercise routines. Through the lens of sustainability, they expanded the app to include features for different age groups and integrated social media elements to foster community engagement. These enhancements promoted social inclusivity and broadened the app's economic viability, demonstrating how thoughtful design can align with both social and business sustainability goals.



Success Story 2: Food Waste-to-Energy Solution

Another team began with a simple composting concept for food waste. Inspired by sustainability principles, they evolved their idea to include food compactors that generate energy for campus food courts. The processed waste was also converted into compost for local farms, creating a closed-loop system that addressed both environmental impact and resource efficiency.



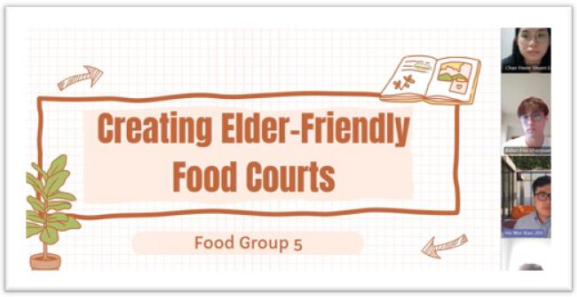
Success Story 3: Elderly-Friendly Food Court

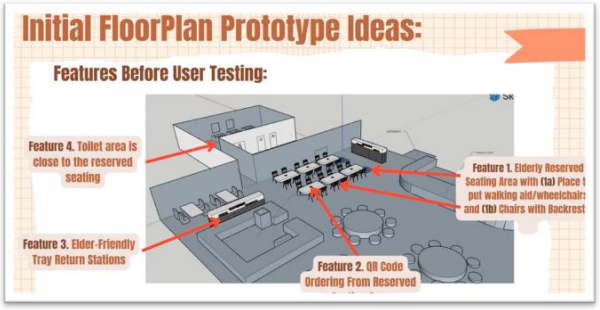
With empathy and social sustainability at the core of their approach, students proposed an enhanced food court design prioritizing elderly-friendly features.

The design included:

- An elderly reserved seating area with chairs that have backrests and designated spaces for walking aids or wheelchairs.
- A QR code ordering system tailored for the reserved area, enabling easier and more convenient meal ordering for elderly patrons and with larger fonts.

This thoughtful concept reflects a commitment to creating accessible and socially responsive public spaces.





Success Story 4: Elder Care Project

This group began with a straightforward elder care project aimed at supporting seniors. Over time, the concept evolved into a broader social wellness initiative, extending activities and engagement opportunities to benefit the wider community. To address common challenges faced by seniors, such as loneliness, depression, and anxiety, the project introduced:

- Virtual reality experiences to stimulate cognitive engagement and offer immersive enjoyment.
- Karaoke sessions to encourage social interaction and emotional expression.
- Void deck mural painting to foster community bonding and creative participation.

Success Story 5: Kampung Kart

As part of their exploration into food sustainability, students developed an innovative app concept called Kampung Kart. Designed to tackle key challenges in the local food ecosystem, the app aims to support local farmers and businesses, reduce food waste, and promote eco-friendly habits within the community. Kampung Kart addresses several pain points, including the high cost of locally produced food, limited access for consumers, and a narrow variety of available local products. By bridging the gap between producers and consumers, the app encourages more sustainable consumption patterns and fosters a stronger, community-based food network.

These projects exemplify how sustainability can be a powerful driver of innovation when embedded in education.

ADOPTION BY OTHER POLYTECHNICS

Following the successful launch of S101 by NP in April 2024, the initiative has been adopted by several other polytechnics in Singapore. In September 2024, Nanyang Polytechnic (NYP), Singapore Polytechnic (SP), and Temasek Polytechnic (TP) incorporated NP's S101 e-learning courseware into their own educational offerings.

NYP adopted the NP model by integrating S101 into its General Studies module, 'Understanding Singapore 2', beginning in October 2024. This module reaches approximately 4,000 students annually. Meanwhile, SP and TP have made the S101 e-learning resource available through their respective library portals, enabling students to access the content for self-paced learning.

S101 Implementation Links at NP, NYP, SP, and TP:

- **S101 (2-hour version):** Integrated into the IMP core module at NP
  https://rise.articulate.com/share/TBOzB_n_YfKgQeikkAKV5S1VgRXwNeZh
- **S101 (0.5-hour version):** A quick learning resource for all learners, shared and adopted by NYP, SP, and TP
  https://for.edu.sg/s101-np

Links to Joint Poly Libraries' (JPL) Guide on Sustainability:

- https://np-sg.libguides.com/sustainability
- https://nyp-sg.libguides.com/jpl_sustainability
- https://sp-sg.libguides.com/jpl_sustainability
- https://tp.libguides.com/c.php?g=961604&p=6983403

This cross-institutional adoption demonstrates the scalability and sector-wide relevance of S101, further amplifying its impact across Singapore's polytechnic education ecosystem.

REFLECTIVE PRACTICE IN EARLY-STAGE IMPLEMENTATION OF SUSTAINABILITY EDUCATION

Now in its inaugural year, the S101 initiative is in the early stages of implementation. As such, data collection and formal evaluation are still underway. However, early qualitative reflections from stakeholders and practitioners have surfaced valuable insights, highlighting areas for enhancement and emerging good practices. These formative observations provide a critical foundation for iterative development and signal promising directions for future research and institutional learning.

Lecturers teaching the "Innovation Made Possible (IMP)" module have observed encouraging shifts in student thinking. Informal comparisons of pre- and post-module submissions indicate that students are increasingly integrating at least one of the three pillars of sustainability – environmental, social, or economic, into their projects. This trend suggests that S101 is beginning to influence students' awareness and application of sustainability principles, laying the groundwork for deeper integration in future coursework.

Reflections have also revealed opportunities to further refine project scopes to better embed sustainability. For example:

- Student groups developing digital products for mass audiences were encouraged to consider inclusive design for elderly users and individuals with disabilities, fostering empathy and collective responsibility.
- Projects involving packaging prompted exploration of affordable, minimal, and biodegradable options, encouraging real-world problem-solving beyond the formal curriculum.

The ideation and conceptualization of S101 were led by the NP library team, who presented the value proposition to a taskforce comprising management and lecturers from the NP School of Design & Environment (DE) and the School of Humanities & Interdisciplinary Studies (HMIS). This early engagement was instrumental in securing stakeholder buy-in, a key success factor in educational innovation. Four core design principles guided the initiative:

- Emphasise foundational sustainability principles and real-world applications.

- Identify a core module that reaches all Year 1 students across disciplines.
- Enable project-based application of sustainability knowledge.
- Avoid duplication with existing sustainability-related modules.

Following this alignment, the library taskforce developed the S101 e-learning module, which was integrated into the IMP curriculum. While this integration successfully reached all first-year students, the taskforce noted that replication in other institutions may require adaptation to local contexts and needs.

This internal reflective phase marked by iterative design, stakeholder feedback, and contextual responsiveness is essential for shaping effective educational interventions. Literature on early-stage educational innovation underscores the importance of such cycles, especially when formal evaluation mechanisms are still evolving[11].
Although systematic data collection is pending, S101 demonstrates a strong foundation in collaborative design, pedagogical alignment, and practitioner-led reflection. These elements enhance the credibility of the implementation process and position S101 as a potentially scalable model for sustainability education. Future research will build on these insights through longitudinal studies and formal evaluation frameworks to assess impact more rigorously.

QUANTITATIVE AND QUALITATIVE OUTCOMES

The S101 initiative has demonstrated significant impact in both scale and depth.

Quantitatively, over 4,500 Year 1 students at NP acquire sustainability literacy annually through the S101 e-learning module. To date, more than 9,000 NP students have participated in this foundational sustainability education. The initiative's success has led to its adoption by other polytechnics—NYP, SP, and TP. Notably, NYP has integrated S101 into its core curriculum, extending the reach to an additional 4,000 students.

Qualitatively, students report gaining a holistic understanding of sustainability, which they actively apply not only in academic projects but also in everyday decision-making and future innovations. This deepened awareness is fostering a generation of responsible innovators, well-equipped to contribute meaningfully to Singapore's national sustainability goals and broader global efforts.

STRATEGIC ADVANCEMENTS FOR S101: EXPANDING SCOPE, ENHANCING ENGAGEMENT, AND DEEPENING USER-CENTRED DESIGN

Building on insights from the literature and reflective practice, the next phase of S101 will focus on three strategic advancements: curriculum expansion, pedagogical innovation, and user-centred refinement.

Expanding Curriculum Integration: Advancing Social Sustainability

S101 will be extended into enhanced modules that explore additional dimensions of sustainability, beginning with social sustainability. This expansion will be systematically aligned

with UNESCO's Education for Sustainable Development (ESD) indicators, particularly SDG 4.7[i], which calls for equipping learners with the knowledge and skills to promote sustainable development, human rights, gender equality, global citizenship, and cultural diversity. By embedding these competencies into the curriculum, S101 aims to foster ethical responsibility and active societal participation among learners.

Enhancing Engagement Through Gamification

To increase learner motivation, engagement, and retention, S101 version 2.0 will incorporate gamification strategies. Interactive elements such as quizzes, problem-solving activities, badges, leaderboards, and rewards will transform the learning experience, encouraging sustained participation and deeper understanding of sustainability concepts. Research supports the effectiveness of gamified learning in fostering environmentally responsible behaviours and improving information retention[24]. These enhancements will make sustainability education more dynamic, personalised, and impactful.

Deepening Feedback Through Human-Centred Design

The development of S101 version 2.0 will be guided by human-centred design principles, specifically through the application of the LUMA methodology. This approach enables systematic collection of user insights through techniques such as rose-thorn-bud, affinity clustering, interviewing, storyboarding, and prototyping. Studies affirm the value of LUMA in aligning digital learning environments with pedagogical goals and usability standards [26, 27]. As Harte et al. [15] emphasise, structured phases of insight gathering, expert usability reviews, and iterative testing allow e-learning platforms to evolve responsively and effectively. By embedding these practices into the refinement of S101, the initiative ensures that learner experiences remain central to its design, contributing to the broader discourse on sustainable and inclusive digital learning.

Together, these strategic directions position S101 not only as a foundational module in sustainability education but also as a model for innovation in curriculum design, learner engagement, and feedback-driven development.

CONCLUSION AND IMPLICATIONS

The Sustainability 101 (S101) initiative exemplifies a forward-thinking approach to embedding sustainability within mainstream education. By aligning with both national and global sustainability goals and integrating sustainability into innovation pedagogy, S101 equips students with the mindset and competencies needed to navigate and shape a rapidly evolving world.

Its success underscores the transformative potential of e-learning innovations in delivering scalable, inclusive, and impactful sustainability education. S101 offers a replicable blueprint for institutions seeking to cultivate sustainability-literate, innovation-ready graduates who are prepared to address complex global challenges.

[i] SDG 4.7 promotes integrating Education for Sustainable Development and Global Citizenship into national curricula to equip learners with competencies for a sustainable future

At Ngee Ann Polytechnic (NP), S101 has empowered over 4,500 Year 1 students annually to develop solutions that are socially responsible, environmentally sustainable, and economically viable. To date, more than 9,000 NP students have benefitted from the initiative, with all future NP graduates poised to acquire foundational sustainability literacy. The adoption of S101 by other polytechnics – NYP, SP, and TP, further affirms its relevance and scalability. When integrated into innovation-focused modules such as NP's "Innovation Made Possible", S101 enables students to apply their sustainability mindset to problem-solving with fresh perspectives. This approach not only enhances learning outcomes but also prepares students to be proactive contributors to Singapore's sustainability goals and global efforts. Ultimately, S101 promotes sustainability literacy and responsible innovation – key pillars for building a resilient and sustainable future.

While S101 has achieved encouraging progress in its first year, its long-term success depends on a commitment to continuous, evidence-based refinement. Recognizing that meaningful impact and scalability require more than initial implementation, future efforts will prioritise gathering comprehensive feedback from NP students and those from other polytechnics who have engaged with the module. By employing both quantitative and qualitative methods to capture diverse learner experiences, the initiative aims to surface reflective insights that will inform iterative enhancements ensuring S101 remains responsive, inclusive, and aligned with evolving sustainability education needs.

Acknowledgement:
The S101 initiative and its pilot implementation were made possible through the collaboration of NP's Environmental Sustainability Curriculum Committee (Chairperson Ms Eng Peck Hong), the School of Humanities & Interdisciplinary Studies (HMIS) and the School of Design & Environment (DE). Their collective expertise and support were instrumental in fostering a sustainability mindset and advancing problem-solving education at NP.

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