UNCOVERING ELECTRONIC SERVICE-LEARNING DESIGN CONSIDERATIONS TO FACILITATE CIVIC AND ACADEMIC LEARNING: INTEGRATING STUDENT, FACULTY AND COMMUNITY PARTNER PERSPECTIVES

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Abstract

Service-learning (S-L) has gained recognition as a high-impact pedagogical practice, with electronic Service-Learning (eS-L) emerging as a model that blends online and in-person instruction with service experiences. While interest in eS-L is growing, large-scale studies on student outcomes remain limited, particularly research that examines design elements critical to effective implementation and outcomes. This study analyzes eS-L design considerations through 39 semester-long modules across STEM (Science, Technology, Engineering, Mathematics) and non-STEM diploma programs in an institute of higher learning in Singapore. Using a mixed-methods approach, data were triangulated from 1,012 student survey responses, focus group discussions with 38 students, interviews with 11 faculty members, and 42 community partner surveys, enabling a holistic examination of eS-L across disciplines. Findings affirm the positive impact of eS-L on academic and civic learning outcomes. Comparison across four service activity types (direct, indirect, advocacy, and research) revealed no significant differences in changes in civic learning, though students in indirect service modules reported lower academic learning. The comparatively lower academic learning outcomes reported in indirect service modules appear to be linked to challenges in designing effective indirect eS-L activities, as observed in lower student ratings of key design elements in these modules. Important design considerations emerged, including the integration of meaningful service with structured reflection, stronger faculty development, and the closer alignment of service activities with intended learning outcomes. These findings underscored eS-L's potential as a sustainable pedagogy that advances both academic achievement and civic engagement, while offering practical guidance for educators and policymakers seeking to design effective eS-L initiatives across diverse educational contexts.

Introduction

Service-Learning (S-L) was adopted as Ngee Ann Polytechnic's (NP) signature pedagogy in 2016, and all students enrolled have at least one S-L module experience during their course of study. In the polytechnic context in Singapore, an academic "module" is taught over one semester and provides in-depth study of a subject, comparable to a college course in the United States. Institutionally, NP adopted Bringle and Clayton's definition of S-L (Bringle & Clayton, 2012, p. 105) as a "course-based, credit-bearing educational experience in which students (a) participate in mutually identified and organized service activities that benefit the community, and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of personal values and civic responsibility." Beyond offering students opportunities to utilize their academic knowledge and skills to address community issues, S-L also strives to instill a sense of civic responsibility and to foster professional development in terms of character development and career preparation.

In response to the COVID-19 pandemic, NP implemented home-based learning in the semester beginning April 2020, requiring instructors to adopt online home-based learning. Adapting S-L modules into electronic service-learning (eS-L) presented a distinct challenge as traditional S-L focuses on in-person interactions with the community. The design and implementation of eS-L therefore demanded a purposeful integration of S-L with technology, along with alignment to pedagogical principles to achieve the learning outcomes.

This study investigated the impact of eS-L on students' academic learning, civic learning, and personal growth across eight academic schools, evaluated the extent to which empirically supported S-L elements are applicable in the eS-L context, and also examined how the element of effective use of technology influenced the design and outcomes of eS-L. Additionally, this study also reviewed how technological capabilities can be strategically leveraged to enhance the implementation of eS-L elements in digital environments.

Post-COVID-19, the mode of education delivery is shifting towards blended learning (i.e., a blend of online and face-to-face learning). Thus, certain S-L aspects may remain online. Beyond providing resilience in the face of pandemics, eS-L has the capability to transcend geographical limitations and maintain a uniform S-L experience for sizeable groups comprising 100 or more students, thereby overcoming equity issues in assessment and evaluation (Ong et al., 2023). Through a sequential mixed-methods investigation of 39 semester-long academic modules at NP, this study reveals the broader applications of eS-L beyond pandemic responses.

Service-Learning

S-L is a high-impact pedagogical practice with well-documented impact on students' critical thinking, academic and civic learning, and personal and/or professional development (Astin et al., 2006; Campbell & Oswald, 2018; Choo et al., 2019; Conway et al., 2009; Eyler & Giles, 1999; Salam et al., 2019; Yorio & Ye, 2012). Celio et al.'s (2011) meta-analysis of over 11,800 pre-collegiate and collegiate students across 62 S-L studies found improvements in attitudes toward self, learning, and school; as well as improvements in civic engagement, social skills,

and academic performance. Other meta-analyses found similar favorable outcomes for understanding social issues, gaining personal insights, and achieving academic and cognitive development, as well as positive effects in the social and citizenship domains (Conway et al., 2009; Yorio & Ye, 2012). Beyond impacts on student learning, Salam et al. (2019) also suggested that S-L can strengthen relationships between stakeholders, can allow faculty members to conduct action research into their teaching practices, and can effectively serve the needs of the community. Specific to NP's context, Choo et al. (2019) found significant improvement in perceived civic outcomes among polytechnic students in S-L modules compared with those in non-S-L modules, as well as favorable outcomes in academic connection, career preparation, and personal and interpersonal development following S-L.

Since adopting S-L as its signature pedagogy in 2016, NP has integrated community engagement into academic learning, requiring every student to complete at least one S- L module that applies course-specific skills to real-world community challenges. These service activities are broadly classified into four categories (Table 1), each differing in the degree of direct interaction with the community and the nature of the response to identified community needs. Table 1 also illustrates the service activities within each category and provides examples from NP.

Table 1

Categories of Service Activities (Bringle et al., 2016; Kaye, 2010) and Illustrative Examples From Ngee Ann Polytechnic

Category	Description	Example from Ngee Ann Polytechnic
Direct	• Involves person-to-person interaction and direct impact on service recipients • Students provide immediate, hands-on assistance to specific individuals • Takes place at community agencies, schools, or care facilities • Examples: tutoring at-risk youths, giving presentation on drug prevention to youths	Students from Optometry conducted eye screenings and provided eye care guidance for low-income families
Indirect	• Benefits community or environment through organizational support • Students have no direct interaction with service recipients and work through intermediary organizations or offices • Examples: creating communication contents (brochures, videos) for partner organization, organizing crowdfunding or donation drives	Engineering students developed prototype devices to enhance safety on shared paths for pedestrians and users of mobility aids
Research	• Focuses on gathering and presenting information about community issues • Applies psychological research methods and data analysis • Helps inform service delivery and program development • Examples: conducting longitudinal study on water or air quality and presenting the results, creating and implementing a survey and generating a report	Life sciences students conducted coastal water testing and submitted their findings to the relevant government agency
Advocacy	• Aims to educate and mobilize public action • Addresses community issues and policy changes • Focuses on broader community awareness and engagement • Examples: conducting public campaigns on social issues in the community, working with governmental bodies to promote awareness of local issues	Students from the Diploma in Mass Communication created an online campaign to raise youth awareness about drug abuse

When the COVID-19 pandemic struck, face-to-face service activities pivoted to digital platforms, a crucial adaptation that enabled students to continue contributing meaningfully to community issues while learning remotely. Although some service activities were easily transferable to online formats, others required significant redesign, including modifying the nature of the service or relocating the S-L component to another module within the curriculum. While prior work has explored the impact of direct and indirect service activities on fostering attitudes toward social equality (Brown et al., 2016), our literature review found no other studies that examined the *differential impacts across categories* of service activities. Hence, this study addressed this lacuna in the literature by investigating these impacts.

Electronic Service-Learning

Conventionally, course instruction and service experiences occur in a face-to-face environment. The emergence of online education alongside the global COVID-19 pandemic has reshaped the education landscape. With the advent of home-based online learning, Singapore's Ministry of Education reviewed how to "blend" classroom and digital learning to "harness the best of both worlds" (Ang, 2020) and augment students' proficiency in digital literacy (Tushara, 2023).

Bringle and Clayton (2020) also emphasized the importance of merging the strengths of S-L with online learning and digital technology for achieving learning goals. Waldner et al. (2012) posited four types of eS-L (Figure 1) with varying combinations of online and onsite course instruction and S-L experiences. The feasibility of eS-L design and implementation depends largely on the nature of the module and project. While all NP course instructions were moved online during the pandemic, online lessons could not replace hands-on laboratory, clinical, and studio sessions. In some cases, it was easier to redesign eS-L service activities in indirect, research, or advocacy categories to be delivered online (vs. direct service).

eS-L can potentially overcome the geographical restrictions faced by traditional S-L (Salam et al., 2019; Waldner et al., 2012) with online communication tools, allowing learning to be more flexible as students can gain access to online materials and instructions at their convenience (Marcus et al., 2019; Muraleedharan, 2024). eS-L is a powerful pedagogy to promote interaction (e.g., student-student, student-instructor, student-community partner) and engagement, which are perceived to be lacking in typical online learning (Figuccio, 2020; Gaytan & McEwen, 2007; Hill et al., 2009; Muirhead, 2004; Swan, 2002; Waldner et al., 2012). Moreover, eS-L can engage non-typical populations (e.g., persons with disabilities), which is a challenge in traditional S-L (Figuccio, 2020; Malvey et al., 2006), individuals who are introverted (Waldner et al., 2012) or shy (Compare & Albanesi, 2022), and those who live far from their schools (McGorry, 2023; Strait & Hamerlinck, 2010). eS-L is also an attractive alternative when minimal physical interaction is possible (Ong et al., 2023). The transition from traditional S-L to eS-L also unveils opportunities to broaden the demographic of students who can partake in such courses through reduced educational expenses (Faulconer, 2020). This approach fosters greater inclusivity and equitable access to educational opportunities, aligning with the imperative to democratize learning experiences across diverse socioeconomic backgrounds.

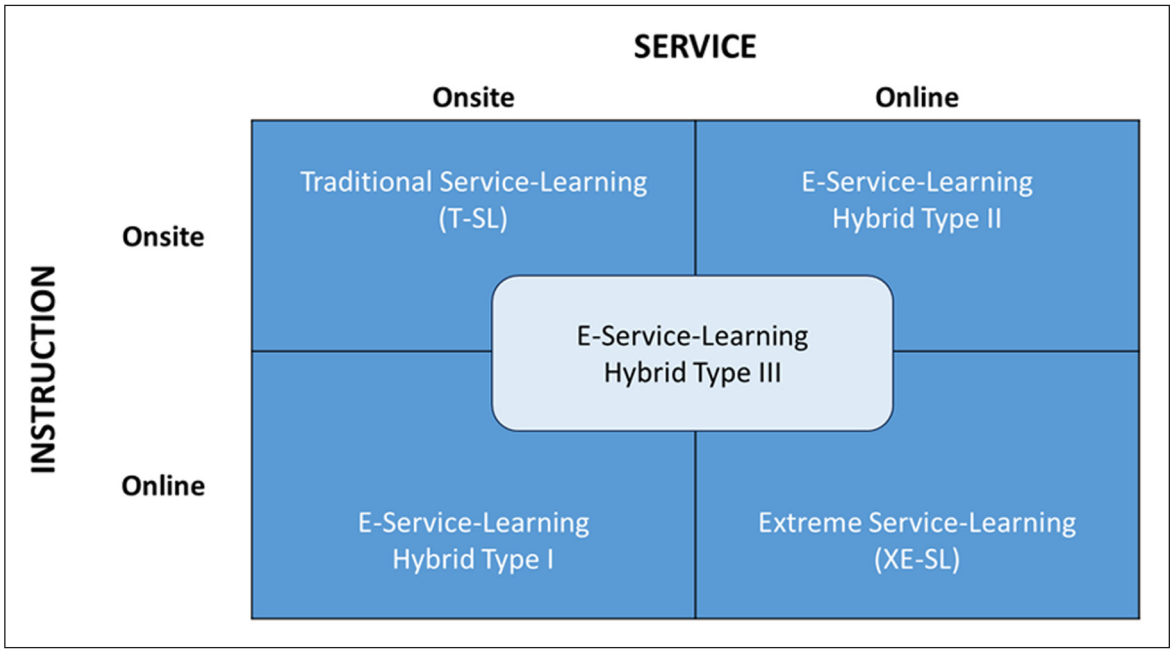

Figure 1 Types of eS-L (Waldner et al., 2012).

Institutions stand poised to leverage a plethora of technological tools and platforms (Faulconer, 2020; Yusof et al., 2021) to facilitate remote collaboration, potentially widening the reach of eS-L initiatives across diverse communities. This adaptive approach is particularly salient in responding to emerging community issues, such as social isolation, amidst the challenges posed by the pandemic (Dinour & Daclan, 2022).

The post-pandemic era heralds a nuanced landscape for eS-L, marked by a confluence of challenges. Foremost among the challenges is the persistent digital divide that accentuates socioeconomic disparities in access to the requisite technological tools and internet connectivity (Bell et al., 2020; Usher et al., 2024; Yu et al., 2023). Concurrently, ensuring sustained student interaction and fostering the sense of community and empathy in virtual settings emerges as a formidable hurdle (Ngai et al., 2024). Furthermore, the prolonged period of uncertainty surrounding the resumption of daily routines imposed significant stress on students, evidenced by an increase in reported mental health issues (Elmer et al., 2020).

Current eS-L research has generally pointed to it generating similar learning outcomes as traditional face-to-face S-L (Figuccio, 2020; Lin et al., 2023; McGorry, 2012; Waldner et al., 2010; Yu et al., 2023). Marcus et al. (2019) analyzed student reflections from a Hybrid Type III eS-L course and found that most students focused on their global citizenship skills, followed by scholarship and adaptability skills. In contrast, teamwork skills—commonly emphasized in traditional S-L—were less prominently reported, which the authors attributed to fewer opportunities for students to take on leadership roles in the eS-L setting. At the same time, students highlighted the benefits of the online platform, particularly its provision of useful learning resources, facilitation of interactions with instructors and peers, and support for tracking their learning progress. Studies investigating extreme eS-L have substantiated its pedagogical efficacy and viability within educational contexts. Waldner et al. (2010) conducted research on fully online eS-L courses in public health policy and management marketing courses. Their findings indicated that these courses successfully met

established benchmarks for effectiveness, including project deliverable completion, client satisfaction metrics, student engagement levels, quality of stakeholder interactions, and skills development outcomes. When the learning outcomes (practical and interpersonal skills, citizenship and personal responsibility) for traditional S-L and extreme eS-L pedagogies were compared for both marketing strategy and marketing research courses, no significant differences were found (McGorry, 2012). Although educators may be inclined to revert to fully in-person S-L activities post-pandemic, these findings underscore the value of eS-L in fostering a more inclusive and impactful educational paradigm.

The eS-L modules in the current study were largely Hybrid Types II and III as influenced by Singapore's national directives in response to COVID-19. This pioneering research is Singapore's first comprehensive study of eS-L in the polytechnic sector. By examining various eS-L hybrid approaches and their impact on academic and civic learning, the study will identify effective module design and implementation elements. The findings will provide educators with critical insights and practical recommendations for developing impactful eS-L programs.

Design and Implementation of S-L and eS-L Modules

S-L Quality Assessment Tool (SLQAT) was introduced for the design, implementation and assessment of S-L modules (Furco et al., 2023). It encompasses 28 "essential elements" derived from high-quality S-L research, which are categorized into five dimensions: Course Design, Learning, Student, Instructor, Community Partner and Partnership. The Center for Service and Learning at Indiana University-Purdue University Indianapolis (IUPUI) has also created a taxonomy for S-L modules, aiming to bolster fidelity and quality by pinpointing six essential characteristics of S-L courses (Hahn et al., 2016). Choo et al.'s (2019) study of NP students in S-L also highlighted important factors such as students' perceived impact of S-L, preparedness for S-L, quality of reflection prompts, and amount of interaction with the community in designing and implementing S-L.

Table 2
NP Office of Service-Learning's S-L Elements Adopted From SLQAT and IUPUI S-L Taxonomy

S-L Element	Descriptive Attribute
Connection between service and learning	There is evidence of how the service activities and the module's learning goals relate to each other.
Critical reflection	The module includes relevant critical reflection activities intended to foster connections between module content and service activities.
Dialogue with diverse others	Dialogue with others across differences (e.g., race ethnicity, age, language, religion, social-economic status) occurs regularly.
Meaningful service	Service activities are based on a clear, meaningful, community-identified issue/need. Service activities help meet the needs that the community finds important.
Reciprocal relationship	Reciprocal partnerships and processes shape the community activities, module design, and community outcomes. There is mutual benefit for both community organization and school.
Community voice	Community partner plays a co-educator role and provides input in shaping the S-L experience.
Student voice	Module incorporates opportunities/activities for student voice (e.g., autonomy, choice, creativity, leadership, influence) in the S-L experience.

NP's Office of Service-Learning (OSL) reviewed and refined the elements to the current list in Table 2 (Ong et al., 2023). The descriptive texts serve as a guide for instructors to determine the presence of each element and assess its level of implementation. These considerations for designing high-quality eS-L were emphasized in our faculty training for designing and implementing eS-L.

Besides the seven S-L elements used by NP OSL, technology effectiveness was included in this eS-L study to capture the considerations and impact of technological tools. eS-L requires technical capability and training of students to implement eS-L online. eS-L activities exhibit four distinct types of technological interaction (Culcasi et al., 2022). The first two focus on delivery methods: an *instrumental channel* employs basic digital tools such as video conferencing without requiring special expertise, while an *integrated channel* demands advanced technical skills for tasks such as digital content creation. The other two types relate to project goals: an *instrumental objective* utilizes existing technological platforms like social media for project implementation, while an *integrated objective* involves creating new technological solutions such as developing custom software to address community needs. Most of the eS-L service activities in NP adopted a combination of the first three types of technological interactions, namely the instrumental channel (e.g., using video conferencing platforms for communication with students and community partners), the integrated channel (e.g., using digital tools for content creation in advocacy projects) and the instrumental objective (e.g., using video conferencing platforms for implementation of eS-L activities with the community participants).

Malvey et al. (2006) highlighted the need to assess students' technological skills, communicate software requirements, and expose them to online learning to mitigate cognitive overload. Other literatures suggest that instructors have the responsibility to bridge synchronous and asynchronous communications in eS-L to promote inclusivity and systematic tracking (Waldner et al., 2012). eS-L requires digital proficiency from students, instructors, and community partners (Zhu et al., 2023). Training in technological platforms/tools should be extended to both instructors (Smeltzer, 2020; Strait & Sauer, 2004) and community partners (Waldner et al., 2012) as well as students to alleviate tech-related anxiety issues in non-digital natives (Meuser et al., 2022). Instructors and community partners should also conduct trials prior to actual eS-L sessions to ensure quality (Yu et al., 2023; Waldner et al., 2012).

Communicating clear expectations is vital to prevent disengagement and confusion in the context of online learning. Prince et al. (2020) proposed the implementation of asynchronous and synchronous modes of contact and communication coupled with the clarification of expected engagement. For eS-L, Hunter (2007) and Waldner et al. (2012) suggested "memorandums of understanding" among students, instructors, and community partners to ensure commitment to project collaboration. This can guide instructors to engage actively with students and provide sufficient feedback to students, which are vital in eS-L because it lacks the immediacy of feedback that face-to-face learning can provide (Hunter, 2007; Tabor, 2007).

Online communication lacks nonverbal cues, affecting communication effectiveness and can lead to feelings of disconnection (Lapidot-Lefler & Barak, 2012). In virtual communication, deciphering nonverbal cues is often challenging for users (Guthrie & McCracken, 2010). Hence, students should be cautioned about inappropriate online communications, as toxic disinhibition effects can affect relationships with others (Shah et al.,

2018; Suler, 2004). eS-L modules should be purposefully designed to promote active participation among all parties, especially for extreme eS-L with less frequent synchronous interaction (Waldner et al., 2010) and interactions can be more truncated (Bringle & Clayton, 2020). Although both S-L and eS-L emphasize building reciprocal relationships with community partners, eS-L's reliance on online interactions requires intentional planning to facilitate these relationships. At the beginning of the course, a community partner "reveal" (e.g., video teleconferencing) can foster active communication and engagement between students and community partners. Students have noted that a real-time chat or a physical meeting was crucial for building relationships and understanding project rationale and issues (McGorry, 2006). Evidently, the strategic deployment of technological tools to facilitate online collaboration and communication is crucial to building these relationships (Stefaniak, 2020).

Faculty Development for S-L and eS-L

Faculty development is essential to achieve the desired student outcomes of increased academic learning, civic learning, and personal growth and/or professional development (Abes et al., 2002; Clayton & Ash, 2004; Howard, 2000). Faculty development is closely related to the success of S-L modules (Ash & Clayton, 2009; Bringle & Hatcher, 1999; Clayton & O'Steen, 2010; Howard, 2000) because it can influence the design and implementation of the modules (Billig, 2007). Faculty development has enhanced staff confidence, their positivity in teaching, and their perception of collaboration with the community in S-L pedagogy (McKinney, 2002). Forming a core group of instructors for research and S-L/eS-L implementation can enhance mutual support and resource pooling (McKay & Rozee, 2004; Rice & Stacey, 1997).

NP OSL has trained over 700 instructors in S-L since 2016. The first-place award in the 2020 MacJannet Prize for Global Citizenship validated the quality and impact of the S-L initiatives in NP. Similarly, faculty development is crucial for eS-L, given the complexity of integrating S-L with online platforms (Guthrie & McCracken, 2010).

In this study, the development of faculty training for eS-L design and implementation adopted an iterative approach. The existing eS-L research findings and NP S-L guidelines informed the initial faculty training. Following the training, the implementation and review of eS-L experiences referenced Kolb's experiential learning framework (Sharlanova, 2004). The concrete experience phase commenced in the October 2021 semester, when eS-L modules were implemented based on the proposed design and implementation approaches. The research team collected data concerning the experiences of students, instructors, and community partners. They analyzed and drew insights from the quantitative and qualitative data reflecting the reflective observation and abstract conceptualization phases to inform the subsequent faculty training for eS-L instructors in April 2022 semester. Another cycle of Kolb's experiential learning commenced, and similar data were collected to inform future faculty training.

Research Questions

This study examined the impact of eS-L on students' learning outcomes, identified good eS-L module designs and essential implementation elements, and elucidated how these elements were related to the student outcomes. The research questions include:

(a) What is the impact of eS-L on civic learning, academic learning, and personal growth and/or professional development?
(b) How are eS-L elements related to students' civic learning and academic learning?
(c) Across the categories of service activities (direct, indirect, research, advocacy), is there a difference in the:
    (i) impact of eS-L on civic and academic learning?
    (ii) student ratings of eS-L elements?

Methods

Participants

Students of eS-L modules from eight NP STEM and non-STEM schools in October 2021 semester (October 2021 to March 2022) and April 2022 semester (April 2022 to September 2022) were invited to participate in this study. A total of 1012 students from first, second, and third year of studies completed one survey before and another survey after their eS-L experience. Among this group of participants, 38 students who reported significantly higher or lower civic learning scores after eS-L took part in an online focus group discussion. An additional 486 students completed only the post eS-L survey.

Eleven instructors whose students participated in the focus group discussions were interviewed. Community partners were invited to complete a survey and 42 responses were collected. The number of schools, modules, and the types of eS-L service activities are summarized in Table 3.

During the October 2021 semester, the COVID-19 pandemic situation in Singapore was such that face-to-face lessons could resume partially in NP with Safe Management Measures. However, community visits were not possible, and all community interactions and activities remained online. As such, modules were designed and conducted as Hybrid Type II eS-L in October 2021 semester, with lessons conducted onsite and service delivery online. In the April 2022 semester, COVID-19 measures further eased and some eS-L modules incorporated onsite community-based activities and were conducted as Hybrid Type III eS-L in the April 2022 semester.

Across the eS-L modules examined in this study, three distinct types of technology interaction by Culcasi and colleagues (2022) were identified: instrumental channel, integrated channel, and instrumental objective. This multi-modal approach enhanced the pedagogical efficacy of community-based activities while maintaining the core principles of S-L. However, as technological examination was not a primary focus of this study, the differential learning outcomes associated with these various modalities of technology interaction were not investigated.

Table 3
Overview of Schools, Modules, and Student Participation in the Study

Number of Schools	Number of Modules	Types of eS-L	Categories of eS-L Activities	Students Involved
8	39	Hybrid Types II and III	Direct	590
			Indirect	241
			Research	99
			Advocacy	82

Research Design and Materials

This study used a mixed methods approach to triangulate quantitative survey results with qualitative interview findings. A within-subjects design was employed to examine changes in students' civic learning scores before and after eS-L. Quantitative analysis of post-eS-L survey responses for students' academic and civic learning as well as correlational analysis of the relationships between these learning outcomes and eS-L elements were conducted. Post-eS-L surveys were conducted for the instructors and the community partners. In addition, qualitative data were collected through student focus groups and instructor interviews to gather insights that may not be obtained through surveys.

Student Quantitative Survey

A 9-item pre-eS-L survey (Appendix A) measured civic learning outcomes. A 39-item post-eS-L survey measured civic learning as well as academic learning and perceptions of the eS-L elements including the connection between service and learning, critical reflection, community voice, meaningful service, dialogue with diverse others, reciprocal relationships, student voice, and technology effectiveness. The responses for the survey items were based on a five-point response scale ranging from (1) *Strongly Disagree* to (5) *Strongly Agree*. The civic learning survey items were adapted from previous S-L research at NP by Choo et al. (2019) and have shown high internal consistency. The remaining survey items were developed by the research team, drawing on insights from pertinent assessment tools identified during the literature review (Furco et al., 2023; Hahn et al., 2016).

Student Focus Group Discussion

The interview questions focused on the students' perspectives on the impact of eS-L on academic learning, civic learning, and personal growth, as well as the eS-L design and implementation elements.

Instructor Survey

A 13-item survey (Appendix B) was designed by OSL staff to assess the extent to which instructors incorporated predetermined S-L course attributes, thereby providing a consistent basis for supporting faculty development and promoting quality in S-L design and implementation. The instructors self-assessed their eS-L designs based on their integration of academic learning, civic learning, and personal growth into the eS-L experiences, and the integration of eS-L elements into the module design and implementation. Appendix B shows the rubrics on a 3-point scale of 1, 3 and 5. This self-assessment survey was completed prior to the interview with staff.

Instructor Interview

The interview questions gathered instructors' perspectives on the impact of their eS-L on the three S-L outcomes (academic learning, civic learning, personal growth) and the eS-L elements.

Community Partner Survey

A 12-item survey (Appendix C) assessed community partners' perception of students' civic learning, connection between service and learning, community voice, meaningful service, dialogue with diverse others, reciprocal relationship, student voice, and technology effectiveness.

eS-L Module Design and Implementation

At the start of the semester, students went through pre-service activities in their respective modules during which instructors briefed them about the principles and purposes of eS-L and the service activities they would undertake with the community partners. Pre-service activities were included to enhance students' comprehension of community challenges, strengths, and essential project details, including policies, ethics, and safety considerations. Students then embarked on the various service activities. Towards the end of the semester, post-service activities required students to present the required deliverables and evaluate how the service activities related to the eS-L outcomes (Ong et al., 2023).

Throughout the semester, reflection activities took place at pre-, during, and post-service. Instructors provided reflection prompts for each of the academic learning, civic learning, and personal growth learning outcomes.

Results

Civic Learning: Triangulating Student, Instructor, and Community Partner Survey Responses

Based on students' pre-eS-L and post-eS-L survey data, paired sample t-test analysis revealed that students reported significantly higher civic learning outcomes after eS-L (M = 3.88, SD = 0.59) than before eS-L (M = 3.78, SD = 0.55), $t(1011) = 6.47$, $p < .01$.

The instructors' ratings for the integration of civic competencies into student learning outcomes had a mean of 3.40 (SD = 0.84). This indicated that instructors generally perceived that they focused on discipline-based content, and connected to civic learning and competencies when relevant to the community activities.

The community partner's survey responses revealed that they perceived students as having good civic learning outcomes. A single-sample t-test revealed that their perception of students' civic learning scores (M = 4.30, SD = 0.64) was significantly greater than the neutral score of 3 on the survey's response scale, $t(41) = 13.05$, $p < .01$.

The qualitative data findings from the students and instructors generally corroborated the quantitative findings. Across students and instructors, the most common finding was that students reported a deeper awareness of social issues. For instance, one student commented how they were "a little bit more self-conscious of the food wastage" while one instructor had mentioned how S-L "left the biggest impact to the student, because the student got to know about their [Dialogue in the Dark blind guides'] daily life, which they have never thought of." Another common finding was that students reported a greater desire to give back to the community because of their eS-L experience. Examples of situations where students felt they could give back were by working in a soup kitchen or by distributing hampers to the elderly. Some students also candidly shared that while they had a greater desire to give back to the community, they were unable to do so. On the other hand, there were students who reported that they did not learn much about social issues due to limited interactions with the community during the eS-L experience.

The quantitative findings of the students and community partners' perspectives, and the qualitative findings of the students and instructors, all suggested that students generally experienced a growth in civic learning as a result of their eS-L experience.

Academic Learning: Triangulating Student, Instructor, and Community Partner Survey Responses

Post-eS-L survey responses indicated that students' academic learning outcomes (M = 3.94, SD = 0.74) were significantly higher than the neutral score of 3, $t(1497) = 48.97$, $p < .01$. This suggests that students experienced good academic learning from the eS-L modules.

The instructors rated the role of eS-L in enhancing academic content, course design, and assignments with a mean score of 4.00 (*SD* = 0.82). This suggested that instructors reported integrating the community activities and relevant social issues as critical dimensions for students' understanding of academic content and ability to complete assignments. Furthermore, the course syllabus, teaching schedule, and assessment plan provided a good rationale for the relationship of the community activities to the course learning outcomes. The students' perceived academic learning from the eS-L experience may be attributable to the well-planned design implemented by instructors as a result of faculty development activities for eS-L.

The qualitative data findings from the students and instructors also corroborated the quantitative findings. Across both the students and instructors, the most common finding was that students enhanced their domain knowledge and skills through their eS-L experience. For example, students across the diplomas listed many skills including "photoshop and design", "cause- effect and ways to prevent or slow down the progression of Alzheimer's", "about hand gestures and our languages" and other domain-related knowledge. Instructors likewise highlighted the various academic contents that students had learnt, such as "Facebook ads manager, TikTok ads manager, Google ads", and "preparing them (students) to build IoT (Internet of Things) sensors in urban farming." In modules into which the instructors had intentionally integrated and scaffolded academic knowledge and skills through the eS-L design, students reported higher ratings for their academic learning in relation to the eS-L experience. Another common finding was that students reported applying the domain knowledge and skills learnt in the eS-L module. For instance, one instructor highlighted how students came up with many ways to solve a real-life problem using their domain knowledge, such as "having a device that is attached to a bicycle or a personal mobility device, some with a wearable device on the neck, and some think of making use of the existing infrastructure for example the lamp post, and then install something on the lamp post." Another example was an Environmental & Water Technology student who explained that their service allowed them to "see how what we learnt in the classroom was actually applied in real life, so I think being able to see that will help to strengthen our understanding and knowledge."

All students in the focus group discussion mentioned that they had no issue in learning the module content and knowledge in the eS-L module. However, a few instructors observed that some students might face difficulties with academic learning. This may be due to condensed delivery of academic content to free up time for eS-L within a semester.

The triangulated findings from the above instructors' interview, students' focus group, and quantitative results from post-eS-L analysis suggested that eS-L was instrumental in helping students achieve their academic learning.

Personal Growth and/or Professional Development

Instructors' perception of the extent to which the eS-L experience supported students' personal growth was analyzed. They rated "the S-L experience engages students in developing personal

learning and/or professional skills" with a mean of 3.80 (SD = 1.03). In general, they perceived good and sufficient evidence of how the eS-L experience and related course content supported students in developing both deeper personal learning outcomes (e.g., moral reasoning, stereotype reduction, becoming more aware of personal values/strengths), and professional skills (e.g., teamwork, communication, time management, project development). This is congruent with the findings on personal growth from the student focus groups.

Two major themes emerged, based on the thematic analysis of the students' and instructors' interviews regarding students' personal growth. The most common theme was that students felt they had developed the core values (Respect, Responsibility, Resilience, Integrity, Compassion and Gratitude) of NP. Among the 38 students interviewed, 63% of the students shared how they could exercise these values during the eS-L module. For example, one student mentioned how they practiced being "respectful in a way that we watch[ed] our words and know how to respect the community regardless of whether they are [perceived as] low or not [in social status]. We [should] treat them as an equal." Students also expressed "gratitude and respect for the people putting in so much effort to make these spaces beautiful and clean for us."

The next most common theme was greater clarity of career paths for students. This was evident when 53% of students described the careers they would like to pursue or avoid based on their eS-L experience. For example, some students would like to pursue careers as "early childhood or primary school teachers" or seek career opportunities in "creating social media posts such as content marketing." Conversely, one student stated that "I don't think I will become something like a social worker. It's just not my passion or like my outlook on life" – indicating careers that they wanted to avoid. Likewise, instructors could also highlight certain careers that students might prefer or avoid. For example, one instructor shared that "some students ... don't like this thing that they're doing. Like they think they know that, ok, I'm not going to do this. I'm not going to do this [study] design anymore. So I'm not doing this [as a] career."

Hence, the instructors' survey results and qualitative responses of both instructors and students consistently suggested eS-L provided opportunities to enhance clarity in career exploration and strengthen NP core values (Respect, Responsibility, Resilience, Integrity, Compassion and Gratitude).

Relationships between eS-L Elements and Learning Outcomes (Academic Learning and Civic Learning)

Table 4 shows Pearson correlations between the eS-L elements with Academic Learning (Pearson's r ranged from .54 to .79, $p < .01$) and the change (Δ) in Civic Learning (Pearson's r ranged from .28 to .35, $p < .01$). Civic learning outcome is presented as the difference between pre- and post-eS-L civic learning scores.

Table 4

Correlation Between eS-L Elements With Academic Learning (AL) and Civic Learning (ΔCL) Outcomes

eS-L Elements	AL	ΔCL
Connection between service and learning	.79*	.35*
Critical reflection	.70*	.35*
Technology effectiveness	.68*	.31*
Meaningful service	.68*	.34*
Reciprocal relationship	.66*	.30*
Student voice	.64*	.32*
Community voice	.58*	.32*
Dialogue with diverse others	.54*	.28*

Note: *$p < .01$.

As shown in Table 4, all eight eS-L elements showed positive and significant relationships with ratings of academic learning, and positive change in civic learning outcomes. These suggested that all eight elements are important considerations in the design and implementation of eS-L modules. The correlation coefficients between the learning outcomes and the eS-L-specific element, technology effectiveness, were comparable to those for the seven traditional S-L elements. This suggested the importance of selecting suitable technological tools to deliver course content and facilitate engagement between students and community partners/members. Students, instructors, and community partners should be prepared to ensure that they are capable of utilizing the technological tools in eS-L. In addition, eS-L design should intentionally promote regular and clear online communication and active engagement among students, instructors, and community partners, keeping in mind the lack/absence of nonverbal communication cues in online communication.

Impact of eS-L on Learning Outcomes Across Categories of Service Activities

A MANOVA analysis was conducted to see if the four categories of service activities would differ based on the learning outcomes and eS-L elements. The multivariate result was significant for service type, *Wilk's Lambda* = .90, $F(3,30) = 3.52$, $p < .001$, indicating a difference in the learning outcomes and eS-L element scores among the four categories of service activities.

Comparing the learning outcomes, the univariate tests showed that the four categories had significant differences in students' ratings on academic learning, $F(3,1008) = 5.06$, $p < .01$. Meanwhile the categories of service activities did not significantly differ for change in civic learning.

Comparing the eS-L elements, the univariate tests showed that the four categories of service activities had significant differences in students' ratings on critical reflection, $F(3,1008) = 3.27$, $p = .02$; meaningful service, $F(3,1008) = 4.04$, $p = .007$; dialogue with diverse others, $F(3,1008) = 4.57$, $p = .003$; reciprocal relationship, $F(3,1008) = 4.27$, $p = .005$; student voice, $F(3,1008) = 7.16$, $p < .001$; and technology effectiveness, $F(3,1008) = 4.17$, $p = .006$. Meanwhile, the categories of service activities did not significantly differ in students' ratings on connection between service and learning and community voice ($p > .05$).

Table 5
Statistically Significant Mean Differences Between Categories of Service Activities

Element/Outcome	Advocacy vs. Indirect	Direct vs. Indirect	Research vs. Indirect
Academic learning	0.25*	0.15*	0.29**
Critical reflection	0.21	0.12	0.19
Meaningful service	0.21	0.16**	0.06
Dialogue with diverse others	0.15	0.21**	0.01
Reciprocal relationship	0.10	0.18**	0.05
Student voice	0.20	0.23***	0.15
Technology effectiveness	0.26**	0.12	0.08

Note: *$p < .05$, **$p < .01$, ***$p < .001$.

The post-hoc comparisons in Table 5 show statistically significant mean differences between various categories of service activities for academic learning and five elements (meaningful service, dialogue with diverse others, reciprocal relationship, student voice, and technology effectiveness). Students involved in indirect service activities reported significantly lower academic learning scores than research, advocacy, and direct service activities. Direct service activities had significantly higher mean scores than indirect service activities for student voice, dialogue with diverse others, reciprocal relationship, and meaningful service. Meanwhile, advocacy service activities had significantly higher technology effectiveness scores compared to indirect service activities. These findings highlight the relative strengths of research, advocacy and direct service activities in academic learning, as opposed to indirect service activities.

Civic Learning: Triangulating Student and Instructor Perspectives on eS-L Elements

There were mixed findings in students' reports of civic learning across the diverse modules, with students in some modules reporting significant change in civic learning, while other modules reported no significant change. The

instructors' interviews and students' focus group discussions provided insights into why certain modules had or did not have significant civic learning.

Critical Reflection

Some instructors were impressed by their students' reflections about their civic learning and quoted specific learning points from them. For example, one instructor shared that "some [students] mentioned it's very insightful" and some even wanted to "volunteer at [the] Food Bank." Another instructor noted that students realized they needed to be more "caring" and "empathetic." On facilitation of civic learning through reflection, one instructor shared that the reflection topics were purposefully curated based on their service experience, on "sustainability issues they [the students] have observed" and the students were also guided through structured reflection questions such as "How do you think your sensor can help in the food security as well as sustainability?"

In some modules where students reported significant improvement in civic learning, many did not recall the reflection sessions or considered them ineffective. They recalled that reflections, though conducted during the semester, were sometimes rushed due to time constraints or were limited by less effective questioning and facilitation. In addition, the students also indicated that most reflection questions focused on drawing out academic rather than civic learning. Although these responses contradicted the finding on positive correlation between critical reflection and both civic learning and academic learning, it is important to note that this was a small student focus group discussion sample relative to the entire sample size. In any case, these students who gained in civic learning are identifying how instructors can improve reflection in eS-L. This has important implications for future faculty development activities for both S-L and eS-L.

Meaningful Service

In modules where significant improvement in civic learning were reported, students were typically able to elaborate how the community partners had helped them gain awareness of the specific social issues and how their services could be useful to the target community. One student explained that "the process of raising awareness about the environment helped [him/her] appreciate the effort that the government had put into creating the clean and beautiful waterways." Another student said that the project helped him/her "learn a lot more about food insecurity in Singapore" and "food wastage." Students also felt that they "were able to contribute back to society," and some shared that their community partners "really enjoyed the presentation" and found it "very useful and meaningful to them."

In modules where students reported no significant improvement in civic learning, they reflected that they had limited interaction with the community, the project duration was too short, or the scope of their service activity was too small. One student explained that their involvement was limited to performing chemical tests in the lab using samples provided by the instructor, without visiting the site personally.

Connection Between Service and Learning

In modules where significant improvement in civic learning were reported by students, they used concepts and skills learnt in their modules to address civic issues faced by the community partners. One student shared that to execute the project, they had to "observe [their] surroundings" and "make connections with what [they] have learnt." Another project incorporated knowledge learnt in class such as "Photoshop, graphic design, ideation, as well as trying to convey the message."

For the modules in which no significant improvement in civic learning was reported, there was little mention of how students had opportunities to integrate multiple academic concepts or verbalize these concepts in their eS-L service activities. This suggests that there may not be sufficient facilitation in the module to align the application of domain-specific knowledge and skills to address identified civic issues within students' eS-L service activities.

Community Voice

For modules in which significant improvement in civic learning was reported by students, the community partners/members were more involved in shaping the students' understanding of the civic issues revolving around the community. Although in some service activities, students had just one meeting with their community partner, they rated their learning from the community partner (e.g., Food Bank) as informative and effective, as they could also reference the community partner's website.

However, in modules in which no significant improvement in civic learning was reported, students had very limited interactions with the community partners/members. For example, one student mentioned that "we actually only get to interact with the elderly when we are presenting." In another instance, one module did not have a community partner, and students presented their work to their own friends and family members. Students in these modules wished they could have more interactions with the community partner. "I believe communication with the partners can actually help us more." These comments indicated that interaction and communication were lacking and might explain the lack of change in civic learning.

Academic Learning: Triangulating Student and Instructor Perspectives on eS-L Elements

The most common theme was that students were able to apply the knowledge and skills they learnt in their modules into the eS-L service activities. The interviews with the instructors, and focus group discussions with students, highlighted the following elements as important for the S-L outcomes: connection between service and learning, technology effectiveness, critical reflection, meaningful service, and reciprocal relationship.

Connection Between Service and Learning

The alignment between service activities and module learning goals helped students apply what they learnt in class to the real-world context via eS-L. Students expressed that they "applied what [they have] learned", "went more in-depth" and "had a very practical [learning]" through their eS-L experience.

Technology Effectiveness

Technology effectiveness enhanced academic learning, especially when suitable technology tools made the learning process easier. In general, students did not encounter difficulties using familiar software such as PowerPoint, Zoom, Instagram, WhatsApp, and MS Teams. Some students appreciated the convenience of online meetings. One student benefited from the online presentation mode as she contracted COVID-19 and required isolation. Conversely, another student shared how technology glitches during the interaction disrupted the lesson and hindered learning.

Critical Reflection

Critical reflection questions could be intentionally designed to facilitate academic learning. Students reported that structured reflections helped them to "remember" the project, gain a "clearer understanding", "summarize what [they] have learned", and "articulate [their] learning."

Meaningful Service

Meaningful service for the community partners required clear understanding of community issues and the provision of services that were beneficial to the community. This could facilitate academic learning through initial research into the community issues and applying their academic knowledge to brainstorm and propose solutions for their community partners. This helped students develop a more in-depth appreciation of their domain knowledge. One student explained, "we get to do research, then we present to our classmates and also our invitees [community partners] as well. So I think they [our classmates and invitees] actually get to learn about what is sleep hygiene and where to seek help."

Reciprocal Relationship

Several students shared that both parties (the students and the community partner) learnt from each other in the eS-L experience. For example, one student shared that they learnt "quite a lot of skills and techniques from them [gardeners] because fairly speaking in poly[technic], we learn more in the books." The eS-L activities with the community helped students visualize how their domain knowledge was being put into practice. As one student

put it, "this module helped me understand things better by allowing me to actually see how these things actually are like in real life."

Students also benefited from the service when the community partner provided feedback on technical aspects. One instructor mentioned that the input and feedback from the community partner enhanced the students' learning, "otherwise it would just be another presentation for another project." One student also mentioned learning on which "anger management [strategies] were more applicable and feasible" to the community after interacting with them.

Discussion

This large-scale, mixed-methods study across multiple academic disciplines validated existing literature (Ngai et al., 2024) and confirmed that eS-L is positively associated with academic and civic learning outcomes as well as personal and professional development. The study also validated the critical role of established S-L design elements for eS-L. All seven traditional elements (i.e., connection between service and learning, critical reflection, meaningful service, reciprocal relationship, student voice, community voice, and dialogue with diverse others) demonstrated significant positive correlations with both academic and positive changes in civic learning. The results indicated that while research, advocacy, and direct service activities enhanced academic learning outcomes more strongly than indirect service, civic learning and elements such as service-learning connection and community voice may be shaped less by service type and more by course design. Thus, all of the design elements can be part of effective S-L course design and incorporated into faculty development curriculum. This underscores the importance of intentionally embedding strategies that promote civic learning and community voice across all forms of service.

Notably, technology effectiveness was a crucial additional design element specific to eS-L. Students' positive perception of technology effectiveness showed significant correlations with both academic and civic learning outcomes. This finding aligns with previous research emphasizing the importance of technological proficiency in eS-L (Zhu et al., 2023) and the need for purposeful design to promote active participation among all parties (Waldner et al., 2010). The importance of technological proficiency must be a key component of effective eS-L course design that receives emphasis in faculty development activities prior to course implementation.

This study makes a novel contribution to literature by examining the differential impacts of service types in eS-L. Although no significant differences were found in civic learning outcomes across direct, indirect, advocacy, and research service types, the analyses revealed that students who engaged in indirect service activities reported significantly lower academic learning than their peers in research, advocacy, and direct service activities. This disparity appears to be linked to challenges in designing effective indirect eS-L activities, as reflected in lower student ratings of key design elements within these modules. Although indirect service may be necessary in certain contexts, instructors could mitigate its disadvantages by intentionally strengthening other course design elements that were shown to promote academic learning gains.

Taken together, these findings demonstrate the potential of eS-L to strategically enhance educational opportunities across diverse institutional contexts. They provide actionable insights for faculty development initiatives and offer guidance on how to design more robust and balanced eS-L experiences. Moreover, the results may inform the development of future frameworks for eS-L design and implementation across NP's academic modules. Ultimately, these outcomes not only contribute to scholarly literature but also provide evidence-based recommendations that can enhance student learning and support both instructors and community partners.

Implications for S-L and eS-L Design

Based on the triangulation of survey results with instructor interviews and student focus group discussions highlighted earlier, the team extrapolated some good practices to adopt. These good practices can help instructors improve academic learning and civic learning outcomes when designing their S-L or eS-L (see Table 6).

Table 6
Good Practices for Improving Academic Learning and Civic Learning Outcomes in eS-L

Elements	Academic Learning	Civic Learning
Critical reflection	Relate reflection activities to the academic learning outcomes for students to understand the relevance of their domain knowledge and skills to the eS-L service activities.	Design structured and intentional reflection activities that guide students in linking their service experiences to the civic learning outcomes of the module.
Meaningful service	Design eS-L service activities that address clearly defined and authentic community needs, allowing students to apply their academic knowledge and skills to real-world challenges faced by the community or partner organization.	Design eS-L service activities that incorporate and articulate civic learning goals alongside academic ones, enabling students to recognize the value of their service not only in deepening academic understanding but also in learning about the community and addressing its challenges.
Connection between service and learning	Strengthen the connection between the service activities and academic learning outcomes by designing reflection activities that help students understand how their domain knowledge can be connected in real-world contexts.	Design the eS-L service activities to help students explore and articulate the link between their domain-related skills and their relevance in contributing to the community, enabling them to see how their academic discipline and future profession can make a meaningful impact in real-world civic contexts.

Example of Enhanced Design for Critical Reflection

When designing reflection activities, in particular the reflection questions and prompts, instructors should intentionally align them with academic and civic learning outcomes (Ash & Clayton, 2009). For example, to connect students' academic learning in marketing theory to their social media campaign with the community, a possible reflection question is: "How did your charity's social media engagement metrics align with the consumer behavior theory you have learned?" Likewise, to link students' volunteering experience with the elderly with broader

civic issues, a reflection question could be: "How has working with the elderly influenced your understanding of Singapore's policy to support its ageing population?"

Example of Enhanced Design for Meaningful Service

The instructor, together with the community organization as a co-educator, should identify and scope service activities that not only align with the module's academic goals but also address authentic issues in the community. For example, biomedical science students in a statistics module can work with an active ageing center to design a survey to evaluate the center's program offerings and seniors' satisfaction and well-being after participating in the various activities. The students can then perform statistical analysis on the collected data, summarize results, and present their findings and recommendations to the center. These insights can help the center refine its programs and provide more targeted support, based on needs identified through students' one-to-one interaction with the seniors and the survey results. Throughout the project, students can be guided to reflect on broader civic issues related to ageing, such as challenges and strengths of the seniors, the roles of active ageing centers, and how the youth can contribute to supporting seniors in their communities.

Example of Enhanced Design for Connection Between Service and Learning

Community-based activities should provide students with an opportunity to explore and articulate how their academic knowledge applies in real-world contexts and how their academic discipline and future profession can contribute to society. For example, optometry students conducting eye screening for children from low-income families can be guided to identify which vision screening techniques from classroom theory and practice are applicable during field service for this specific community population. The students' pre-service preparation (e.g., desktop research) and post-service evaluation (e.g., oral presentation, written report), can include tasks to highlight the importance of early detection skills in preventing childhood vision issues and to explore how these issues relate to broader civic concerns, such as developmental challenges, educational equity, and poverty reduction in underserved communities.

Additional eS-L Elements

In addition to the three eS-L elements highlighted in Table 6, the study highlighted two other elements of interest for improving academic learning outcomes, namely technology effectiveness and reciprocal relationships. Likewise, community voice was highlighted as another element of interest for improving growth on civic learning.

Technology Effectiveness. To enhance technology effectiveness in eS-L modules, educators should assess available tools and intentionally adopt those that best support specific learning and service goals. These include using technology as a medium for communication (instrumental channel) and developing comprehensive activities

through digital platforms (integrated channel). Additionally, students can learn to harness digital platforms to serve community needs (instrumental objective) and create innovative digital solutions (integrated objective). This multifaceted approach enhances both the learning experience and community impact of eS-L. For example, in modules where technology is an instrumental channel, instructors should first familiarize themselves with the necessary technological tools for conducting online discussions or presentations with community organizations or members. They should then support students and, if necessary, community partners in becoming adept at using these tools. This ensures that students and community partners can focus on the activity content rather than being hindered by technical challenges during the S-L activity.

Reciprocal Relationship. A good practice to incorporate reciprocal relationships in eS-L modules is for instructors to begin by considering the perspectives of all stakeholders and designing the eS-L activity to provide mutual benefit to all stakeholders involved, including the community partner organization, community members, students, faculty, and the institution's administration (Bringle et al., 2009; Jacoby, 2014). Instructors should support students in recognizing the potential benefits of their service activities for various stakeholders involved. To achieve this, instructors must establish channels within the eS-L activity by which students receive regular feedback from the different stakeholders they collaborate with.

Community Voice. A good practice for strengthening community voice in eS-L design is to actively seek the community partner's input throughout the community service activities and to encourage students to do the same. This will ensure that, despite limited face-to-face interactions with the community during eS-L, students can stay engaged and involved with the community. For instance, students developing a digital literacy program for an elderly care home could schedule fortnightly video calls with their community partner to present their progress, engage in discussions about community needs, and collaboratively refine their solutions, thereby fostering a sustained and meaningful partnership throughout the project.

Implications for Faculty Development and Institutional Support

The research findings and the above discussions suggest that the instructor plays a key role in the quality of S-L/eS-L design and delivery. As such, faculty development is closely related to the success of S-L/eS-L modules (Ash & Clayton, 2009; Bringle & Hatcher, 1999; Clayton & O'Steen, 2010; Howard, 2000) because it influences the course design and implementation (Billig, 2007). With appropriate faculty development programs, instructors would be equipped not only to produce a good initial S-L/eS-L design, but also to iteratively enhance their course design and implementation.

The design and implementation of quality S-L/eS-L modules require much effort from the instructor (Choo et al., 2019). As such, institutional support can create "academic environments that cultivate professional growth [and that, in turn] ... lead to increase in organizational commitment and retention, motivation, satisfaction, and performance" (O'Meara, 2013, pp. 218–219). Having institutional support and campus resources to support

the design, implementation, and assessment of S-L and eS-L pedagogies can contribute to their quality (Ong et al., 2023; Ti et al., 2021). Scaffolded training programs can be designed to avoid overwhelming new instructors as they build their capacity and work on the quality of their S-L/eS-L design and delivery. Campus units can offer help with the technical aspects of suitable technologies in eS-L.

In 2017, OSL was founded at NP to advance the integration of S-L as NP's signature pedagogy (Ti et al., 2021). One of OSL's primary goals is to empower S-L instructors to create and execute S-L modules in their programs/disciplines. To achieve this goal, OSL staff implemented virtual training workshops for OSL trainers to model how to design and deliver eS-L modules, so that the participants experienced first-hand what their students would go through. Welch and Plaxton-Moore (2017) identified workshops and individual consultations as the most common methods for S-L faculty development. Consequently, OSL staff offered one-on-one coaching (virtual and face-to-face) to eS-L instructors after workshops, offering tailored guidance for their S-L/eS-L course design and implementation. The eS-L taxonomy in Table 2 was particularly useful in coaching and self-development of S-L instructors because it served as a template and benchmark for instructors to consider in their initial S-L/eS-L design as well as in subsequent refinements.

Additionally, OSL staff organized regular sessions for a core group of S-L and eS-L practitioners in NP to share good practices, exchange ideas, and perform informal study and formal research on S-L and eS-L courses in their respective schools/disciplines. OSL staff believed that such a faculty learning community is essential in strengthening institutional capacity in S-L and eS-L, as well as providing instructors with up-to-date knowledge and skills in designing S-L and eS-L courses amidst today's evolving educational landscape.

Limitations

There were several limitations in the current study. Despite the large number of student participants from various disciplines, not all diploma programs in NP were represented in the study. The modules that were included in the study had consent from the respective instructors and students. The purposive sampling nature for focus groups and interviews is vulnerable to self-selection bias as instructors who opt for eS-L may inherently be more dedicated educators. The research team attempted to reduce this bias by emphasizing to students and instructors that participation in the study was completely voluntary and that their candid input would help to enhance S-L and eS-L knowledge and practices. In addition, this research only used self-reported data, which might not assess true student learning (Steinke & Buresh, 2002). Furthermore, although pre and post-test results show statistically significant changes, establishing direct causality remains challenging.

Future Research

Future research can explore the realms of longitudinal studies in S-L and eS-L, as well as investigation on the difference in students' learning outcomes for S-L and eS-L.

Longitudinal Studies

By tracking students' progress and experiences over an extended period, these studies could provide valuable insights into the sustained benefits of eS-L on academic, personal, and civic development. Longitudinal research allows for a deeper understanding of how eS-L contributes to students' knowledge retention, skill development, and their ability to apply learned concepts in real-world contexts. Additionally, such research could also elucidate the influence of eS-L on the students' subsequent professional pathways and post-graduation civic engagement, offering critical insights into whether eS-L experiences foster enduring commitments to socially conscious career choices and sustained community participation. Furthermore, longitudinal research helps to identify factors that may influence the long-term outcomes of eS-L, such as the duration and intensity of engagement as well as the role of reflection and community partnerships. To address potential self-selection bias, subsequent studies should incorporate control groups comprising non-service-learning participants, thereby enabling more rigorous assessment of the distinctive effects attributable to eS-L interventions. The findings from longitudinal studies with a good control of self-selection bias in eS-L can inform program design, curriculum development, and institutional policies, leading to continuous improvement and the cultivation of meaningful, transformative learning experiences for students.

Investigating the Difference in Students' Learning Outcomes for S-L and eS-L Modules

By systematically investigating the differences in these outcomes, the research could shed light on the unique benefits and potential advantages offered by both S-L and eS-L approaches. The findings of this study will contribute valuable insights into the effectiveness and impact of these pedagogical methods, aiding in the enhancement of future S-L and eS-L initiatives at NP and beyond. It will also further clarify how faculty development can be improved for the different types of S-L.

Conclusion

S-L as a high impact pedagogy (Kuh et al., 2008) has been adopted as NP's signature pedagogy since 2016. With advancement in educational technology and with the landscape shifting towards online learning, this study investigated the impact of eS-L on student learning outcomes across various NP modules. This comprehensive investigation of eS-L across 39 modules in a Singapore's institute of higher learning presents empirical evidence of its efficacy in enhancing academic and civic learning outcomes. Through mixed-methods analysis encompassing over 1,000 student responses, complemented by qualitative data from students and staff, the study demonstrated significant student learning outcomes, particularly in direct service, research, and advocacy service activities.

The findings revealed that all eight eS-L elements contributed substantively to learning outcomes, with three components emerging as particularly crucial: the connection between service and learning, critical reflection,

and meaningful service. Technology effectiveness, whilst not traditionally associated with S-L, was found to be an essential element in the eS-L context. These results span both STEM and non-STEM disciplines, addressing a notable gap in existing literature regarding eS-L implementation in Asian higher education contexts.

Module design, instructor delivery, and reflection emerged as critical factors influencing student experiences, which underscores the importance of robust faculty development and support systems. The variation in learning outcomes across different categories of service activities provides valuable insights into the differential impact of eS-L elements, offering implications for program design and implementation.

As educational institutions navigate digital transformation, this research provides evidence-based frameworks for developing effective eS-L that maintains meaningful community engagement whilst enhancing student learning. The findings suggest that eS-L's relevance extends beyond pandemic-era adaptations, offering sustainable opportunities for educational innovation in varied circumstances. These insights contribute significantly to faculty development, curriculum design, and policy formulation in higher education institutions seeking to integrate S-L in digital environments.

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Appendix A

Pre- and Post-eS-L Survey for Students

For Pre- and Post-eS-L Surveys

Civic Learning

1) I often try to act on solutions that address social, local or international problems in the community.
2) I try to encourage others to participate in activities that help to improve the community.
3) I am aware of the important needs in the community.
4) I am aware of what can be done to meet the important needs in the community.
5) I feel that I have the ability to make a difference in the community.
6) I plan to find time or a way to make a positive difference in the community.
7) I participate in activities that help to improve the community.
8) Being concerned about local or international issues is an important responsibility for everybody.
9) Being informed about social issues is a good way to improve the community.

For Post-eS-L Survey

Academic Learning

10) Due to the Service-Learning experience, I was able to apply the academic content of this/other module(s).
11) Due to the Service-Learning experience, I have been motivated to learn more about the academic content in this/other module(s).
12) Due to the Service-Learning experience, I have developed skills and knowledge for my diploma's industry/field.

Connection Between Service and Learning

13) The module content that I have learnt in class was important in the execution of the Service-Learning experience.
14) The module content that I learnt in class helped to enhance the Service-Learning experience I had with the community.
15) I did more than volunteerism as the service I provided was connected to my learning.

Critical Reflection

16) During reflection activities, my lecturer/tutor helped me to deepen and broaden my critical thinking in my reflection(s).

17) The reflection activities contributed to the achievement of the module objective(s).
18) The reflection activities helped me to understand the Service-Learning experience better.
19) The reflection activities helped me to understand the module's content better.

Community Voice

20) The community partner influenced the direction of the Service-Learning experience.
21) The community partner had a say in how the Service-Learning experience should be done.
22) The community partner got to share more about their organization and the community they serve.
23) The community partner's contributions in the Service-Learning experience were acknowledged.

Meaningful Service

24) The service that I provided was relevant to the community I served.
25) The service that I provided met the community need(s).
26) The service that I provided was meaningful to the community I served.

Dialogue With Diverse Others

27) I had the opportunity to talk to people of different culture(s), social, or economic background(s) during my Service-Learning experience.
28) I gained a better understanding of people of different culture(s), social, or economic background(s) during my Service-Learning experience.

Reciprocal Relationship

29) I believed that the community partner and/or community had benefited from the Service-Learning experience.
30) I had frequent discussions with the community partner throughout the Service-Learning experience.
31) I benefited from the Service-Learning experience.

Student Voice

32) I felt that my opinions were valued by my group members.
33) I felt that my opinions were valued by my lecturer/tutors.
34) I contributed actively to the Service-Learning experience.

Technology Effectiveness

35) Appropriate technology tools were used throughout this module.
36) The technology tools enabled me to engage with others during my Service-Learning experience.
37) Different online tools were used throughout the Service-Learning experience.
38) I could interpret non-verbal communication cues online.
39) I am confident in using technology tools to implement community services online.

Appendix B

Instrument: Survey for Instructors

eS-L Outcome/ Element	Attribute	Rating & Description		
		1	3	5
Academic Learning	Community activities enhance academic content, course design, and assignments.	The instructor includes community activities as added components to the course. The course document, teaching schedule and/or assessment plan conveys this information.	The instructor utilizes the community activities as a "course content resource" to provide additional insight for students' understanding of academic content and ability to complete assignments. The course document, teaching schedule, and/or assessment plan describe the relationship of the community activities to course learning outcomes.	The instructor integrates the community activities and relevant social issues as critical dimensions for students' understanding of academic content and ability to complete assignments. The course document, teaching schedule, and/or assessment plan provides a strong rationale for the relationship of the community activities to the course learning outcomes.
Civic Learning	Civic competencies (e.g., knowledge, skills, disposition, behavior) are well integrated into student learning outcomes.	The instructor focuses on discipline-based content, with some attention given to civic learning or development of civic competencies.	The instructor focuses on discipline-based content and connects to civic learning and civic competencies when relevant to the community activities.	The instructor focuses on the integration of discipline-based content with civic learning and civic competencies and emphasizes the relevance of the community activities to the public purposes of the discipline in society.
Personal Growth/ Professional Development	The eS-L experience engages students in developing personal learning and/or professional skills.	Students seem likely to develop at least some personal learning or professional skills in the course or eS-L experience, but this is not explicit or is not clearly related to the eS-L experience per se.	There is some evidence of how the eS-L experience can support students in developing deeper personal learning outcomes (e.g., moral reasoning, stereotype reduction, becoming more aware of personal values/strengths); or in developing professional skills (e.g., teamwork, communication, time management, project development).	There is clear evidence of how the eS-L experience and related course content supports students in developing both deeper personal learning outcomes (e.g., moral reasoning, stereotype reduction, becoming more aware of personal values/ strengths), and in developing professional skills (e.g., teamwork, communication, time management, project development).
Connection Between Service and Learning	There is evidence of how the service activities and the course learning goals/objectives relate to each other.	The service activities seem likely to relate to some of the course learning goals/objectives, but this relationship may be superficial, implicit, or unclear.	There is clear evidence of how at least some part of the service activities relate to some of the course learning goals/objectives.	Most or all service activities are clearly and explicitly related to the course learning goals/objectives.

(Contd.)

eS-L Outcome/ Element	Attribute	Rating & Description		
		1	3	5
Critical Reflection	The course includes relevant critical reflection activities intended to foster connections between course content and service activities.	While at least one reflection activity is present, reflection is minimal, superficial, or does not connect the service activity with course content or learning goals/ objectives.	The course provides at least one substantive reflection activity (whether through writing, electronic, oral or other modalities) that links the service activity with at least one course learning goal/objective.	The course provides ongoing, challenging, and multiple critical reflection activities throughout the course that foster connections between the service activity and one or more course learning goals/objectives.
Dialogue With Diverse Others	Dialogue with others across differences (e.g., race, ethnicity, age, language, religion, social-economic status) occurs regularly.	The instructor, course, and community activities offer students a few opportunities for interaction and dialogue with diverse others.	The instructor, course, and community activities engage students in periodic interaction and dialogue with diverse others, as well as interaction and dialogue with peers across a range of experiences and diverse perspectives.	The instructor, course, and community activities engage students in frequent interaction and dialogue with diverse others, as well as interaction and dialogue with peers across a range of experiences and diverse perspectives.
Meaningful Service	The service activities are based on a clear, meaningful, community-identified issue/need. The service activities help meet community needs that the community finds important.	The service activities seem likely to relate to a community issue/need, but it is not clear whether the community or partner has identified this issue as a priority.	The service activities are somewhat related to some need or issue identified in consultation with the community or partner.	The service activities are directly responsive to a clear and substantive need or issue that the community or partner has identified and that contributes to the public good.
Reciprocal Relationship	The eS-L experience is designed to benefit all stakeholders involved. Stakeholders: **S**tudents **O**rganization (Community) **F**aculty **A**dministration **R**esidents (Community)	Possible benefits for students, partners, or other stakeholders of the eS-L experience may be inferred or understood, but are not explicit or articulated.	Outcomes or benefits for students and for at least one other stakeholder (e.g., community members, partner organization) anticipated from the eS-L experience are clearly evident in foundational or supplemental information about the course.	The intended benefits for students, partners, and other stakeholders are clearly articulated and explained (e.g., evident in the course design), and are linked to course objectives/goals and service activities' expectations and deliverables.
Community Voice	The community partner has a co-educator role and provides input in shaping the eS-L experience.	The community partner is implicitly involved in shaping the eS-L experience, but details on their participation as a co-educator are unclear.	The community partner participates in some way as a co-educator (e.g. designing the eS-L experience, presenting to the class).	The community partner participates in many meaningful ways as a co-educator throughout the course (e.g. designing the eS-L experience, presenting to the class, providing readings, delivering lessons to students, and/ or providing feedback on student work).

(Contd.)

eS-L Outcome/ Element	Attribute	Rating & Description		
		1	3	5
Student Voice	The course incorporates opportunities/ activities for student voice (e.g. autonomy, choice, creativity, leadership, influence) in the eS-L experience.	Students have some opportunities to influence the eS-L experience in terms of selection or logistics, but these choices may be trivial, unclear, or underspecified.	Clear opportunities are present for students to influence, select, or give leadership to at least some substantive elements of the selection, planning, or delivery of the service experience.	Clear and reasoned opportunities are present in several aspects of the course for students to influence, select, or give leadership to many key elements of the selection, planning, or delivery of the eS-L experience.
Technology Effectiveness: Technology Suitability	Technological tools are utilized to deliver course content, engage students in learning and facilitate service activities.	Some evidence to show occasional utilization of technological tools in delivery of course content, student engagement, and service facilitation. Tools used are suitable for the intended purpose.	Clear evidence to show regular utilization of technological tools in delivery of course content, student engagement, and service facilitation. Tools used are a good fit for the intended purpose.	Strong evidence to show significant utilization of technological tools in delivery of course content, student engagement, and service facilitation. Tools used add value beyond the intended purpose.
Technology Effectiveness: Technology Capability	Students should be prepared and be provided with learning resources and have the capability to utilize the relevant technology for their learning and execution of service activities.	Students have undergone introductory training to prepare for the utilization of relevant technologies. Not all learning resources are available and learners need to look online for resources.	Students have undergone a moderate amount of training to prepare for the utilization of relevant technologies. All learning resources are accessible.	Students have undergone a substantial amount of training to prepare for the utilization of relevant technologies. All learning resources are accessible and technical help is readily available.
Technology Effectiveness: Active Online Participation and Communication	Regular and clear online communication, active engagement, and development of a sense of community among the students.	There is minimal and/ or irregular online communication among students and between instructors and students. There may be some engagement and sense of community among students, but it is not explicit nor articulated.	There is adequate and regular online communication among students and between instructor and students. There is clear evidence of active engagement and sense of community.	There is substantial and regular online communication among students and between instructor and students. There is strong evidence of active engagement and sense of community, and how these link to course and service objectives and deliverables.

Appendix C

Instrument: Survey for Community Partners

Civic Learning

1) This eS-L experience helped the students to become more aware of community issues.
2) The students demonstrated a sense of responsibility to help and contribute to the community.

Connection Between Service and Learning

3) The goal(s) for the students' eS-L service activities were clear to me.
4) The students were able to apply course knowledge and skills to their eS-L service activity.

Community Voice

5) I felt valued as a co-educator in the eS-L experience.

Meaningful Service

6) I am satisfied with the service provided by the students.
7) In general, the benefits of working with eS-L outweighed any burdens it may have added to our work.

Dialogue With Diverse Others

8) The students had meaningful interactions with community members from my community organization.

Reciprocal Relationship

9) I had a good working relationship with the faculty during the eS-L service activity.
10) I had a good working relationship with the students during the eS-L service activity.

Student Voice

11) The students were given the opportunity to decide how the eS-L service activity was conducted.

Technology Effectiveness

12) The eS-L service activity that was conducted online was smooth and effective.