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Service-Learning with Intergenerational and Cross-Cultural Social Interactions: A Study of University Students in Hong Kong

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Abstract

Background: Service-learning (SL) is an experiential educational approach integrating community service with academic study and personal growth. It is valued in higher education for enhancing student learning and development. Including intergenerational and cross-cultural engagement can promote social interaction between students and the community, although it also comes with challenges. **Purpose:** This paper reports on an investigation of the benefits and challenges of implementing SL projects with intergenerational and cross-cultural communication. **Methodology/Approach:** This study employed a mixed method combining quantitative and qualitative approaches to analyze survey results, student reflective reports for the course, and interview data. **Findings/Conclusions:** The outcomes encompassed enhancing professional skills, practical experience, and exploration of career options. Additionally, the analysis highlighted the positive impact of SL on students' personal development. Furthermore, implementing SL projects with intergenerational and cross-cultural social interaction presented several challenges, including communication barriers among generations, resistance from interviewees who may be distracted, and cultural barriers for international students. **Implications:** In conclusion, this paper provides discussion and suggestions regarding designing and implementing SL

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projects within the human-computer interaction course. These insights are beneficial for enhancing the delivery of SL practice, particularly within the dynamic contexts of intergenerational and cross-cultural social interaction.

Keywords
service-learning, intergenerational communication, cross-cultural communication, social interaction, human-computer interaction

A substantial body of literature has mentioned the benefits of service-learning (SL), an experiential education approach that integrates community service with academic learning (Hou, 2010; Rosenberger, 2000; Strage, 2004; Waldstein & Reiher, 2001). For students, engaging in SL projects can improve their academic performance, leadership, and personal and interpersonal development (Astin et al., 2000; Driscoll et al., 1996; Giles & Eyler, 1994). For schools, it can strengthen multicultural education, improve teaching methods, and facilitate communication between teachers and students (Driscoll et al., 1996; Hou, 2010; Rosenberger, 2000). For the community, SL can lead to a harmonious atmosphere and promote social democracy (Giles & Eyler, 1994; Rosenberger, 2000; Strage, 2004).

This study explored the dynamics of intergenerational and cross-cultural social interaction within SL by examining an SL project in the human-computer interaction (HCI) course at Hong Kong Baptist University in Hong Kong. The HCI course is designed to provide comprehensive education, aiming to empower students with a multidisciplinary knowledge base combining social science, design, business, and computing, to address 'real-world' challenges in the interaction between humans and computers (Faiola, 2007). Recognizing the value of the practical application and the nature of interdisciplinarity, academics and educators have become increasingly aware of the value of integrating SL projects into HCI courses (Lampe, 2016; Mankoff, 2006; Shneiderman et al., 2006). Our study investigated an SL project in an HCI course across two semesters, targeting the underexplored area of intergenerational and cross-cultural engagement. In the project, culturally diverse students collaborated to enhance mobile app accessibility for local seniors, applying the design thinking stages of Empathize, Define, Ideate, Prototype, and Test (Plattner, 2013) to develop inclusive tech solutions.

Prior research has highlighted the positive impact of SL on student learning and development. Lampe (2016) analyzed an HCI service-learning initiative at the University of Michigan, noting students' enhanced professional communication and reconsidering digital citizenship. Shneiderman et al. (2006) advocated for integrating social interaction in HCI education, emphasizing the practical benefits and deeper social understanding, which aligns with the Community Informatics Initiative. Additionally, Feyt and Mwalemba (2021) discovered that SL courses in South Africa fostered skill development, civic-mindedness, and engagement through interviews and thematic analysis.

Despite the benefits of SL projects, students may face some challenges in project-based education. A recent study discussed several challenges of getting HCI students involved in user-centered design projects by asking them to interact directly with target users and solve their problems (Roldan et al., 2020). For example, students may encounter more conflicts or become unreflective during the design process due to their lack of knowledge or skills in communicating with the users. Therefore, the study in this paper focused on the dynamics of *social interaction* in the SL project. In particular, we aim to address two research questions: ***RQ1:*** *How do students benefit from engaging in intergenerational and cross-cultural interactions within the context of service-learning projects in HCI courses?* ***RQ2:*** *What are the challenges associated with intergenerational and cross-cultural interactions in service-learning settings within HCI education?* Finally, based on the reflections and evaluation of this SL project, we discuss the benefits and challenges of conducting an SL project with diverse social interactions.

Background

Cross-Cultural Social Interaction

University internationalization has fostered multiculturalism on campuses, enhancing educational experiences through diverse cultural exchanges (Guo & Jamal, 2007; Owens et al., 2011; Peterson et al., 1999). However, cross-cultural interactions often face challenges such as communication barriers and cultural misunderstandings (Belford, 2017; Molinsky, 2007). The mix of local Hong Kong citizens, Mainland Chinese, and international students at our university presents a microcosm of such diversity. Studies have highlighted cultural distinctions and identity attitudes between Hong Kong locals and Mainland Chinese, influenced by language, technology preferences, and civic values (Chow et al., 2020; Lau, 1992). Shared cultural traits typically ease communication, while differences can lead to miscommunication and negative perceptions due to linguistic and behavioral disparities (Crago et al., 1997; Thomas, 1984; Zhao, 2007). Furthermore, "culture shock" can cause psychological distress among those adapting to new cultural environments (Lewthwaite, 1996; Neuliep, 2012). Promoting intercultural understanding and communicative competence is essential for improving interactions across cultures (Lewthwaite, 1996).

Intergenerational Social Interaction

Our service-learning (SL) project engaged in intergenerational social interaction, with students around twenty years old conducting interviews with older adults. Research has highlighted the mutual benefits of such interactions, including improved relationships and attitudes between generations (Bales et al., 2000; Meshel & McGlynn, 2004). Studies have suggested these exchanges can enhance prosocial behaviors in the young and emotional well-being in the elderly (Kessler & Staudinger, 2007; Meshel & McGlynn, 2004). However, challenges arise due to limited intergenerational

communication experience and differences in daily experiences, which can hinder conversation and self-disclosure (Strom & Strom, 2015).

Barriers to Social Interaction-Based Education

Integrating community engagement with learning presents several challenges. Teachers need to invest additional time in planning, including recruiting community partners and coordinating projects throughout the semester (Mankoff, 2006). Technical SL projects may require extra time for testing and adjustments to ensure product continuity (Hannon, 2006; Nejmeh, 2012), along with addressing the integration of course content, control over learning, and assessment (Ziegert & McGoldrick, 2008).

Students face communication difficulties with peers, teachers, and community partners, which can lead to tension and reduced productivity (Morin, 2009; Yusof et al., 2020). Group conflicts can be intensified by the authentic nature of SL projects (Yusop & Correia, 2013). Relationship building with community organizations also poses challenges, necessitating a balance between rapport and professionalism (Driscoll et al., 1996). Additionally, students often struggle with applying theoretical knowledge to practical situations and fitting into the program (Blouin & Perry, 2009; Yusof et al., 2020).

Method

Participants

Having obtained approval from the Institutional Review Board, the Centre for Service-Learning at Hong Kong Baptist University guided us to collect and analyze participants' data. The analysis of students' course and exam data adhered to the privacy regulations outlined in the personal data ordinance of Hong Kong Baptist University. A total of 51 undergraduate students contributed to this research over the course of two academic terms. During the 2021/2022 academic year, 21 students enrolled in the course, with the majority being native Cantonese speakers from Hong Kong ($n = 19$), complemented by three native Mandarin speakers from Mainland China, and one native English speaker from Malaysia. The following academic year, 2022/2023, saw the participation of 30 students, which included six students from Mainland China and one exchange student from Germany. The course was accessible to undergraduate students from various departments, resulting in a heterogeneous educational background among the participants. Additionally, a total of 25 old adults contributed to this research over the course of two academic terms, with 13 in the 2021/2022 academic year, and 12 in the 2022/2023 academic year.

Design

This investigation employed a mixed-methods approach, combining a descriptive research design encompassing surveys and interviews and a pre-post intervention

design, embedded within a 13-week Human-Computer Interaction (HCI) course. The survey was administered in the form of a self-reflective report upon the completion of the course. The intervention consisted of a service-learning (SL) project that was incorporated into the HCI curriculum.

Given the interdisciplinary nature of HCI, the course also welcomed students from other disciplines, such as journalism and social science. In the HCI course, the mandatory SL project was worth 25% of the final grade and required students to design and evaluate user interfaces for a mobile app for older adults. The project followed Plattner's (2013) design thinking process to complete milestones: *user requirement analysis, sketching & prototyping,* and *user evaluation*. Initially, students gathered older adults' specific issues while using mobile apps, then applied HCI principles to redesign the interface, which the older adults later evaluated. Figure 1 shows all SL activities structured around the design thinking process. Prior to the semester, we partnered with a local social service center for older adults, which assisted in recruiting participants aged 55 to 65 for the project. Students visited the center twice, spending about 90 min per visit to interact with ten older adults. The provided services concentrated on comprehending and mitigating the challenges older adults face with mobile applications, providing instruction on mobile phone usage, and delivering support to reduce social isolation. Additionally, we invited older adults to join the students' presentations, with some attending via Zoom due to health reasons.

Figure 2(a)–(c) illustrate the activities corresponding to the three distinct milestones. Furthermore, the students were prompted to present their projects at the end of the project, during which older adults and our collaborative partners were invited to offer critiques on their final presentations, as depicted in Figure 2(d). The SL

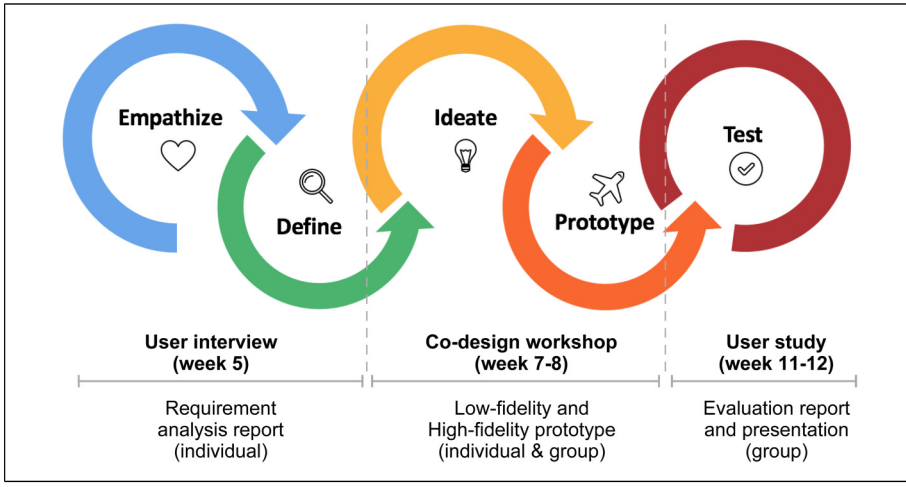

Figure 1. The milestones of a design thinking process for the service-learning project in our HCI course.

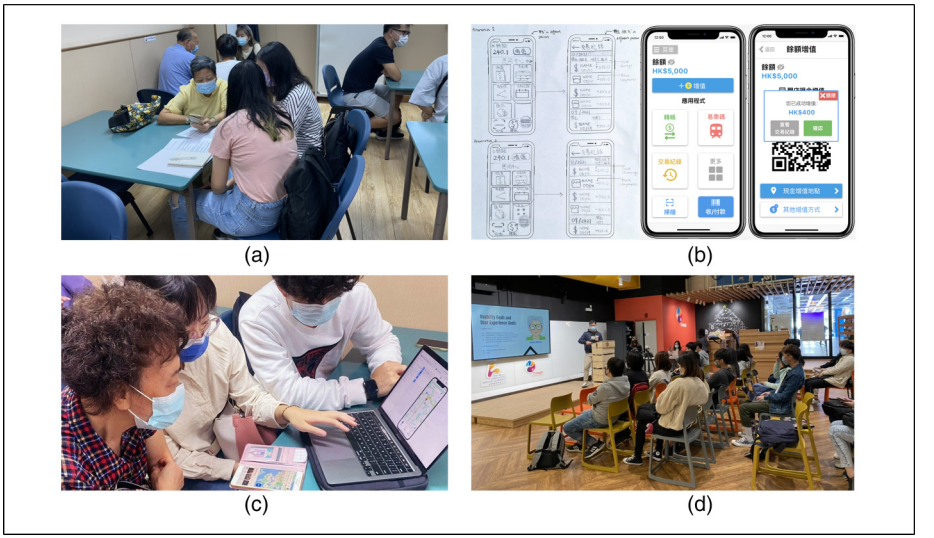

Figure 2. The pictures of the key activities performed in the project. (a) User interview, (b) Co-design workshop (ideation & prototyping), (c) User evaluation, (d) Presentation.

project encompassed a variety of social interactions, including intergenerational engagement between students and older adults, as well as cross-cultural interaction among participants from different regions like Hong Kong, Mainland China, Malaysia, and Germany.

Materials

Our research aimed to evaluate the learning outcomes by employing quantitative and qualitative methodologies. The qualitative component involved collecting students' final self-reflection reports, conducting follow-up interviews with three students to gain insights into their experiences with the service-learning (SL) project throughout the course, and conducting a post-hoc survey with two social workers and two representatives of older adults. The self-reflection report could be an effective way to assess SL through critical reflection (Molee et al., 2011), comprising 11 questions such as "What were the major challenges? What 'didn't work'?" as outlined in Appendix A, was formulated based on a pre-existing questionnaire designed to assess SL. This instrument facilitated the gathering of students' reflections on their participation in the SL project and their recommendations for enhancing the project's structure, as per Whitley et al. (2017).

Concurrently, the study incorporated a quantitative analysis, which included the evaluation of pre-test and post-test results using the Service-learning Outcomes Measurement Scale (S-LOMS) as developed by Snell and Lau (2020). This evaluation

was conducted as a part of a large study entitled "Assessment of Academic Service-learning Programme" supported by the Centre for Service-learning at Hong Kong Baptist University. The S-LOMS questionnaire not only collected demographic data but also gauged personal growth across seven dimensions: Knowledge Application (KA), Creative Problem-solving Skills (CPS), Relationship & Team Skills (RTS), Self-reflection Skills (SRS), Caring & Respect (CR), Sense of Social Responsibility (SSR), and Self-understanding (SU). The full set of questions is available in Appendix B. The participation in the pre- and post-surveys was entirely voluntary, with 17 out of 51 students completing both. The response rate may have been influenced by the nature of the lottery incentive and the non-mandatory nature of class survey. However, based on the data from learning activities, such as assignment submissions and class participation, there were no significant differences in engagement between those who completed both surveys and those who did not.

In addition, the quantitative assessment encompassed the scores from the SL project and the final written examination results. The final written examination was designed to test the students' comprehension of fundamental HCI theories and their ability to design user interfaces.

Procedures

According to the regulation of the Centre for Service-learning at our university, participation in the S-LOMS questionnaires before and after the SL project was entirely voluntary. Consequently, seventeen students completed the questionnaires both before and after the semester. Students who completed pre- and post-tests were automatically entered into a raffle with the opportunity to win a voucher valued at 100 Hong Kong Dollars (HKD). However, all students were required to finish the self-reflection report when they finished the project. Any personally identifiable information was removed from the documents before analysis in our research to ensure the students' privacy. Through our thematic analysis of students' textual reports, we discerned students' strategies and approaches to address the challenges arising from intergenerational and cross-cultural interactions within the SL projects. We conducted additional follow-up interviews with three participants (P22, P23, and P24) from the 22/23 academic year (AY) to delve deep into these findings and complement our analysis. In the following paper, the indexes (P1-21) refer to students from the 21/22 AY, while the indexes (P22-51) refer to students from the 22/23 AY. Quantitative data analysis, included the pre-test and post-test results of the Service-learning Outcomes Measurement Scale (S-LOMS).

Analytic Strategy

We derive the findings by adopting qualitative and quantitative analysis in this study. All qualitative data collected is in English and analyzed using an open coding method (Vaismoradi et al., 2013). We dropped private information to ensure anonymity and confidentiality. The first author reviewed around half of the data from eight students,

including individual requirement analysis reports, individual and group reports for design works, final self-reflection reports, and coded individually to develop a preliminary codebook. Then, the two authors discussed the codebook and code results obtained in the initial stage to find emerging thematic findings. After agreeing on the coding scheme, the author coded the rest of the data. We opted not to apply Inter-Rater Reliability (IRR) measures to assess the consistency among coders because our study requires observational patterns and understanding of specific contexts rather than quantitative numbers. We also emphasized that coding was an iterative process rather than a product, in line with prior work by McDonald et al. (2019).

In analyzing the quantitative data, we conducted Shapiro-Wilk normality tests to verify whether the data collected from the S-LOMS questionnaire conform to a normal distribution. If the data did not follow a normal distribution, we employed non-parametric tests, such as the Wilcoxon-Mann-Whitney test, in place of the paired t-test to perform significant analysis between the pre-test and post-test results of the S-LOMS questionnaire measured on a 7-point Likert scale. Additionally, we explored the correlation between students' performance in the SL project and their performance in the final written exam. We used Jamovi software[1] to perform all statistical analyses in this study.

Our qualitative analysis identified nuanced themes addressing both RQ1 and RQ2 by capturing students, older adults, and social workers' perceptions regarding their SL project experiences. Meanwhile, quantitative analysis complemented these qualitative findings by addressing RQ1, analyzing pre-test and post-test results from the S-LOMS questionnaires, and exploring the correlation between students' performance in the SL project and their final written exam.

Results

Through both quantitative and qualitative analyses, our study demonstrates the benefits and challenges associated with intergenerational communication and cross-cultural social interaction in SL projects within the context of an HCI course.

Professional Skills and Career

Four critical learning values were identified from the survey data of participants in the HCI course's service-learning (SL) project: *real-life practical experience*, *professional career options*, *transferable skills*, and *professional skills*.

Real-life Practical Experience. Most students appreciated the precious **real-life practical experience** they obtained from the SL project. They mentioned that the project provides them with chances to "*talking to the real elders to understand their actual needs" [P10]* and then "*re-design the user interface of the system accordingly" [P12]*. In addition, several respondents emphasized the importance of reaching real users and experiencing the real design process as a part of HCI learning.

> "*The best part was I really can follow the target's requirements to design a user interface for them. And they can give me feedback on how to improve the design. Not just imagine the scenario." [P17]*

Professional Career Options. The data also indicated that the project experience had **implications for students' future professional careers**. P9 shared that the project experience can make his resume more competitive in the job market by "*adding the real-life practical project reference in my CV and portfolio.*" On the other hand, P7 stated that the experience provides chances to "*experience working as a UI/UX designer*", inspiring the aspiration to work as an HCI designer for the future career.

Transferable Skills. Another valuable part noted by students in the feedback report is the **improvement of some transferable skills**, including interview skills, perspective-shifting, reflection and evaluation on design, and project management.

Students noted that communication skills they learned through interactions with older adults were transferrable to other contexts. P24 noted that the increased communication involved, "*such as interviews with the older adults, discussion within the team, and presentations*", is the main difference when comparing the SL project with other courses he had taken. Similarly, P2 emphasized that the experience of working with older adults was even beneficial for future careers.

Another transferable skill participants mentioned a lot was "perspective-shifting" during the design process. P11 stated: "*It is a great chance for us to learn what the user thinks as a developer.*" In addition, some students indicated that the experience sharpened their project management skills because they needed to think about how to "*develop the project insurance in a better whole-round consideration and well-planned." [P15]*

Professional Skills in HCI

Quantitative Results: Correlation Between the Score of SL Project and Score of Final Exam. The student's performance in the service-learning (SL) project was positively associated with the student's performance in the final written exam ($r = 0.458$, $p < .05$), which suggested that students who perform well in the SL project were likely to perform well in the final written exam, as indicated by the positive correlation.

Subjective Feedback. Students also repeatedly mentioned the relevant professional skill sets, such as design concepts and prototyping tool usage learned from the SL project. For example, P8 indicated that the project bridges the gap between theory from lectures and practice, which deepened the understanding of concepts. This idea was also echoed by P7, who thought the best part of SL project is that "*we were able to practice the knowledge learned in the class and experience the whole process of application design.*" Except for the theoretical part, P2 also mentioned the prototyping skills practiced: *"In this project, I have also learned the skills of drawing paper prototypes and*

the skills of using software to draw high-fidelity prototypes. These skills have improved my professional skills in the aspect of UI/UX design." [P2]

Personal Development

Both the LOMS questionnaire results and qualitative data analysis identified benefits for personal growth.

S-LOMS Questionnaire. The S-LOMS framework was utilized to assess the impact on students' personal development across seven domains, namely Knowledge Application (KA), Creative Problem-solving Skills (CPS), Relationship & Team Skills (RTS), Self-reflection Skills (SRS), Caring & Respect (CR), Sense of Social Responsibility (SSR), and Self-understanding (SU) (Snell & Lau, 2020). A total of seventeen students completed the S-LOMS questionnaire both before and after their participation in the service-learning (SL) project. The statistical analysis results indicated that the students' ratings for all the aspects (excluding Sense of Social Responsibility) in Table 1 showed significant improvements after completing the SL project compared to those gathered before the project.

Subjective Feedback

Civic Orientation and Engagement in Local Community. An important aspect of personal development identified by participants was cultivating a sense of Civic Orientation and Engagement, such as social responsibility (SSR) and Caring & Respect (CR) of students. SSR advocates for students in outreaching and partnering

Table 1. Comparison Between Pre-Test Result and Post-Test Result Assessed by the S-LOMS Questionnaire.

Statement	Test	Mean	Effect size	*T*-value	*P*-value
KA	Pre-test	6.76	0.75	3.10	$p < .01$
	Post-test	7.97			
CPS	Pre-test	7.02	0.98	4.04	$p = .001$
	Post-test	7.95			
RTS	Pre-test	6.46	0.90	3.70	$p < .01$
	Post-test	7.55			
SRS	Pre-test	7.41	0.83	3.41	$p < .01$
	Post-test	8.19			
CR	Pre-test	7.77	0.57	2.34	$p < .05$
	Post-test	8.38			
SSR	Pre-test	7.33	0.46	1.88	$p = .078$
	Post-test	7.88			
SU	Pre-test	6.69	0.67	2.74	$p < .05$
	Post-test	7.91			

with the broader community for the benefit of society. Almost all students noted in their evaluation that they had benefited from the social interaction in the project. Developing social responsibility includes accessing and involving the community, raising awareness of social problems, supporting and seeking solutions, and fostering future career development. For instance, P11 stated the best part of the project was the chance to "*get involved in society*" and "*get in contact with the underprivileged people in the society.*" Several students also noted that participating in the project increased their attention to the seniors' barriers in the digital society (for example, loneliness and problems with technology) that were "*easily ignored in the past." [P13]*

As P2 mentioned in the evaluation report, after noticing the problems, they started to reflect that "*many apps in the market were not user-friendly to older adults,*" then thinking about making more efforts to help and change. Meanwhile, more students thought about addressing the problems in interface design.

> "*Meaningful service addresses a community need. The beauty of service-learning is that something real and concrete is occurring…" [P15]*

Furthermore, care, empathy, and respect were mentioned repeatedly throughout students' feedback and evaluations, which aligns with Caring & Respect (CR) in the service-learning (SL) assessment. Engaging in social interaction within the SL project exposes students to diverse perspectives and life experiences. Through these interactions, students developed empathy by gaining a deeper understanding of others' challenges, emotions, and needs. Students indicated that they "*learn listening" [P1]*, try to be "*more considerate during the conversation" [P9]*, how to "*think about others' needs" [P5]*, and then "*realize the importance of user-centered design" [P5]* in HCI.

Empathy also played a key role in expanding individuals' perspectives. By understanding the lived experiences of others, individuals were more likely to broaden their own perspectives, which can positively impact their self-identity by fostering open-mindedness and a willingness to learn from others.

> "*The empathy developed in the service-learning project also helped me to cultivate self-identity and connect to society." [P18]*

The comments from the students revealed the influence of the service-learning project will continue in the future. P2 wrote: "*Therefore, I have decided to think more about older adults' difficulties and their needs when developing apps in the future career.*" P18 also talked about citizenship improvement, which will help "*effectively cultivate the core competence of our future employment.*" The attitudes and perceptions of seniors toward new technology and life also inspired students. P10 regarded talking and working with older adults as a powerful life lesson, where P10 stated that "*I am admired by the attitude of the elders towards the new technologies… which manifests the spirit of "Never too late to learn." [P10]*

Problem-Solving and Team Collaboration within Cross-Cultural Context. Another assessment of personal development is problem-solving and team collaboration, such as Creative Problem-solving Skills (CPS) and Relationship & Team Skills (RTS). CPS is defined as the ability to solve problems with innovative ideas, involving three steps: understanding and unpacking a problem, brainstorming problem-solving ideas, and evaluating possible solutions to determine the most effective approach (Amran et al., 2019). Students frequently mentioned this skill with concrete examples of its application. For instance, some students shared how they solved unexpected problems during interviews by using different communication strategies:

> "*… the questions we have prepared beforehand may not work as they seem too brief. Throughout the process, we changed our strategy and spotted the points from older people's speeches that we found useful and asked for details." [P14]*

The ability to communicate and work with others, referring to Relationship & Team Skills (RTS), was noted by participants a lot, particularly during the process of cross-cultural interaction. P15 indicated that "*the cooperation work*" is essential in the whole process. P14 also appreciated the peer learning: "*Having a groupmate can widen the views of the project and assemble different opinions of a design …." [P14]*

Cultural Empathy. Students also mentioned the cultural empathy that they develop through engagement with local older adults within the SL project. This ability was crafted from the unfamiliar and challenging working experience with older adults from different cultural backgrounds. Multiple students emphasized the SL project's significance as it gave them a valuable opportunity to engage in meaningful conversations with local older adults, which allowed them to "*better understand the needs of older adults and the diverse cultures and lifestyles that exist beyond their own.*" *[P24]*

According to the students' feedback, interviewing local older adults helped them become more involved in the local community and develop a greater understanding and appreciation for different cultures and lifestyles. An exchange student from Germany stated in the interview, "*For me, an international student, it was the first time getting in contact with locals." [P24]* Non-local students also noticed differences between the older adults in Hong Kong and those in their home countries. P24 stated that "*when my parents even struggle using a mobile phone, I just saw them (the interviewees) use a mobile phone and Apple watches as normal routine for them.*" Similarly, P22 also reported that "*I felt that older adults in Hong Kong seem to have a greater ability to learn about technology when compared to my own grandparents.*"

Challenges in the Context of Intergenerational Communication and Cross-Cultural Social Interaction

Students' reflective reports frequently mentioned three specific challenges during the intergenerational service-learning (SL) process: (1) communication gaps between

generations, (2) distractions experienced by older adults, and (3) cultural barriers for non-local students.

Challenge 1: Communication Gaps Between Generations. One of the primary challenges identified by the students was communication difficulties when interacting with older adults. Nearly all of the students reported experiencing misunderstandings and communication breakdowns during their interviews with older adults, which required additional time and effort.

Knowledge Gaps and Information Asymmetry. Some misunderstandings were attributed to knowledge gaps and information asymmetry, particularly in digital technology. Many students reported that they had to spend a considerable amount of time teaching the seniors how to use their mobile phones and applications since some older adults were not familiar with the functions of smartphones. For instance, P9 stated, "*when doing the usability testing with older adults… they may not be able to figure out what those new functions are.*" Additionally, several students stated that, during the user study and interview phase, older adults experienced confusion because they were unfamiliar with technical terms and jargon commonly used in UI/UX design, therefore, students should "*use some simple terms or explain more to them, which hinders the working process*." *[P16]*

Different Language Usage. Students also identified differences in language usage as a cause of misunderstanding. P1 stated the interviewing process was hard because "*they used too much Chinglish unconsciously that older adults may not understand.*" To overcome the communication problems, students reported that they attempted various methods, including providing further explanations, demonstrating examples, and simplifying processes.

Inadequate Explanation. Students also stated that ineffective communication has resulted from students' and the interviewers' ability to describe their problems, express their thoughts, and understand interlocutors. P15 stated that "*Sometimes, older adults understand what I am asking, but they do not know how to accurately express it to let us know.*" Similarly, P13 stated that older adults's misunderstanding of "*the process or the questions*" also caused some problems when collecting their opinions.

Challenge 2: Limited Understandability and Attention of Older Adults. Another identified barrier was older adults' tendency to become distracted during the interviews. Some students mentioned that this was the most challenging issue because they were unsure how to politely redirect their attention when "*they said many things that are not related to our questions." [P3 & P4]*

To solve the present problem, some students tried to "*interrupt them and bring the topic back" [P21]* directly or "*remind politely" [P9 & P10]* when the discussion is out of track. Some other students adopted more smooth approaches such as "*ask something more specific questions" [P4]* depending on their sharing. P17 and P18 suggested to

"*try to listen and understand all the things of the interviewees first*" and "*try to throw out the content or point which the interviewees have said*", then "*ask them some questions related to the off-topic content*" to get them back.

Challenge 3: Culture Barriers for Non-Local Students

Language Barriers within Communication for Non-local Students. The language barrier was also derived from cultural diversity in our students. Students involved in our courses include non-local students from Germany, Malaysia, and Mainland China, whose first languages were all not Cantonese. Meanwhile, nearly all of the older adults were not fluent in English. Non-local students reported encountering cultural and language barriers. P3 wrote that the interaction with older adults was difficult because they could not speak English. P3's partner, P4, also said it was hard to be a translator and accommodator during the interview. Other non-local students (P7, P8, and P20) also presented language problems in the reflection reports.

Furthermore, one student from Germany reported that the language barriers were partially overcome because of reasonable task distribution within the group cooperation and considerable interviewer arrangements. P24 stated he was assigned an interviewee who is fluent in English, "*my groupmates were taking most of the interview and a few interviewees assigned is fluent in English" [P24]*. P24 emphasized the interview experience was much better than the expectations as an international student, because "*with the course tutor's and group mates' support, this obstacle did not significantly impact my final project.*"

Understanding of Local Living Customs. In addition to the language barriers, some non-local students reported experiencing cultural differences in ways of thinking during the development of app prototypes and the interview process. Specifically, two mainland students, P22 and P23, noted that the design ideas of the local users were vastly different from their own, possibly due to variations in user expectations shaped by previous mobile app usage habits, such as "*the targeted users, the local older adults, may have different thinking and expectation based on their previous experience using Hong Kong Apps.*"

The non-local students mentioned the challenges of cross-cultural understanding and adaptation, particularly in the context of design and conducting interviews. This created an additional burden of understanding local cultural and social norms because older adults from different regions may have distinct needs. Therefore, they emphasized the help of collaboration with local students in a team, considering that the design should be community-focused and learning-centered to better serve the target user group.

Personal Development from the Older Adults and Community Collaborators

Based on feedback gathered from a post-event survey and comments from the local community center, the senior participants greatly valued the chance to engage with the younger generation and expand their technological knowledge. They expressed

gratitude for the students who introduced them to contemporary user interfaces, and instructed them in the use of smartphones and various apps during the service sessions. This exchange not only equipped the seniors with essential tech skills but also cultivated a feeling of community and active participation. Furthermore, the course instructor observed a mutual exchange of knowledge and experience between the students and seniors. For instance, some seniors drew on their professional backgrounds to offer insights on user experience design and provided advice on presentation skills and perspectives on life. By contributing to the students' learning experience, the seniors felt a heightened sense of accomplishment.

Discussion

This section will discuss the benefits and challenges of implementing the service-learning (SL) project in the context of intergenerational and cross-cultural social interaction, addressing two research questions introduced at the beginning—"How do students benefit from engaging in intergenerational and cross-cultural interactions within service-learning projects" and "What are the challenges associated with intergenerational and cross-cultural interactions in service-learning settings."

Benefits of SL in Learning, Personal Development, and Social Interaction Skills

Students in our study stated that their professional knowledge learning, personal growth, and social interaction skills benefited from the SL. The skillsets students honed in the SL project align with the goal of meaningful HCI education. For instance, their professional skill sets, such as real-life practical design experience, were enhanced during the project. Supplementing the qualitative results, our quantitative analysis results also show that students' performance on the SL project is positively associated with student's performance on the final exam, suggesting that the hands-on experience and practical application gained through the SL project have contributed to an enhanced understanding of the theoretical knowledge taught in the course.

In addition, previous studies have emphasized the importance of integrating practical projects and real-life community connections for university students. The results of our study indicated that SL projects fused with various social interactions could serve as an effective and operable practice, enhancing users' application of theoretical knowledge, community impact, cultural competency, and learning climate (Levesque-Bristol et al., 2011). This kind of practical project and community engagement can better prepare students for the challenges and opportunities they will face in their professional lives while also fostering personal development and a sense of social responsibility.

Notably, in the context of intergenerational and cross-cultural communication, the quantitative and qualitative results of our study emphasized that the SL project is beneficial to their personal growth and soft skills improvement. Our findings echo the previous works, which have shown that SL is beneficial to university education, helping develop students as a whole person (Astin et al., 2000; Driscoll et al., 1996; Giles & Eyler, 1994;

Shneiderman et al., 2006). The participants in our study reported that the social interaction embedded in real-life project experience helped them experience the work as a real UI/UX designer and think about exploring a professional career in the HCI sector. These results affirm recent advocates of incorporating SL with computer science courses (Coulter-Kern et al., 2013; Faiola, 2007; Feyt & Mwalemba, 2021; Lampe, 2016; Shneiderman et al., 2006). We show that SL projects not only enhance students' academic performance in class but also influence their career development. Therefore, we think implementing SL projects with diverse social interactions could enhance students' learning experience and outcomes.

Challenges of SL in the Context of Intergenerational and Cross-Cultural Social Interactions

The study also identified the challenges that arise when service-learning (SL) involves intergenerational communication in a multicultural class, including communication problems between intergenerational and cross-cultural groups and language and cultural barriers that affect non-local students.

The primary challenge identified in our intergenerational SL project was communication issues arising from knowledge gaps and language differences between generations. This aligns with difficulties previously observed in intergenerational social interaction research. Some students reported spending more time than anticipated explaining and clarifying concepts, which impeded project progress and increased their workload. Additionally, varying attitudes towards technology across different generations may have contributed to these challenges. Previous studies have shown that the generation gap between students and older adults can influence technology adoption. Some older adults stated they were resistant to using mobile phones, which hindered students from interviewing them about mobile phone use (Sanders & Scanlon, 2021; Vassilakopoulou & Hustad, 2021). Younger and older adults have distinct views and attitudes towards technology and mobile application usage (Hill et al., 2015; Paul & Stegbauer, 2005; Yao et al., 2021).

Another major challenge encountered during the intergenerational communication aspect of the SL project was distraction among older adults, likely due to limited understanding of the project and attentional decline with aging (Akatsu & Miki, 2004; Jefferies et al., 2015). This made it difficult for students to engage and interact effectively. To address this issue in future SL courses, it may be necessary to provide additional support from both the community and interviewees.

One more challenge identified in our SL project was the language and cultural barriers faced by non-local or international students. Students from diverse cultural backgrounds may have different perspectives, which can hinder communication and collaboration within groups and with interviewees. While most SL projects aim to work with local NGOs or communities, in the context of a multicultural class, international students may encounter language barriers that negatively impact their participation and performance. Our findings underscore the need for solutions to help non-local students engage effectively in local community service.

Implications for Service-Learning Implementation

Although implementing service-learning (SL) projects might cost extra time, as discussed in the previous studies, the benefits they offer to students, the school, and the community have been thoroughly examined (Hannon, 2006; Mankoff, 2006; Nejmeh, 2012; Ziegert & McGoldrick, 2008). The time investment required for faculty is particularly rewarding. Firstly, SL projects often result in increased student engagement, deeper learning, and practical application of course concepts, as indicated by our study. Additionally, SL projects provide opportunities for faculty to build strong ties with local communities and foster collaborative research with local service communities. Last but not least, the potential appreciation fostered by SL for the local community can enhance the university's reputation and create future collaboration opportunities. Such partnerships may also lead to resources, grants, or support.

Engaging with Local Communities. Engaging with diverse communities can expose students to a wide range of user needs and perspectives, which is crucial in creating inclusive and accessible technology solutions. This exposure can help students design with empathy and inclusivity in mind. The work done by students in SL projects can have a lasting impact on the community. By addressing real needs and creating tangible outcomes, students can contribute to the long-term betterment of society.

Our results have shown the benefits of integrating SL projects into the HCI course, including improving students' performance and community engagement. Collaborating with community partners and non-profit organizations could also help students build professional networks. These connections can be invaluable for internships, job opportunities, and collaborative projects after graduation. Community engagement activities such as SL projects in higher education would help nurture the students' diverse abilities, embodying the university's mission for the Whole Person Education philosophy. Therefore, embedding and coordinating SL projects in courses would become essential to connect students with non-profit organizations, contributing to the greater good of society.

Intergenerational Communication. Integrating intergenerational communication into SL projects can significantly enhance students' educational experience while providing meaningful benefits to the community. By understanding the perspectives of older adults, students can develop greater empathy and cultural sensitivity. This is crucial in a world where populations are aging, and the need for services that cater to older adults is increasing. Training in intergenerational communication can improve students' overall communication skills, making them more effective collaborators and professionals (Roodin et al., 2013). They learn to articulate ideas clearly and listen actively to feedback from individuals with different life experiences and communication styles.

Initial communication barriers might impede student engagement in the project; however, perceptions of SL can evolve over time by providing essential support or guidance to address misunderstandings and alleviate discouragement (Chan et al., 2021). To solve communication problems resulting from knowledge gaps and language differences

between generations, as mentioned by students, we call to implement preparatory measures that enhance students' comprehension of the older adult population's perspectives as preliminary preparation. Some related seminars and training engaging with senior social workers can be conducted to improve the students' awareness and understanding. In addition, some valuable strategies, such as role-playing exercises and volunteering in local events, can be implemented for community immersion.

Enhancing Cross-Cultural Understanding. Enhancing cross-cultural understanding within SL projects can have profound implications for students, educational institutions, and the communities they serve. Students develop global competence, which is increasingly important in our interconnected world. They learn to navigate and bridge cultural differences, preparing them for international collaboration in their future careers. Exposure to different cultural perspectives can enhance problem-solving skills. Diverse teams often develop more innovative solutions as they combine a variety of viewpoints and approaches (Wang et al., 2019). Cultural exchange activities enrich the educational experience for all students, not just those from abroad, and promote a campus culture that values diversity (Jackson, 2011).

Considering the challenges of cross-cultural understanding and adaptation met by non-local students, our study's findings underscores the need for solutions to help non-local students engage in local community service, such as creating mixed-nationality groups and communicating with NGO representatives in advance. Before connecting with the community, some workshops can be organized to build cultural competency, where students can learn about the local norms and values. Diverse forms, including seminars, case studies, and interactive activities, could be included. It would be helpful to foster students' communication with real people in the local community. In addition, educators can implement strategies to facilitate exchanges between students from different cultural backgrounds. For instance, group projects involving cultural diversity and buddy systems would allow students to learn from each other's experiences and perspectives.

Enhancing Efficiency in Service-Learning Project Implementation. Considering that implementing SL projects may require more time compared to traditional classes, as discussed in prior studies, we offer several suggestions to make SL less time-consuming (Hannon, 2006; Mankoff, 2006; Nejmeh, 2012; Ziegert & McGoldrick, 2008). These include leveraging existing community partnerships embedded within the university rather than establishing new partnerships for each course, integrating SL into central course design, and adopting collaborative teaching models by partnering with colleagues and graduate assistants.

Conclusion

In summary, this study comprehensively evaluates service-learning (SL) implementation with intergenerational and cross-cultural social interaction in a human-computer interaction (HCI) course. The research employs a mixed-methods approach, combining

qualitative and quantitative analysis, to uncover the rich and complex benefits and challenges of the SL project. We concluded that while integrating SL with diverse social interaction within an HCI course presents its unique challenges, the benefits are substantial and far-reaching. By carefully addressing the challenges through planning and resource allocation, educators can enhance the educational impact of SL projects. The insights from this research can serve as a valuable resource for HCI educators and beyond seeking to incorporate SL into their curriculum, ultimately contributing to cultivating socially responsible and culturally competent citizens.

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The raw/processed data required to reproduce the above findings cannot be shared at this time due to legal/ ethical reasons.

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The study obtained the approval from IRB. The Centre for Innovative Service-Learning (CISL) of Hong Kong Baptist University guided and approved this study's data collection and analysis. The analysis of students' course and exam data adheres to the privacy regulations outlined in the personal data ordinance of Hong Kong Baptist University.

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1. https://www.jamovi.org/

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