




Reflection and group cohesion drive service-learning gains: a pre-post study of credit-bearing courses in Hong Kong

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ABSTRACT

Service-learning is widely used to promote students' civic and social development, yet most evidence and many design assumptions, derived from Western, face-to-face implementations. This study extends global service-learning research by testing a structured, credit-bearing model in a Chinese cultural setting during pandemic-era online delivery, and by identifying program features that most strongly predict student gains. Using a one group pre-post research design, undergraduates completed matched surveys before and after participating in credit-bearing service-learning subjects at a Hong Kong university. Measures assessed civic engagement (attitudes and behaviors), social responsibility, service leadership, intrinsic motivation, perceived group cohesion, and opportunities for reflection. Repeated measures MANOVA indicated significant improvements across all outcomes (medium-to-large effects), including particularly strong gains in service leadership—a culturally resonant civic construct for Chinese societies. Regression analyses showed that two factors consistently predicted post-course outcomes: group cohesion and reflection opportunities. In contrast, pre-program intrinsic motivation did not predict gains; instead, intrinsic motivation increased through participation and was associated with stronger outcomes when measured after the experience. These findings provide important implications for service-learning globally. Student development is less dependent on who enters highly motivated and more dependent on how courses are designed, specifically whether programs intentionally build cohesive teams and embed structured reflection, even in online or disrupted conditions. This study also offers empirical evidence supporting the effectiveness of structured, credit-bearing service-learning programs in Chinese higher education.

1. Introduction

In an era marked by global challenges such as social fragmentation, misinformation, and declining civic participation, the urgency of promoting civic engagement and social responsibility among university students has never been greater. Higher education institutions are key sites for cultivating informed, responsible, and socially engaged citizens (Chittum et al., 2022). Service-learning is a strong approach to foster civic development: it integrates academic learning with community service and emphasizes the application of academic knowledge to practical, real-world contexts to address social needs. From a pedagogical perspective, service-learning aligns learning objectives with meaningful community work to create opportunities for reflective and experiential learning (Kenny & Gallagher, 2002). In recent years, service-learning has increasingly been adopted as a course-based, credit-bearing subject in higher

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education (Bringle et al., 2004). Through this pedagogy, students are empowered to connect classroom knowledge with practical applications, address real community needs, and simultaneously enhance their academic understanding, critical thinking, problem-solving skills, and sense of civic responsibility (Sheffield, 2005; Dorsett, 2022).

Various theoretical models have been proposed to explain the transformative effects of service-learning. One widely recognized model is the service-learning framework proposed by Delve et al. (1990), which emphasizes the development of social responsibility and active citizenship through community engagement. Rooted in theories of intellectual and moral development, this model describes five phases—exploration, clarification, realization, activation, and internalization—which guide students from an initial curiosity about social issues to a sustained commitment to social justice. In the exploration phase, students are encouraged to explore new service opportunities without a specific commitment. This phase cultivates curiosity and critical awareness of social issues. The clarification phase prompts students to define their personal values in the context of their service experiences. This phase fosters students' empathy and informed decision-making as they form connections with peer groups and communities. During the realization phase, students deepen their engagement with a specific population or issue, linking their personal values to service experiences and social justice through critical reflection. In the activation phase, students begin to advocate for meaningful social change, applying their knowledge and skills to address real-world injustices. Finally, the internalization phase integrates these service experiences into students' identities, which fosters a lifelong commitment to community engagement and social responsibility.

Empirical research has consistently supported the positive impacts of service-learning. Studies demonstrate that service-learning programs effectively enhance students' civic engagement (Celio et al., 2011) and strengthen their sense of social responsibility (Demirören & Atılgan, 2023). Beyond civic dimensions, service-learning has been shown to contribute to intellectual growth (Astin et al., 2000), academic achievements (Salam et al., 2019), and prosocial behavior (Dinizulu et al., 2024). Moreover, it has been reported that participation in service-learning programs promotes the development of various positive attributes, including emotional competence, resilience, social skills, problem-solving, and teamwork (Gordon et al., 2022). These findings highlight the effectiveness of service-learning as a multifaceted pedagogy that nurtures students' holistic development.

However, much of this evidence is drawn from Western contexts, where service-learning has been practiced and studied for over five decades. In contrast, service-learning is a relatively recent component of higher education systems in Asia (Hong et al., 2024; McCarthy, 2009), with a shorter institutional history and fewer longitudinal evaluations, which limits theory-building and evidence accumulation in Chinese settings. In Hong Kong, the first service-learning centre in higher education was established in Lingnan University in 2006, which marks the beginning of service-learning programs offered to university students (Xing & Ma, 2010). Since then, service-learning has gradually gained popularity with increasing support from universities, governments, charitable foundations, and community partners. In 2012, The Hong Kong Polytechnic University integrated service-learning into its institutional curriculum and began rigorously promoting the development of credit-bearing service-learning courses for undergraduates in the undergraduate curriculum. Today, all eight publicly funded universities in Hong Kong, along with several private institutions, offer service-learning courses and programs to students, with some making service-learning a graduate requirement. As universities are increasingly expected to respond to rapidly changing social needs while preparing students for complex community-based problem solving, there is growing urgency to implement and evaluate pedagogies that can integrate academic learning with civic-capacity building. In this regard, service-learning offers a scalable curricular approach for developing students' civic-related competencies and prosocial attributes in ways that align with local emphasis of social harmony and collective wellbeing.

At the same time, the adoption of service-learning in Hong Kong and other Chinese cultural contexts raises an important question: can service-learning achieve similar benefits in Chinese contexts, or should it be adapted to fit local values and educational traditions? Existing research has largely focused on Western contexts, which leaves significant gaps in understanding how such programs operate in Chinese societies. Cultural factors, such as collectivism, authority-based education, and traditional norms around civic engagement (Hong et al., 2024; Gao et al., 2024), may significantly shape students' motivations and experiences in service-learning. For example, while students in individualistic societies often view service-learning as an opportunity for personal growth or self-expression, students in collectivist cultures may participate in service-learning out of a sense of moral obligation to the community. When service-learning is viewed as a duty rather than a voluntary endeavour, students may engage passively and focus on fulfilling requirements rather than critically examining social issues. This, in turn, may limit their development of critical thinking skills and civic engagement. Additionally, service learning in individualistic cultures often encourages independent thinking, leadership, and personal agency, whereas in collectivistic cultures, it is often framed as a collective effort, emphasizing teamwork and shared social responsibility. A strong focus on group harmony may discourage students from challenging social norms or advocating for social change. Furthermore, while Western education systems prioritize student autonomy, participatory decision-making and open discussions, education in Chinese contexts tends to be authority-based. As a result, students may feel less comfortable expressing personal opinions or engaging in critical discussions about social issues, reducing the potential for civic engagement and transformative learning. These cultural differences highlight the need for localized research to determine whether service-learning can achieve comparable impacts on Chinese students and communities as reported in Western contexts.

Another important limitation in the study of service-learning is the reliance on Western notions of civic engagement, a core outcome of service-learning. Western frameworks often emphasize individual participation in civic activities, which may not fully align with the cultural nuances of civic engagement in Chinese contexts (Putnam, 2000; Xing & Ma, 2010). The service leadership model proposed by Shek and Chung (2015a) offers a culturally relevant framework for understanding civic engagement in Chinese society. This model defines service leadership as the ethical practice of addressing the needs of self, others, groups, communities, and environments while fostering social harmony (Shek et al., 2019). It emphasizes three key components of effective leadership: competence, character, and a caring disposition. Competence refers to essential general skills such as management, problem-solving, with an emphasis on 21st-century skills like emotional quotient (EQ), adversity quotient (AQ), and spiritual quotient (SQ) (Shek et al.,

2015a). Character refers to moral qualities such as integrity, righteousness, and courage, drawing from both Western values (Peterson & Seligman, 2004), and traditional Chinese virtues (Shek et al., 2015b). Finally, a caring disposition involves attributes like empathy and active listening, which enable leaders to prioritize the wellbeing of individuals, groups, and communities (Shek et al., 2022). By bridging Eastern and Western perspectives, the service leadership model provides a culturally grounded framework for fostering civic engagement in Chinese societies.

Service-learning has commonly been used as a method to cultivate service leadership qualities in students (Chan & Thomas, 2015). Theoretically, engaging with communities in need can promote students' moral characters, caring disposition, and general leadership skills (Chung & Bell, 2015; Shek & Zhu, 2023; Lin et al., 2023). However, empirical studies examining the impact of service-learning on students' service leadership development remain scarce. As Shek and Chung (2015b, p.229) noted, "although it is intuitive to believe that service learning can nurture the leadership qualities, moral character, and caring disposition in university students, we need empirical evidence to substantiate such an assumption." Preliminary studies suggest that service-learning can positively impact students' development of caring dispositions and leadership attributes, but these studies are often limited by small sample sizes or methodological constraints. For instance, while Shek and Ho (2019) found qualitative evidence of increased empathy among students who participated in a service-learning subject that involved serving clients in a drug rehabilitation agency, the qualitative findings did not show statistically significant changes. In another study, Ma et al. (2018) reported positive outcomes of a service-learning program in students' caring dispositions, character strengths and beliefs in service leadership, where university students mentored underserved youth, but the sample size of 30 participants limited the generalizability of their findings. These gaps highlight the need for further research employing robust methodologies and larger, more representative samples to validate the impact of service-learning on service leadership development.

In addition to cultural frameworks, the effectiveness of service-learning programs on students' development is affected by multiple factors at different ecological levels. According to Bronfenbrenner's (1989) ecological system theory, the development of positive behaviors is determined by the interaction between individual qualities and the environmental factors at different ecological systems. At the individual level, students' intrinsic motivation plays a key role in determining the extent of their engagement and learning outcomes. Research suggests that students who find service-learning programs intrinsically rewarding are more likely to invest time and effort into the process, and to experience personal growth and civic engagement (Bong, 2001; Eccles & Wang, 2012; Liem et al., 2008; McGuire & Gamble, 2006; Miller & Brickman, 2004; Ngai, 2009).

At the peer level (microsystem), group cohesion is a critical factor. It refers to the degree to which group members feel connected, supported, and committed to their group and its goals (Carron & Brawley, 2000). In educational settings, especially in collectivist cultures, a strong sense of belonging and teamwork can boost students' commitment to service-learning. Prior research shows that positive group dynamics and high group cohesion promote adolescents' civic engagement and sense of social responsibility (Fahmy, 2006; Kahne & Spote, 2008; Zaff et al., 2010). In the context of service-learning, cohesive groups tend to create more supportive and engaging environments that enable deeper reflection, more effective collaboration, and greater meaning-making from the service experience.

Effective teaching and learning activities, as part of the microsystem, also play a significant role in shaping students' learning experiences and outcomes in service-learning. Specifically, reflective practices are critical to service-learning programs because service-learning is essentially a pedagogy based on experiential and reflective learning. Studies have shown that the frequency and quality of reflection significantly influence students' cognitive, affective, and social outcomes in service-learning (Eyler et al., 2001; Krug, 1991). Another factor influencing the outcomes of SL programs is the mode of delivery. In particular, under the COVID-19 pandemic, SL programs were forced to provide through online modes. However, except a few exceptions, few studies have been conducted.

Given these cultural considerations and the limited empirical work in Chinese contexts, the present study examined the feasibility and preliminary outcomes of implementing structured, credit-bearing service-learning at a Hong Kong university during the COVID-19 pandemic. Framed as a preliminary study, this study lays groundwork for more rigorous future research. Specifically, it was aimed to: (1) examine the effects of service-learning on students' civic engagement, social responsibility, and service leadership; (2) investigate the role of intrinsic motivation in shaping learning outcomes; and (3) assess whether perceived group cohesion and opportunities for reflection enhance students' developmental gains. Accordingly, the following research questions were examined:

RQ1. What are the effects of service-learning on students' civic engagement, social responsibility, and service leadership in a Chinese context?

RQ2. How does student motivation shape learning outcomes in service-learning?

RQ3. Do perceived group cohesion and opportunities for reflection enhance students' development through service-learning?

Based on prior literature, the following hypotheses were proposed:

H1. Students' civic engagement, social responsibility, and service leadership will increase following participation in service-learning projects.

H2. Higher intrinsic motivation prior to service-learning will predict more positive learning outcomes.

H3. Greater perceived group cohesion and more opportunities for reflection will be associated with better learning outcomes.

2. Methods

2.1. Participants and procedure

This study adopted a pre-post design to address students' changes before and after participation in service-learning. This approach permits within-participant comparisons over time and is common in educational research for documenting students' change. When combined with repeated-measures models, it can improve precision by accounting for individual differences across time points (Marsden & Torgerson, 2012). That said, without a comparison group, observed changes from pre-post designs cannot be attributed solely to the program and may reflect maturation or concurrent experiences. Such limitations should be aware of when interpreting the findings.

Target population was students who enrolled in service-learning subjects at a government-funded public university in Hong Kong. Quota sampling was utilized to ensure representation of service-learning subjects offered by different faculties. From a total of 66 service-learning courses offered in the 2020/21 academic year, 13 were selected based on faculty representation. After getting approval from the subject teachers, all students who enrolled in the selected course were invited to participate in the study via email. Data collection involved two online questionnaire surveys: the pre-test data were collected in the first lecturer of the subject, while the post-test data were collected after the students completed the whole service-learning subject including the direct service in community.

A total of 440 students participated and completed the pre-test questionnaire (response rate = 63.4%). Of these, 249 also completed the post-test, resulting in an attrition rate of 43.4%. The initial sample reflected the total enrolment in the selected courses and was intended to provide adequate power for multivariable analyses. An a priori power analysis (G*Power 3; Faul et al., 2007), based on a two-time-point repeated measures MANOVA with a medium effect size, $\alpha = 0.05$, and $\beta = 0.80$, indicated a minimum of 127 participants. The final matched sample of 145 exceeded the threshold for adequate statistical power.

During 2020/21 academic year, all courses were conducted online due to the pandemic. While some service-learning subjects successfully provided online services, others either replaced the service component with alternative activities (e.g., prepare video/audio learning materials) or postponed direct service delivery. Subjects in which students did not engage in any form of service were excluded from the study. This criterion contributed to the reduced post-test sample, as some enrolled students had not yet undertaken direct service by the end of the academic year.

Potential attrition bias was examined using chi-square tests and MANOVA, which showed no significant differences in demographic characteristics between the pre-test only, post-test only, and matched pre-post samples. Characteristics of participants who completed both waves of the survey are reported in Table 1. Most participants were female (61.4%) and born in Hong Kong (71.7%). Ethical approval was obtained from the Institutional Review Board of the corresponding author's institution (Reference no.: HSEARS20201228004). All procedures adhered to institutional ethical guidelines, including anonymity and informed consent.

2.2. Implementation process

The service-learning programs were delivered online, with format and timing shaped by pandemic-related constraints and course-specific requirements. Each course was led by qualified instructors who held academic positions within their respective faculties and possessed expertise in both their disciplinary fields and community engagement practices. Courses typically spanned one or two semesters (13 weeks, 3 hours per week). After initial lectures and workshops, students completed at least 40 hours of direct service. Service activities varied by subjects, included tutoring in English, Chinese, and Science for disadvantaged youth in Chinese mainland, career talks for secondary school students, and healthcare services such as eye-care support for children and parents. These activities were designed to enable students to apply academic knowledge in real-world settings.

Assessment components commonly included class participation, service proposals, fieldwork observation, reflective journals, group presentations, and reports. Program design was guided by a logic model specifying four components: inputs (e.g., faculty

Table 1
Demographic profile of the participants.

	Pre-test		Post-test	
	n	%	n	%
Gender				
Female	89	61.4	87	60
Male	56	38.6	58	40
Year of study				
Year 1	21	14.5	16	11
Year 2	48	33.1	43	29
Year 3	50	34.5	41	28.3
Year 4	20	13.8	46	31.7
Year 5	6	4.1	-	-
Place of birth				
Hong Kong	104	71.7	105	72.4
Mainland China	37	25.5	34	23.4
Others: Canada, France, Indonesia, Macau, Pakistan, Thailand	4	2.8	6	4.1

support, student engagement), activities (e.g., instruction, service, reflection), outputs (e.g., completed projects, documented reflections), and outcomes (e.g., increased subject understanding, civic engagement, service leadership, personal growth). This structured yet adaptable framework supported consistency across disciplines while promoting meaningful student development.

2.3. Measures

Civic Engagement

The Civic Engagement Scale (CES) (Doolittle & Faul, 2013) was used to measure students' civic attitude and civic behavior. The subscale of civic attitude comprises eight items, e.g., "I believe I should make a difference in my community." The civic behavior subscale has six items, e.g., "I am involved in structured volunteer position(s) in the community". All items were rated on a 7-point scale (1 = disagree; 7 = agree). The sum of item scores was used as the indicator of the subscale score, with higher scores representing a high level of civic engagement. The psychometric properties of the CES have been validated in both Western and Chinese contexts (Chang et al., 2021; Remr, 2023). In the present study, both subscales showed high internal consistency and good construct validity. Cronbach's α s were above .95 at both pre and post-tests, and the model-fitting indices were summarized in Table 2.

Social Responsibility

Social responsibility was measured with three items previously used by scholars (Schmid, 2012). Students were asked to evaluate their perceived importance of the following statements: "To be considerate to others", "to take responsibility for others", and "to help other people", on a five-point scale (1 = very unimportant, 5 = very important). The total score of these three items was used as an indicator of the level of social responsibility, with a higher score indicating a higher level of social responsibility. Internal consistency of this scale was high ($\alpha = .94$ and $.88$ for Wave 1 and Wave 2, respectively). Confirmatory Factor Analysis (CFA) model demonstrated an excellent fit to the data (Table 2).

Service Leadership

Students' service-leadership was assessed with the 9-item Service-Leadership Behavioural Scale (SLBS) developed by Shek et al. (2019) to measure the behavioral dimension of service-leadership at both pre- and post-tests. The SLBS is an indigenous assessment tool and has been validated in different youth populations (Shek, 2020). Sample items include "I strive to serve other people regardless of their positions", and "I keep learning from other people regardless of their positions." All items are rated on a 6-point scale (1 = very dissimilar to me; 6 = very similar to me). Cronbach's $\alpha = .97$ and $.94$ for pre- and post-tests, respectively. The model fitting index were shown in Table 2, indicating a satisfactory fit to the data.

Motivation

An adapted situational motivation scale (SIMS) (Standage et al., 2003) was adopted to measure intrinsic motivation (4 items). Students were asked to choose reasons why they are currently engaged in this program, i.e., service-learning subject. Sample items include "I think that this subject is interesting" (intrinsic motivation). Students responded to each item on a 7-point rating scale (1 = corresponds not at all, 7 = corresponds exactly). Previous studies have demonstrated strong psychometric properties of the SIMS across different populations, including Hong Kong youth (Guay et al., 2000; Lonsdale et al., 2011). The total score of the scale was used the indicator of intrinsic motivation. Higher scores signified higher levels of intrinsic motivation. Cronbach's α was $.98$ based on the matched sample. Satisfactory model fitting indices were obtained based of CFA (Table 2).

Perceived Group Cohesion

At post-test, a six-item perceived group cohesion scale was adopted to measure group cohesion students perceived during the service-learning programs (Tulin et al., 2018). Sample items include "I feel that I belong to this group.", and "I am happy to be part of this group". All items were rated on a 7-point scale (1 = strongly disagree, 7 = strongly agree). Total scale score was used to indicate the level of students perceived group cohesion. Reliability and validity of the scale were established in previous studies (Chin et al., 1999). The internal consistency of the scale in the present study was high ($\alpha = .96$) and the model fitting was very good (Table 2).

Opportunities for Reflection

Two items excerpted from Moely and Ilustres' scale (2014) were used to measure students perceived opportunities for reflection

Table 2

Model fit indices of key constructs at pre- and post-tests.

Scale	χ^2/df	CFI	TLI	RMSEA	SRMR
CA-1	2.85	0.993	0.987	0.065	0.011
CB-1	1.072	1	1	0.013	0.006
CA-2	3.081	0.988	0.978	0.092	0.014
CB-2	2.128	0.995	0.989	0.067	0.012
SR-1	0	1	1	0	0
SR-2	0	1	1	0	0
SL-1	2.355	0.992	0.986	0.056	0.017
SL-2	2.748	0.978	0.968	0.084	0.024
IM	2.235	0.997	0.992	0.092	0.004
OR	0	0.994	1	0	0
GC	2.354	0.998	0.995	0.074	0.006

Note: IM = Intrinsic motivation at pre-test; CA-1 = Civic attitude at pre-test; CB-1 = Civic behavior at pre-test; SR-1 = Social responsibility at pre-test; SL-1 = Service leadership at pre-test; CA-2 = Civic attitude at post-test; CB-2 = Civic behavior at post-test; SR-2 = Social responsibility at post-test; SL-2 = Service leadership at post-test; OR = Opportunity of reflection at post-test; GC = Group cohesion at post-test.

during their service-learning study. Students were asked to respond to two statements, “I had opportunities to reflect on my service-learning experience through discussions with faculty, students, and community members”, and “I had opportunities to reflect on my service-learning experience through written journals and paper I did for the course”, on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The Cronbach’s α was .90, indicating high internal consistency. Excellent model fitting indices were obtained (Table 2).

2.4. Reliability and validity

Multiple steps were taken to support the reliability and validity of the study measures. Reliability was assessed using Cronbach’s alpha. All scales showed high internal consistency across both waves ($\alpha = .88 - .98$), exceeding the conventional .70 benchmark for acceptable reliability in social science research (Cook & Beckman, 2006). Content validity was addressed by selecting established and widely used scales aligned with the target constructs and the service-learning context. Construct validity was examined via Confirmatory Factor Analysis (CFA) for each scale at both pre- and post-test. As summarized in Table 2, model fit indices indicated strong fit (e.g., CFI > .95, TLI > .95, RMSEA < .08, SRMR < .05), supporting the hypothesized factor structures (Shaw & Crisp, 2011). Taken together, these procedures provide evidence for the psychometric adequacy of the instruments used in this study.

2.5. Data analysis

The data were cleaned, and missing values were replaced using multiple imputation using R. Descriptive statistics and internal consistency (Cronbach’s alpha) were calculated for each measure to assess its reliability. Confirmatory Factor Analyses (CFA) were conducted for each construct to examine the validity of the instruments. To address the first research question, a repeated measures MANOVA was conducted to compare students’ scores on civic engagement (i.e., civic attitude and civic behavior), social responsibility, and service leadership before and after they participated in the service-learning subjects. For research questions 2 and 3, four multiple regression analyses were performed with the four learning outcomes measured at the post-test serving as the dependent variables. In each regression model, age and gender were input in the first block, while students’ pre-test scores on the specific learning outcome, learning motivation, opportunities for reflection, and group cohesion were entered in the second block. Bootstrapped estimates were computed using 1000 resamples.

3. Results

3.1. Descriptive statistics

Means and Standard Deviations of all key variables as well as the simple correlation coefficients are listed in Table 3. The means of all four outcome variables at post-test were higher than their respective means at pre-test. The directions of all significant correlations are consistent with the expected directions.

3.2. Students’ changes before and after the service-learning programs

A repeated measures MANOVA was conducted to examine the effect of service-learning on students’ civic attitude, civic behavior, social responsibility, and service leadership. The results of the multivariate test indicated a significant overall effect of service-learning, Wilk’s Lambda = 0.66, $F(4, 175) = 22.04$, $p < .001$, partial $\eta^2 = .34$, suggesting that service-learning had a substantial impact on the

Table 3
Means, standard deviations, and simple correlations of predictors and outcome variables.

	1	2	3	4	5	6	7	8	9	10	Mean	SD	α
1. IM	-										18.14	4.69	.98
2. CA-1	.78***	-									36.51	9.06	.98
3. CB-1	.61***	.71***	-								25.81	5.96	.95
4. SR-1	.74***	.80***	.62**	-							11.01	2.41	.94
5. SL-1	.72***	.77***	.59**	.78***	-						33.07	6.91	.97
6. CA-2	.16	.18*	.09	.09	.16	-					44.05	7.23	.96
7. CB-2	.07	.03	.20	.00	.03	.71***	-				30.85	6.89	.95
8. SR-2	.00	-.02	-.06	.04	.03	.70**	.52**	-			12.67	1.95	.88
9. SL-2	.11	.09	.08	.09	.15	.77***	.67**	.77***	-		39.57	5.58	.94
10. OR	.05	.05	.07	.04	.08	.62**	.55**	.65**	.70**	-	8.40	1.46	.90
11. GC	-.02	.02	-.02	-.02	-.03	.62**	.52**	.67**	.68**	.66**	35.21	6.27	.96

Note: IM = Intrinsic motivation at pre-test; CA-1 = Civic attitude at pre-test; CB-1 = Civic behavior at pre-test; SR-1 = Social responsibility at pre-test; SL-1 = Service leadership at pre-test; CA-2 = Civic attitude at post-test; CB-2 = Civic behavior at post-test; SR-2 = Social responsibility at post-test; SL-2 = Service leadership at post-test; OR = Opportunity of reflection at post-test; GC = Group cohesion at post-test.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

combined dependent variables.

Follow-up univariate tests revealed that service-learning had a significant effect on all four outcomes: civic attitude, $F(1, 178) = 63.70, p < .001, \eta^2 = .26$; civic behavior, $F(1, 178) = 47.24, p < .001, \eta^2 = .21$; social responsibility, $F(1, 178) = 58.40, p < .001, \eta^2 = .25$; and service leadership $F(1, 178) = 84.09, p < .001, \eta^2 = .32$.

As shown in Table 3, students' post-test scores on all four learning outcomes were significantly higher than their pre-test scores. Cohen's d for repeated measures indicated medium to large effects (Cohen, 1988; Lakens, 2013): $d = 0.65, 95\% \text{ CI } [0.32 - 0.80]$, for civic behavior; $d = 0.67, 95\% \text{ CI } [0.25 - 0.73]$ for civic behavior; $d = 0.50, 95\% \text{ CI } [0.16 - 0.63]$, for social responsibility; and $d = 0.72, 95\% \text{ CI } [0.37 - 0.85]$, for service leadership. These findings provide strong support for Hypothesis 1.

3.3. Influence of learning motivation on students' learning outcomes

Results of the regression analyses are presented in Table 4. After controlling for the effects of gender and year of study, as well as students' pre-test scores, the effects of internal motivation on the four learning outcomes were all non-significant. This suggests that students' initial learning motivation in studying service-learning subject did not affect their learning gains from the subject in civic attitude, civic behavior, social responsibility, and service leadership. Hypothesis 2 was not supported.

3.4. Influence of program-level factors on students' learning outcomes

For the prediction of program-level factors of students' learning outcomes, several findings emerged (Table 4). First, only students' civic behaviors at pre-test significantly predicted their performance on the same scale at post-test ($\beta = .21, p < .05$), while other learning outcomes at post-test were not affected by students' pre-test scores. Second, opportunities for reflection significantly predicted civic attitude ($\beta = .34, p < .001$), civic behavior ($\beta = .29, p < .01$), social responsibility ($\beta = .34, p < .001$), and service leadership ($\beta = .39, p < .001$), with more opportunities for reflection in classroom teaching and in assignments are associated with higher levels of learning outcomes in service-learning. Third, group cohesion significantly predicted civic attitude ($\beta = .37, p < .001$), civic behavior ($\beta = .30, p < .01$), social responsibility ($\beta = .45, p < .001$), and service leadership ($\beta = .44, p < .001$). Students who perceived that their groups in service-learning as cohesive and united tend to gain more from the subject. The findings support our third hypothesis.

4. Discussion

This study examined the feasibility and preliminary outcomes of credit-bearing service-learning programs in a Chinese context during the COVID-19 pandemic. Using a one group pre-post design, results indicated that students showed significant improvements in civic engagement, social responsibility, and service leadership following participation. Students perceived group cohesion and opportunities for reflection were positively associated with their learning outcomes. These findings offer initial evidence that credit-bearing service-learning programs may support the holistic development of university students in Chinese higher education. In particular, the study demonstrated students had significant gains in service leadership, a culturally relevant model for understanding civic engagement in Chinese contexts. At the same time, it should be noted that the design limits causal inference, and effects should be interpreted with caution. Within these constraints, these findings contribute to the existing body of service-learning research and highlight directions for more rigorous future research.

Consistent with previous research conducted in Western contexts (Astin et al., 2000; Eyler et al., 2001; Pinto & Costa-Ramalho, 2023; Lin et al., 2025), the findings point to the potential of service-learning to foster university students' civic and social development. In relation to RQ1, results indicated students' significant learning gains in civic engagement, social responsibility, and service leadership within a Chinese cultural context, with service leadership showing particularly notable improvement.

This study also extends the literature by documenting these benefits in a Chinese setting during the pandemic, where collectivist

Table 4
Regression of civic attitude, civic behavior, social responsibility and service leadership at time 2 on individual-level and program-level factors.

	CA-2			CB-2			SR-2			SL-2		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-.41	1.02	-.03	-.19	1.04	-.01	.29	.26	.07	.30	.71	.03
Year of Study	.02	.52	.00	-.35	.53	-.05	-.16	.13	-.08	-.54	.36	-.10
IM	.31	.28	.20	-.18	.28	-.12	.03	.07	.06	.09	.19	.07
DV-1	.11	.08	.14	.24	.11	.21*	.10	.07	.12	.11	.07	.14
Reflection	1.67	.43	.34***	1.4	.44	.29**	.45	.11	.34***	1.50	.30	.39***
Group cohesion	.43	.10	.37***	.33	.10	.30**	.14	.03	.45***	.39	.07	.44***
R ² change			.498			.425			.549			.598

Note: IM = Intrinsic motivation at pre-test; DV-1 = Score of Dependant variable at pre-test; CA-2 = Civic attitude at post-test; CB-2 = Civic behavior at post-test; SR-2= Social responsibility at post-test; SL-2 = Service leadership at post-test.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

values and cultural norms may shape students' experiences and expectations of service-learning. Whereas western frameworks of civic engagement often emphasize individual agency and self-expression, the service leadership model draws on Confucian virtues such as collective responsibility, empathy, and moral character. The observed gains therefore suggest that service-learning may not only support civic attitude and engagement as articulated in Western paradigms but also cultivate leadership qualities that are culturally grounded in Chinese traditions.

A unique strength of this study is the inclusion of diverse service-learning programs offered across disciplines, including natural sciences (e.g., engineering), humanities, health, and social sciences (e.g., applied social sciences). At the participating university, all service-learning courses follow a standardized design framework, which ensures consistency across disciplines. This framework includes (a) an e-learning component introducing fundamental concepts of service-learning applicable to all programs, (b) discipline-specific lectures and workshops based on professional knowledge, (c) a minimum of 40 hours of direct service, (d) reflective assessment, and (e) academic credit. Such a systematic approach embeds key elements of service-learning in every course, while allowing discipline-appropriate adaption. Findings suggest that this standardized, yet flexible model is workable and has the potential to be scalable to other institutions. By maintaining essential components and permitting contextual tailoring, the framework enables students from different fields to benefit. The cross-disciplinary implementation and use of a common design also help operationalize service-learning theory in practice, illustrating how a coherent model can be implemented across academic units.

At the same time, alternative explanations should be considered. First, the observed improvements in students' civic engagement, social responsibility, and service leadership may partly reflect natural developmental changes rather than program effects alone. While such trends are plausible, the structured integration of reflection, community service, and disciplinary learning, may accelerate these positive changes beyond natural maturation. This research design is also commonly used in the field of service-learning (Chan & Thomas, 2015; Chung & Bell, 2015; Shek & Zhu, 2023; Lin et al., 2023; McCarthy, 2009; Pinto & Costa-Ramalho, 2023). Second, attrition and potential self-selection may bias estimates if students who completed both waves were more motivated or engaged than those who did not. This is a common challenge in longitudinal studies. Although such bias cannot be ruled out, prior research using similar designs has consistently documented benefits of service-learning (Keen & Hall, 2009; Bolton Holz & Pinnow, 2015), and the present findings align with those patterns. Third, regression to the mean could contribute to apparent improvements. However, consistent gains across multiple constructs reduce the likelihood that regression alone explains the results.

Contrary to previous findings that highlight the positive influence of intrinsic motivation on students' learning outcomes in service-learning, the present study found that students' intrinsic motivation measured before course participation did not predict civic engagement, social responsibility, and service leadership. One plausible explanation is that initial learning motivation may shift during participation, and that the motivation shaped by actual service-learning experiences is more proximally related to outcomes. Supporting this view, Lo et al.'s (2022) study revealed that students' experiences in service-learning significantly influenced their motivation, which in turn, impacted their cognitive learning outcomes. To test this possibility, we further compared students' scores on intrinsic motivation before and after their participation in service-learning programs. The results showed that students scored significantly higher on intrinsic motivation at post-test than at pre-test. Further regression analysis indicated that students' intrinsic motivation at post-test significantly predicted their learning outcomes in civic attitude, civic behaviors, and service leadership. These results address RQ2 by suggesting that service-learning may enhance students' intrinsic motivation, and that this enhanced, experience-informed motivation is more strongly associated with student gains. The findings also extend motivational perspectives in service-learning by highlighting that motivation evolves with meaningful engagement rather than remaining static.

Consistent with H3, perceived group cohesion and opportunities for reflection were significantly correlated with all learning outcomes. Stronger group cohesion and more frequent reflection were linked to greater gains in civic engagement, social responsibility, and service leadership development. According to the service-learning framework proposed by Delve et al.'s (1990), reflection serves as a critical bridge between action and understanding, which enables students to process their experiences and deepen their learning at every phase of service-learning. For example, in the exploration phase, guided reflection encourages students to critically analyse the social issues they encounter, which helps them move beyond initial curiosity to develop a deeper awareness of community needs. In the realization phase, critical reflection helps students connect their personal values to service experiences and begin to question issues of social justice. During the internalization phase, reflection supports the integration of service experiences into students' identities, developing a lifelong commitment to active citizenship and social responsibility. Recent research by Sanders and colleagues (2016) likewise indicates that structured reflection significantly enhances students' personal growth and community self-efficacy. The present findings suggest that these functions of reflection remain salient in a Chinese cultural context.

The results also point to the value of intentional team building in service-learning programs. When students experience a sense of belonging and cohesion within groups, they tend to benefit more from service-learning. Strong peer relationships and group cohesion create a supportive environment for exchanging ideas during reflection activities. Collaborative reflection allows students to share diverse perspectives, challenge their own assumptions, and co-construct knowledge. When students feel comfortable with their peers, they are more likely to engage in honest discussions and critically analyse their experiences, leading to a deeper understanding of social issues. Furthermore, a highly cohesive group provides important emotional support when students face challenges during service-learning. The mutual support among group members can increase resilience and motivation, which enable students to persist in their commitment to community engagement. This is consistent with Jones et al. (2022), who found that interpersonal attentiveness and shared emotional engagement promote group cohesion and facilitate joint knowledge construction.

In sum, this study contributes to service-learning research in three ways. First, it provides preliminary pre-post evidence that credit-bearing, curricular service-learning is associated with improvements in civic engagement, social responsibility, and service leadership among Hong Kong undergraduates, extending findings that have been dominated by Western contexts to a Chinese higher education setting. Second, by incorporating service leadership as a culturally grounded outcome, the study goes beyond conventional Western

civic engagement frameworks and demonstrates that service-learning may cultivate leadership qualities aligned with Chinese conceptions of ethical, relational service. Third, the findings highlight two actionable program features—structured reflection opportunities and perceived group cohesion—that are consistently associated with stronger outcomes in an online/pandemic implementation. At the same time, because the study used a one-group self-report pre–post design and measured cohesion/reflection at post-test, the results should be interpreted as preliminary and correlational. Quasi-experimental or longitudinal studies are needed to test causality and durability of these effects.

5. Conclusion and limitations

This study examined whether credit-bearing, curricular-based service-learning courses implemented at a Hong Kong university during the COVID-19 pandemic were associated with changes in students' civic and leadership development, and which individual and program-level factors were linked to these outcomes. Students reported significant pre-post increases in civic attitude, civic behaviour, social responsibility, and service leadership, with medium to large effect sizes. These findings suggest that structured, credit-bearing service-learning is associated with positive civic- and service-oriented development in a Chinese higher education context, although causal conclusions cannot be drawn from the one-group design. Pre-program intrinsic motivation did not predict any of the post-test learning outcomes after relevant controls were applied. However, students' intrinsic motivation increased after participation, and post-program motivation was positively associated with several outcomes. This pattern suggests that motivation may be shaped by the service-learning experience and that experience-informed motivation is more proximally related to learning gains than baseline motivation. Students' perceived opportunities for reflection and group cohesion were consistently and positively associated with all four outcomes at post-test. These results highlight reflection and peer-group processes as promising program features for strengthening civic engagement, social responsibility and service leadership development in service-learning.

Despite its contributions, several limitations warrant caution. First, the study was conducted at a single university in Hong Kong, which may limit the generalizability of the findings. Future work should include institutions across different Chinese regions. Second, the one group pre-post design limits causal and long-term inferences. Multi-wave longitudinal studies and stronger designs (e.g., quasi-experimental approaches) are needed. Third, the attrition rate was relatively high, resulting in a smaller matched sample; future studies might employ incentives and systematic follow-up to reduce loss to follow-up. Fourth, reliance on self-reports raises the possibility of social desirability bias. Future studies could incorporate objective measures, such as behavioral indicators, or include evaluation from teachers or community partners to strengthen the evidence. Fifth, although the instruments showed strong psychometric properties in this sample, further validation in diverse Chinese populations is recommended. Finally, the absence of a control group increases the risk that observed changes reflect confounding influences (e.g., concurrent coursework or external events).

Practically, higher education institutions can strengthen service-learning by adopting a coherent course framework, including discipline-specific preparation, minimum service hours, structured reflection, and academic credit, and by intentionally building group cohesion and embedding mandatory, well-designed reflection to maximize student learning and development.

Statements and declarations

We declare that the data used in this paper were derived from Ms. Pecky Li's Doctoral Thesis.

Ethical considerations and consent for publication

Ethical guidelines of the author's institution were strictly followed, ensuring participant anonymity and obtaining informed consent.

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Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used GPT-5.0 in order to proofread the writing. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

CRedit authorship contribution statement

Lu Yu: Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Daniel Tan Lei Shek:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Xiaoou Hong:** Writing – review & editing, Data curation. **Pecky Pui Ki Li:** Writing – original draft, Formal analysis, Data curation, Conceptualization.

Declaration of conflicting interest

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

Supplementary materials

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Data availability

The data is available and shared.

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