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## Does Service-Based Learning Strengthen Students' Core Skills?

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**Abstract.** The Ministry of Education, Culture, Research and Technology of the Republic of Indonesia launched the Learning Freedom, Independent Campus policy at the beginning of 2020. The aim of this new strategy is to give universities the chance to adapt learning, so that higher education learning activities are more adaptable and reinforce students' core skills. Various universities are developing service-based learning, which is implemented through three learning models, namely, humanitarian projects (HP), thematic work lecture (TWL), and teaching assistance (TA). This study aimed to describe students' involvement in service-based learning and its impact on students' core skills. The population of this study were students from major state universities in East Java who had participated in HP, TWL, and TA. The sample was determined using systematic random sampling. Data analysis was carried out using a descriptive approach and multivariate analysis. This study found that students were highly involved in HP, TWL, and TA. Overall, the service-based learning model strengthens students' core skills. Sequentially, HP, TWL, and TA are service-based learning models that effectively strengthen students' lifelong learning, communication, and problem-solving skills. Meanwhile, TWL is very effective in strengthening students' teamwork skills. Further research is recommended to elaborate and validate specific skills as part of the core skills components. This research does not discuss in detail students' involvement in service-based learning, and their core skills as influenced

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by gender, academic ability, socioeconomic background, and departmental differences. This was a limitation in this research, so further research is needed.

**Keywords:** service-based learning; teaching assistance; thematic work lecture; humanitarian projects; students' core skills

## 1. Introduction

Universities must apply learning innovations swiftly and precisely in this period of fast change (MBKM, 2021). Perhaps, because of disruption in various areas of life, learning innovation is needed so that universities can prepare graduates who are qualified, skilled, capable, creative, resilient, and responsive to the changes in their environment (Zaini et al., 2023).

The Directorate General of Higher Education in the Ministry of Education and Culture of the Republic of Indonesia introduced a policy called Learning Freedom, Independent Campus (LFIC) in response to the swift changes occurring in society. This policy grants universities the autonomy to implement educational programs that are tailored to the unique needs, problems, and features of each campus (MBKM, 2021). The LFIC policy aims to foster learning independence, encourage creativity in teaching, and allow campuses, instructors, and students to innovate. It is anticipated that the adoption of the LFIC policy will inspire educators and learners to develop a variety of innovative teaching strategies, thereby making educational activities more adaptable, enjoyable, and significant. In higher education, learning activities take on many forms in addition to in-person lectures. Numerous community-based student initiatives, such as instructional support in educational units, fieldwork, business practice, and community service through real-world lectures, can be transformed into pertinent courses. The goal of implementing such learning innovations is to increase students' fundamental abilities to deal with the difficulties of a changing society (Hardini et al., 2022). Over the past five years, several East Java universities have adopted LFIC policies in the form of service-based learning (Amiruddin et al., 2023).

Research has revealed that service-based learning can enhance a range of job skills and offer a variety of learning opportunities to prepare students for a range of future obstacles (Cooper, 2014; Harkins et al., 2018; Lim & Bloomquist, 2015). Research advises graduates to study according to several service-based learning models that effectively bolster fundamental competencies, to make them competitive in the labor market (Madam et al., 2020; Salleh et al., 2019).

The purpose of this study was to determine how service-based learning could be used to help students develop fundamental abilities. In this study, three service-based learning models – teaching assistance in basic education units (TA), thematic work lectures (TWL), and humanitarian projects (HP), which are components of the LFIC policy – were explored. These three service-based learning models are part of the eight learning models in the LFIC policy. This study answers three research questions: (1) Does service-based learning strengthen students' learning

involvement? (2) Does students' core skill set get stronger through service-based learning? and (3) To what extent does service-based learning help students develop their core skills?

The primary focus of this study was on three service-based learning models, and the goal is to characterize the extent of student involvement in each model. Additionally, this study attempted to explain how students' basic competencies evolved because of participating in three different service-based learning models. In the end, it was anticipated that this study would identify the best service-based learning model for enhancing students' fundamental competencies.

## **2. Literature Review**

### **2.1. Student Involvement in Service-Based Learning**

The level of student participation will affect how well students learn. Student involvement in learning is the amount of mental and physical effort that students exert to improve their academic experience. Consequently, students who participate in a great deal of service-based learning are the ones who devote a great deal of time and effort to their studies, actively participate in their education, and communicate with teachers and other students regularly to complete assignments, and vice versa (Ivanova & Moretti, 2018).

The term involvement describes the mental and physical effort students put into service-based learning. The amount of student involvement can be assessed subjectively and statistically, for example, by counting the hours spent on community service projects or by gauging how seriously students take service-based learning and how high their learning standards are. The degree to which students engage in service-based learning will determine the experiences they have and the core skills they acquire (Prianto et al., 2022). Thus, a metric to evaluate the efficacy of instruction is the degree to which students are engaged in the process of learning (Astin, 2014; Rahman et al., 2020). Thus, student involvement in learning is a form of individual activity, so it can be explained using various verbs, such as individual connection, individual commitment, persistence, involvement, taking part, participating, showing enthusiasm for, and paying attention.

Because of rapid advancements in digital technology, the social and cultural landscape is changing very fast. Universities need to equip students with various competencies in accordance with the expectations of the world of work and changes expected in the future (Hasyim et al., 2022). The LFIC policy urges colleges to help students prepare for the rapid changes the world is facing. The LFIC strategy places a strong emphasis on encouraging colleges to create and execute innovative curricula, so that students can acquire information, skills, and attitudes that are in sync with societal trends (MBKM, 2021).

It is envisaged that the LFIC policy will provide universities greater latitude to foster autonomous and flexible learning, support creative learning, and offer education that meets universities' requirements. In addition to in-person lectures, learning activities can take place outside the classroom, through a variety of

activities, such as volunteer work, independent study or projects, student exchanges, internships, research, and involvement in humanitarian initiatives. The expectation is that, by exposing students to a range of real-world and contextual learning experiences, their basic skills will improve (MBKM, 2021).

The LFIC policy encourages universities to enhance students' learning capacities. It will provide students with challenges and opportunities to understand societal issues, foster their creativity and inventiveness, and strengthen their capacity to seek out and acquire knowledge based on real issues (Amiruddin et al., 2023; Hardini et al., 2022; MBKM, 2021). Thus, learning activities in higher education are expected to improve students' hard and soft skills.

Service-based learning is one of the active learning models that the LFIC policy promotes to achieve this goal. In essence, service-based learning is undertaken to implement active learning. It has been demonstrated that students' cognitive, emotional, social, and attitudinal development is impacted by active learning. Research indicates that using this method of instruction improves students' post-college knowledge, involvement, and activity levels (Mendonca & Franberg, 2014). A paper by Brame (2007) explains that active learning can strengthen students' learning experiences.

Three service-based learning models – TA, TWL, and HP – encourage students to apply what they have learned in the classroom to solve real-world challenges. According to Ma et al. (2018), these learning models enable students to pursue their own career objectives. These teaching models also benefit students' personalities, by fostering the growth of traits such as empathy, selflessness, and compassion. By integrating theory and learning experiences, students can critically evaluate values and enhance their emotional, social, and cognitive skills (Lovat & Clement, 2016).

The LFIC policy was introduced five years ago, and many students are interested in being involved in service-based learning. Students most commonly use three service-based learning models, namely, TA, TWL, and HP. TWL involves a series of lectures on community service with specific themes that are based on the needs of the community and the students' areas of competence. Students and community members develop and carry out the activity programs. TA is intended to provide opportunities for students to learn and develop themselves through teaching activities at elementary schools. HP is a type of instruction that uses planned and structured activities to increase students' social awareness and sensitivity. The locations for implementing humanitarian project activities are determined by the campus, and are generally areas that are experiencing disasters and designated as disaster areas by either the regional or central government (Amiruddin et al., 2023; Hardini et al., 2022).

In this study, student involvement in service-based learning was measured with eight indicators of involvement, namely, individual connectedness to learning (connect), individual commitment to carrying out learning (commit), persistence (persist), intensity of involvement (involve), willingness to take part in the activity

(take part), level of participation (participate), enthusiasm for learning (enthusiasm), and attention to learning activities (attention). Therefore, this paper explains the impact of student involvement in service-based learning to strengthen students' core skills (Ivanova & Moretti, 2018; Prianto & Firman, 2022).

## 2.2. The Urgency to Strengthen Core Skills

Human resources with a variety of abilities are in high demand in the employment market right now. In addition to technical proficiency, modern human resources are expected to be self-sufficient learners, inventive, creative, and able to adjust rapidly to a variety of environmental changes. Strong core skills have been found to indicate that human resources can accomplish tasks and advance in their careers by applying teamwork skills, analytical skills, communication skills, and lifelong learning skills (Brewer, 2015).

The terms core competencies and core skills are used by international organizations such as the Organisation for Economic Co-operation and Development and the International Labour Organisation to characterize human resources that are believed to be competitive in the labor market (Brewer, 2015; Hadiyanto et al., 2021). In developed countries such as the United States of America, England, Australia, and ASEAN (Association of Southeast Asian Nations) countries, good human resources are described as possessing core skills, key skills, workplace know-how, and employability skills. Research has identified the fundamental skills needed by employers, which are as follows (Prianto & Firman, 2022):

- Delivery-related competence: the ability of an individual to execute duties in line with their area of competence. The following are examples of this kind of competency: flexible thinking, the capacity to manage diverse resources, working in teams, analytical thinking, attainment focus, planning steps that are effective and understandable to others, and leadership.
- Competencies that are related to the ability to build interpersonal relationships (interpersonal competence): This type of competency includes a focus on meeting needs and serving customers (client focus), diplomatic ability in understanding situations, understanding people's aspirations, maintaining good relationships with stakeholders, the ability to influence and convince other parties (diplomatic sensitivity), the ability to convince others based on an honest, humble and respectful attitude (influencing), the ability to negotiate to achieve mutually reinforcing and beneficial results (negotiating), having a good understanding of various aspects of the organization, and understanding the organizational structure and various decisions taken by the organization (organizational knowledge).
- Competencies relating to facing future challenges (strategic future planning) include developing one's talents and potential according to future challenges (developing talent), aligning oneself with the needs, priorities and goals of the organization to strengthen the organization (harmony), building relationships that are based on mutual trust, strengthening internal and external networks that strengthen an

organization (strategic networking), developing a broad perspective, understanding future challenges, and developing competitive advantages to take advantage of various market opportunities (strategic thinking).

This study is based on other research, and describes four core skills expected by the job market (Brewer, 2015; Gregorová et al., 2016; ILO, 2015; Prianto et al., 2021) (see Table 1).

**Table 1: Core skills and description of specific skills**

Core Skills (CS)	Specific Skills (SS)
Lifelong learning skills (CS-1)	<ul style="list-style-type: none"> <li>• Engage in abstract thinking (SS1)</li> <li>• Understand and apply new knowledge and skills (SS2)</li> <li>• Collect, process and use information (SS3)</li> <li>• Interpret and communicate information (SS4)</li> <li>• Become an independent learner (SS5)</li> <li>• Use discovery methods to answer problems (SS6)</li> <li>• Accept responsibility for what has been learned and applied (SS7)</li> <li>• Use time effectively (SS8)</li> <li>• Complete work (SS9)</li> <li>• Choose the best way to complete a task (SS10)</li> <li>• Immediately start, carry out, and complete tasks (SS11)</li> <li>• Encouraged to become lifelong learners (SS12)</li> <li>• Able to adapt to new situations and conditions (SS13)</li> <li>• Have a strong drive to learn (SS14)</li> <li>• Encouraged to find the best way to do activities (SS15)</li> </ul>
Communication skills (CS-2)	<ul style="list-style-type: none"> <li>• Is a competent reader (SS16)</li> <li>• Attentive to the needs of others (SS17)</li> <li>• Able to formulate the core of the problem (SS18)</li> <li>• Listen and communicate effectively (SS19)</li> <li>• Learn from a problem (SS20)</li> <li>• Read information, situations, and conditions (SS21)</li> <li>• Read, understand, and use information sources (SS22)</li> <li>• Communicate and understand social needs (SS23)</li> <li>• Use numerical language to explain problems (SS24)</li> <li>• Articulate various ideas and the nature of the vision (SS25)</li> </ul>
Teamwork skills (CS-3)	<ul style="list-style-type: none"> <li>• Interact with colleagues (SS26)</li> <li>• Contribute to realizing organizational goals (SS27)</li> <li>• Work in a team according to work culture (SS28)</li> <li>• Plan, decide, and carry out activities with the team (SS29)</li> <li>• Work in a team or group (SS30)</li> <li>• Respect other people's thoughts and opinions (SS31)</li> <li>• Serve as a mentor to others and provide feedback (SS32)</li> <li>• Lead effectively (SS33)</li> <li>• Take on a leadership role if needed (SS34)</li> <li>• Mobilize group members (SS35)</li> <li>• Direct oneself at work (SS36)</li> <li>• Take responsibility for what has been done (SS37)</li> <li>• Build partnerships to strengthen performance (SS38)</li> <li>• Strengthen group consensus for making decisions (SS39)</li> <li>• Value other people's input (SS40)</li> <li>• Receive feedback, and resolve conflicts (SS41)</li> </ul>

Problem-solving skills (CS-4)	<ul style="list-style-type: none"> <li>• Think creatively (SS42)</li> <li>• Solve problems independently (SS43)</li> <li>• Test various assumptions (SS44)</li> <li>• Identify various problems (SS45)</li> <li>• Read data according to the context or situation (SS46)</li> <li>• Adapt to new environments (SS47)</li> <li>• Identify and offer new ideas (SS48)</li> <li>• Collect, verify, and manage information (SS49)</li> <li>• Manage time, money, and other resources (SS50)</li> </ul>
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If they are to participate in the labor market after graduation, students are expected to have acquired the competencies listed in Table 1. Today, job seekers require strong core competencies, which enable them to execute tasks quickly and effectively. Research indicates that individuals who can communicate effectively, learn continuously, collaborate with others, and solve problems tend to be able to manage tasks efficiently, achieve optimal learning, and succeed in their professional endeavors (Prianto & Firman, 2022; Setiawati & Budi, 2018). This research intended to determine whether participation in service-based learning by students enhanced their core skills.

### 3. Research Methods

The population in this study was students from three major state universities in East Java who were participants in the LFIC program, especially those who took part in TWL, TA, and HP. The total population is presented in Table 2.

**Table 2: Population distribution of universities and type of service-based learning model**

University	Service-based learning model			Total
	TA	TWL	HP	
MSU-A	340	650	98	1,088
MSU-B	125	780	210	1,115
MSU-C	320	550	85	955
Total	785	1,980	393	3,158

*Note.* MSU-A = Major State University A, MSU-B = Major State University B, MSU-C = Major State University C

The formula to calculate the number of samples is  $n = N / (1 + (N \times e^2))$ , where  $n$  is the number of samples,  $N$  is the number of the population, and  $e$  is the margin of error (5%). The population in this study was 3,158 students. Thus, the sample size of this study was 356 students. Systematic random sampling was used to establish the sample size (Scheaffer et al., 2011). The number of students enrolled in each service-based learning model determined the sample size for each class proportionately. Table 3 displays the dispersion of the sample.

**Table 3: Distribution of sample size**

University	Service-based learning model			Total
	TA	TWL	HP	
MSU	38	73	11	122
BU	14	88	24	126
SSU	36	62	10	108
Total	88	223	45	356

The researchers created a validated and reliable questionnaire ( $\alpha = 5\%$ ) to gather data on students' participation in service-based learning and their core skills. They created two questionnaires: one concerning students' participation in service-based learning and the other about students' core skills (see Appendix). The questionnaire was developed by the researchers based on various indicators of students' engagement in service-based learning and indicators of core skills.

Respondents received the questionnaires that were used to collect the data via Google Forms. Respondents were asked to share their thoughts regarding particular skill indicators shown in Table 1, their degree of participation in service-based learning, and the enhancement of their fundamental abilities. Because the respondents in this study were university students, they were assumed to be able to express their opinions through questionnaires (Jimaa, 2013; Spooren & Motelmans, 2006; zeYin-Fah et al., 2012).

To describe students' involvement in service-based learning and students' core skills, researchers used the five categories listed in Table 4, namely, very low, low, medium, high, and very high. The categories were applied to the questionnaires; the lowest rating was scored 1 and the highest 5. Thus, the score range was obtained by subtracting the highest score from the lowest score, and dividing it by 5. The score interval for each category is 0.8 (Table 4).

**Table 4: Gradation of students' involvement in service-based learning and their core skills**

Score	Student involvement	Student core skills
1,00–1,80	Very low	Very low
1,81–2,60	Low	Low
2,61–3,40	Moderate	Moderate
3,41–4,20	High	High
4,21–5,00	Very high	Very high

This data were analyzed using a descriptive approach (Arikunto, 2010) to describe student involvement in service-based learning models, namely, TWL, TA, and HP. The eight indicators of learning involvement are presented in the results section. This study explains students' core skills levels as influenced by their involvement in service-based learning. It used multivariate analysis (Johnson & Wichern, 2007) to determine the influence of service-based learning on students' core skills.

The purpose of this study was to determine how involved students were in the three different service-based learning models. Additionally, this study aimed to characterize the fundamental skill levels of students after their participation in the three service-based learning models. The researchers wished to determine which learning approach had the most influence on the development of students' core skills.



## 4. Results

### 4.1. Students' Involvement in Service-Based Learning

The first research question of this study is, Does service-based learning strengthen students' learning involvement? It was found that students' involvement could be categorized as very high involvement for the three service-based learning models, TWL, TA, and HP (see Figure 1). Students' involvement in TWL were dominantly described by individual connectedness to learning (connect), intensity of involvement (involve), and level of participation (participate). Students' involvement in HP were dominantly described by individual commitment to carrying out learning (commit), persistence (persist), enthusiasm for learning (enthusiasm), and attention to learning activities (attention). Students' involvement in HP were dominantly described by their willingness to take part in the activity (take part). The average score of students' involvement in service-based learning is 4.76, which is considered very high. In other words, service-based learning was very effective for involving students in learning.

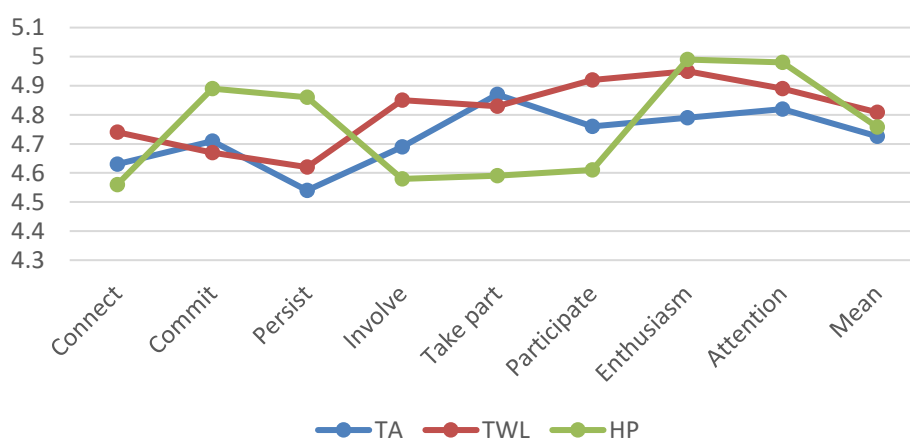
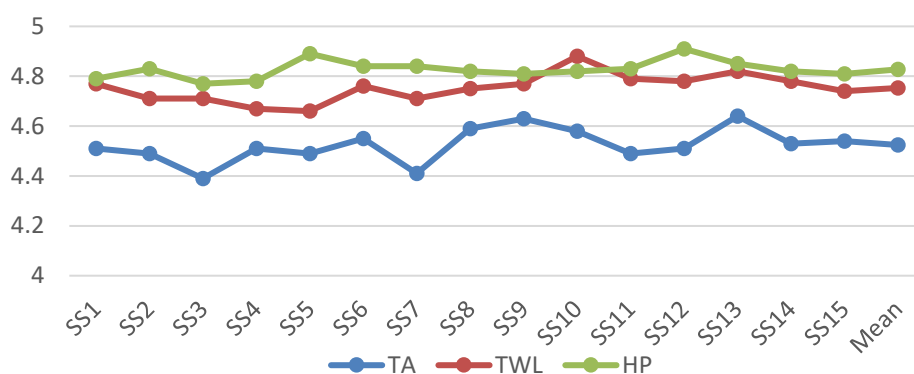


Figure 1: Students' involvement in service-based learning

### 4.2. The Impact of Service-Based Learning on Strengthening Students' Core Skills

The second research question is, does students' core skill set get stronger through service-based learning? This study describes four core skills of students after they were involved in TWL, TA, and HP. The *first* core skill (CS1) is lifelong learning skills (see Table 1). This study explained the average score of 15 indicators of lifelong learning skills after students were involved in TWL, TA, and HP (see Figure 2).

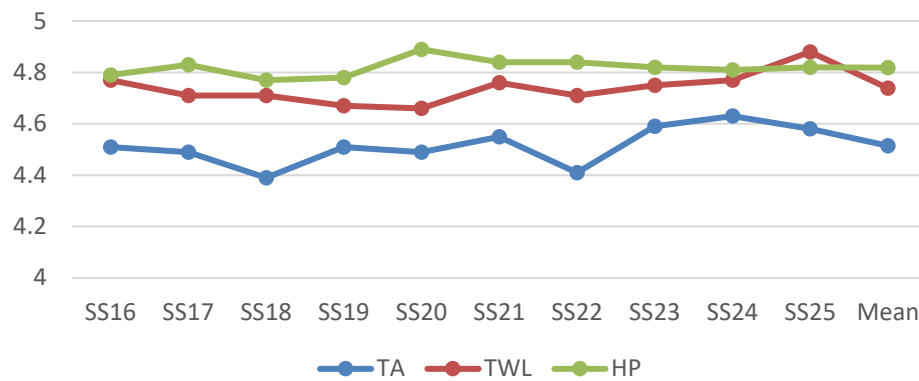


**Figure 2: Students' lifelong learning skills**

This study revealed that HP and TWL had a very strong effect on developing lifelong learning skills, which is explained by the following indicators: abstract thinking, understanding, applying new knowledge and skills; collecting, processing and using information; interpreting and communicating information, becoming an independent learner, being able to use discovery methods to answer problems, responsible for what has been learned and applied, using time effectively, working completely, choosing the best way to complete a task, immediately starting, carrying out, and completing tasks; encouraged to become lifelong learners, able to adapt to new situations and conditions, being a strong drive to learn, and encouraged to find the best way to do activities.

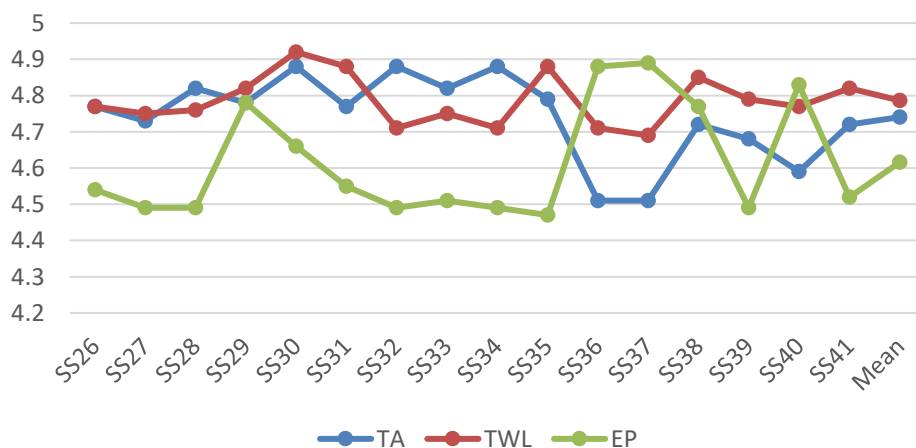
The *second* core skill (CS2) is communication abilities. The average results of 10 skills representing the core skill of communication skills after student participation in service-based learning through TWL, TA, and HP activities are presented in Figure 3. The following are the 10 specific skills of communication skills: reading proficiency (SS16), an acute awareness of others' needs (SS17), the ability to formulate the core of the problem (SS18), effective listening and communication skills (SS19), the ability to learn from a problem (SS20), the ability to read and comprehend situations and conditions (SS21), read, understand, and use information sources (SS22), ability to communicate and comprehend societal needs (SS23), ability to use numerical language to explain problems effectively (SS24), and ability to articulate various ideas and what their vision (SS25).

This study found that students' participation in TWL, TA, and HP strengthened the development of communication skills. The service-based learning model that had the strongest effect on the development of communication skills was HP, followed by TWL and TA (Figure 3). Therefore, the finding of this study is that service-based learning is effective in strengthening students' communication skills.



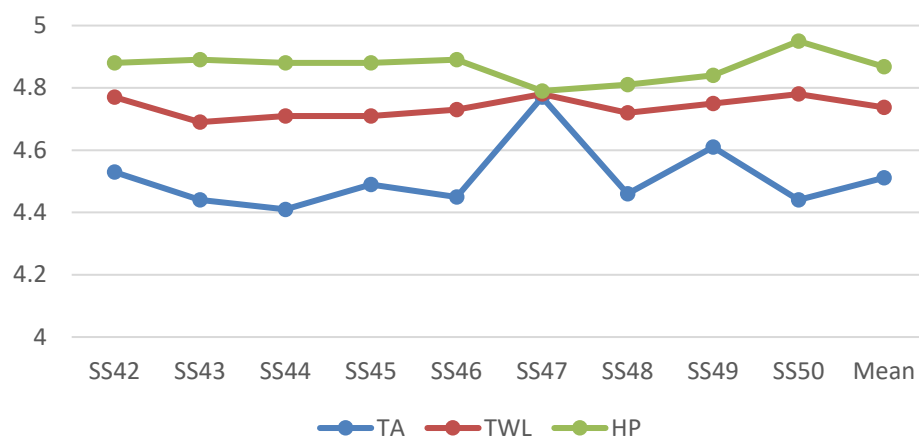
**Figure 3: Students' communication skills**

The *third* core skill (CS3) is teamwork skills. The average scores of 16 specific skills making up teamwork skills are given in Figure 4. This study found that student involvement in TWL, TA, and HP had a very strong effect on the development of teamwork skills. TWL had a very strong effect on the development of nine specific skills, namely, interact with colleagues (SS26), contribute to realizing organizational goals (SS27), plan, decide and carry out activities with the team (SS29), work in a team or group (SS30), respect other people's thoughts and opinions (SS31), mobilize group members (SS35), build partnerships to strengthen performance (SS38), strengthen group consensus for making decisions (SS39), and receive feedback and resolve conflicts (SS41). TA had a significant effect on the development of four specific skills: work in a team in accordance with company culture (SS28), serve as a mentor to others and provide feedback (SS32), lead effectively (SS33), and take on a leadership role (SS34). Three metrics that measured an individual skill to direct oneself at work (SS36), take responsibility for what has been done (SS37), and value other people's input (SS40), were strengthened by HP (see Figure 4).



**Figure 4: Students' teamwork skills**

The *fourth* core skill (CS4) is problem-solving. Figure 5 reports on the development of nine specific skills after students had participated in TWL, TA, and HP activities as part of service-based learning.



**Figure 5: Students' problem-solving skills**

The results are that student participation in TWL, TA, and HP had a significant effect on the development of problem-solving skills, as evidenced by the following nine specific skills: think creatively (SS42), solve problems independently (SS43), test various assumptions (SS44), identify various problems (SS45), read data according to the context or situation (SS46), adapt to new environments (SS47), identify and offer new ideas (SS48), collect, verify, and manage information (SS49), and manage time, money, and other resources (SS50). HP was the most dominant service-based learning model that strengthened problem-solving skills.

The descriptive analysis of this study demonstrates that three service-based learning models – TWL, TA, and HP – were effective in enhancing students' core skills.

However, this study demonstrates that HP and TWL were two service-based learning models that significantly strengthened students' core skills on lifelong learning skills, communication skills, and problem-solving skills (see Figures 2, 3, and 5). Meanwhile, students' teamwork skills were strengthened equally by TWL, TA, and HP (see Figure 4).

#### **4.3. Effectiveness of Service-Based Learning in Strengthening Students' Core Skills**

The third research question in this study is, To what extent does service-based learning help students develop their core skills? This study found that the implementation of service-based learning had a significant effect on strengthening students' core skills: lifelong learning skills, communication skills, teamwork skills, and problem-solving skills. The contribution of implementing service-based learning in strengthening lifelong learning skills, communication skills, teamwork skills, and problem-solving skills was 31,8%, 33,6%, 55%, and 76,3%, respectively (see Table 5).

**Table 5: Tests of between-subjects effects**

Source	Dependent variables	Sum of squares	df	Mean square	F	Sig.
Corrected model	Lifelong learning skills	3.130 <sup>a</sup>	2	1.565	83.825	.000
	Communication skills	2.538 <sup>b</sup>	2	1.269	90.867	.000
	Teamwork skills	9.494 <sup>c</sup>	2	4.747	571.358	.000
	Problem-solving skills	5.422 <sup>d</sup>	2	2.711	218.089	.000

Note. a) R squared = .322 (Adjusted R squared = .318), b) R squared = .340 (Adjusted R squared = .336), c) R squared = .764 (Adjusted R squared = .763), d) R squared = .553 (Adjusted R squared = .550)

Thus, this study found that the overall implementation of service-based learning contributed to the development of teamwork skills, problem-solving skills, communication skills, and lifelong learning skills.

By applying multivariate analysis, four research findings can be reported on by this study: a) HP was the most effective service-based learning model for strengthening lifelong learning skills, followed by TWL and TA; b) HP was the most effective service-based learning model for strengthening communication skills, followed by TWL and TA; c) TWL was the most effective service-based learning model for strengthening teamwork skills. HP and TA are two learning models that have an equivalent influence on enhancing teamwork skills; d) HP was the most effective service-based learning model for strengthening problem-solving skills, followed by TWL and TA (see Table 6).

**Table 6: Multiple comparisons the effectiveness of service-based learning models in strengthening students' core skills**

Dependent variable	Learning model (I)	Learning model (J)	Mean difference (I-J)	Sig.	Conclusion
Lifelong learning skills	TA	TWL	-.1742*	.000	HP > TWL > TA In sequence, the learning models that are most effective in strengthening students' lifelong learning skills are HP, TWL, and TA.
		HP	-.3007*	.000	
	TWL	HP	-.1265*	.000	
Communication skills	TA	TWL	.0583*	.000	HP > TWL > TA In sequence, the learning models that are most effective in strengthening students' communication
		HP	-.2013*	.000	
	TWL	HP	-.2596*	.000	

					skills are HP, TWL, and TA.
Teamwork skills	TA	TWL	-.3335*	.000	TWL > TA ≈ HP TWL is the most effective learning model to strengthen students' teamwork skills. The effectiveness of HP and TA in strengthening students' teamwork skills is equivalent.
		HP	.0117	.484	
	TWL	HP	.3452*	.000	
Problem-solving skills	TA	TWL	-.1944*	.000	HP > TWL > TA In sequence, the learning models that are most effective in strengthening students' problem-solving skills are HP, TWL, and TA.
		HP	-.4173*	.000	
	TWL	HP	-.2229*	.000	

Note. \* The mean difference is significant at the .05 level.

Accordingly, this study found that HP was the best service-based learning paradigm for enhancing communication, problem-solving, and lifelong learning abilities. The best service-based learning paradigm for enhancing collaboration abilities was TWL. Compared to HP and TWL, TA was less effective at fostering lifelong learning, communication, teamwork, and problem-solving abilities.

## 5. Discussion

This study demonstrates that students were likely to participate in learning activities more deeply when service-based learning was implemented. Numerous studies have demonstrated that student learning outcomes improve with increased student involvement in the learning process. This study supports other research that found that service-based learning can increase students' involvement (Mandernach, 2015; Setiawati & Budi, 2018; Yulhendri et al., 2022) and strengthen learning outcomes (Astin, 1999; Krsmanovic, 2022; Liu et al., 2023; Yusof et al., 2020). The study conducted by Krsmanovic (2022) found that student involvement in service-based learning has a positive effect on learning participation, and strengthens various learning experiences and leadership aspects. The study conducted by Yusof et al. (2020) explains that student involvement in real activities has a positive impact on gaining learning experience. Meanwhile, the study conducted by Liu et al. (2023) found that student involvement in learning is the main factor that strengthens student achievement. Therefore, it is necessary to develop various service-based learning models that strengthen students' core skills.

When considered from the perspective of lifelong learning skills, HP, TWL, and TA were three service-based learning models that enhanced students' fundamental abilities. According to other studies (Gregorová et al., 2016; Omar et al., 2022; Su et al., 2014), integrating service-based learning in higher education enhances students' capacity for lifelong learning. The findings of this study are consistent with those findings.

This study revealed that HP, TWL, and TA are three service-based learning models that strengthen students' communication skills. The findings clarify the findings of other research studies, namely, that the implementation of service-based learning models in higher education has a positive effect on communication skills (Ahmad et al., 2022; Gregorová et al., 2016; Snell & Lau, 2020).

According to this study, three service-based learning models that improve students' teamwork skills are TWL, HP, and TA. The results of this study demonstrate how well the three service-based learning models can help students develop their teamwork skills. These results corroborate that of a number of other studies that found that implementing service-based learning models in higher education improves students' ability to operate as a team. Among the soft skills that are likely to increase pupils' competitiveness is teamwork (Abdelaziz & Al-Ali, 2020; Hadiyanto et al., 2021; Trisdiono et al., 2019).

This study identified three service-based learning models—HP, TWL, and TA—that improve students' problem-solving abilities. This result corroborated other research that found that integrating service-based learning into higher education improves students' ability to solve problems (Lenkauskaitė, 2020). Problem-solving skills were among the core skills that enable students to compete in the job market (Gregorová et al., 2016; Omar et al., 2022).

In sequence, the learning models that were most effective in strengthening students' lifelong learning skills, communication skills, and problem-solving skills were HP, TWL, and TA. TWL was the most effective learning model for strengthening students' teamwork skills. The effectiveness of HP and TA in strengthening students' teamwork skills was equivalent.

In principle, HP and TWL are models of project-based learning and active learning (Brame, 2007). Students' learning autonomy affected how well HP and TWL strengthened basic skills (Green & Du Plessis, 2023). It was expected of students to recognize problems, assess them, and come up with solutions. Students were, thus, inspired to be environmentally conscious, critical thinkers, creative thinkers, communicators, and lifelong learners (Al-Busaidi & Al-Seyabi, 2021; Trisdiono et al., 2019).

Other studies demonstrate that students' engagement in service-based learning will cultivate a sense of self-worth and a sense of being valued and needed by others. Students' personal growth was greatly strengthened by service-based learning, particularly in the areas of self-efficacy, self-esteem, and self-confidence

(Stukas et al., 1999; Yusop & Correia, 2013). These various aspects of personal development will strengthen students' core skills, such as lifelong learning, communication skills, teamwork skills, and problem-solving skills. The involvement of students in service-based learning also strengthens students' understanding of their social environment and the diverse character of people with whom they work together. These skills will encourage students to learn new things from their social environment and become more sensitive to social problems.

Service-based learning provides students with real-world experience. Furthermore, service-based learning enables students to develop various skills to prepare them for entering the job market after graduation. At that time, they must be equipped with various skills related to their work. They will work, communicate with many people, and face various problems in the workplace. Therefore, they should be able to solve problems, communicate, and work in teams.

## 6. Conclusion

This study concludes that students' involvement in the three models of service-based learning, namely, TWL, TA, and HP, was at a very high level. These learning models were very effective in strengthening students' core skills.

Students' core skills—lifelong learning skills, communication skills, teamwork skills, and problem-solving skills—were found to be strengthened by the use of TWL, TA, and HP, as learning activity alternatives in higher education. This study discovered a number of particular skills that are components of students' fundamental competencies. It demonstrates how effective service-based learning models can improve communication, problem-solving, and lifelong learning skills—that is, through HP, TWL, and TA, respectively. Furthermore, TWL, in particular, is a service-based learning approach that enhances teamwork skills.

Theoretically, this study shows the importance of strengthening service-based learning in higher education to develop students' core skills in preparation for entering the job market. Practically, developing the four core skills can be done by implementing service-based learning models, which include TWL, TA, and HP.

This research has not discussed in detail students' involvement in service-based learning and their core skills based on gender, academic ability, socioeconomic background, and departmental differences. This was a limitation in this research, so further research is needed.

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## Appendix

Questionnaire statements for students' involvement in service-based learning, lifelong learning skills, communication skills, teamwork skills, and problem-solving skills whose validity and reliability have been confirmed (coefficient numbers in the questionnaire statements are validity coefficients)

### **Students' involvement in service-based learning (reliability coefficient = .809)**

1. I have a high connectedness in my learning (.798)
2. I have a high commitment to carry out my learning (.811)
3. I do my learning assignments in order to achieve the best results (.799)
4. I am intensively involved in my learning (.822)
5. I actively take part in my learning (.819)
6. I am very enthusiastic about learning and actively involved in the classroom (.817)
7. I am very attentive to my learning activities (.788)

### **Lifelong learning (reliability coefficient = .813)**

1. The ability to absorb information from my senses and make connection to the wider world (.789)
2. I apply what I understand in my daily life (.813)
3. I am able to collect, process and use information (.822)
4. I am able to interpret and communicate information (.819)
5. I am able to study independently according to my interests (.799)
6. I am able to use discovery methods to solve a problem (.833)
7. I am responsible for what I have learned and applied (.841)
8. I use my time effectively (.822)
9. I work completely (.838)
10. I determine the best way to complete my tasks (.811)
11. I immediately start, carry out, and complete tasks (.789)
12. I am driven to be a lifelong learner (.798)
13. I adapt to new situations and conditions (.809)
14. I am encouraged to learn independently (.815)
15. I look for the best way to do activities (.788)

### **Communication skills (reliability coefficient = .819)**

1. I am competent in reading the job description (.834)
2. I pay attention to others' interests (.815)
3. I am able to formulate the core of the problem (.822)
4. I am able to listen and communicate my idea effectively (.779)
5. I learned to find wisdom in the problems I faced (.788)
6. I read information, situations and conditions as a basis for making decisions (.799)
7. I am able read, understand, and use information sources (.834)
8. I am able to communicate and understand the societal needs (.829)
9. I use numerical language to explain problems effectively (.833)
10. I am able to articulate my vision clearly (.779)

### **Teamwork skills (reliability coefficient = .815)**

1. I am able to interact with colleagues (.793)
2. I contribute to realizing organizational goals (.801)
3. I am able to work in a team according to work culture (.811)
4. I make a plan, decide and carry out activities with the team (.799)

5. I am able to work in a team or group (.809)
6. I respect other people's thoughts and opinions (.822)
7. I am able to serve as a mentor to others and provide feedback (.816)
8. I am able to lead my team effectively (.829)
9. I am able to take on a leadership role if needed (.833)
10. I am able to mobilize group members for best performance (.827)
11. I am able to direct myself at work (.839)
12. I take responsible for what I have done (.817)
13. I build partnerships to strengthen performance (.779)
14. I strengthen group consensus in decision making (.784)
15. I appreciate others' contributions (.799)
16. I receive feedback, and resolve conflicts (.803)

**Problem-solving skills (reliability coefficient = .827)**

1. I am able to come up with unique and original solutions (.833)
2. I am able to solve problems independently (.837)
3. I use various assumptions to solve problems (.819)
4. I am able to identify various problems (.843)
5. I read data according to the context or situation (.839)
6. I able to adapt to new environments (.799)
7. I able to identify and offer new ideas to complete work (.826)
8. I collect, verify and manage information (.831)
9. I am able to manage time, money and other resources (.837)