Community service as an application of the independent learning – independent campus program to improve the competence of chemical engineering students through collaborative and student project-based learning

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ARTICLE INFO

ABSTRACT

The community service program is one of the Tri Dharma or three obligations of Higher Education conducted by the academic community in Indonesia. A brand-new initiative in education was unveiled by the Ministry of Education, Culture, Research, and Technology, specifically Independent Learning – Independent Campus. Numerous Chemical Engineering – Institut Teknologi Indonesia faculty members and students collaborated with partners to manufacture and diversify cocozone oil as an outcome of downstream research and community service. As part of the 'Independent Learning - Independent Campus' program, community service is examined to determine its effect on student competence development and faculty-student engagement. Furthermore, students are unaware of its cost because it is subsidized by the government, though it highlights the importance of voluntary community work. Similarly, faculty members followed the same trend, though their ratings were higher than the pupils. Student socialization is an important part of their education and learning process. Additionally, community service activities are beneficial to the partner since they cushion them against the economic effect of the COVID-19 pandemic.

1. Introduction

The community service program is one of the Tri Dharma or three responsibilities of Higher Education conducted by the academicians in Indonesia. This initiative aims to enhance the link between academics and the community to solve societal problems. One of the forms of community service is training to strengthen the economy. The service should also include undergraduate students in caring for others by applying what they have learned in lectures. Community training programs for undergraduate students are typically meant to improve the students' academic and personal achievement (Allen et al., 2006; Maton et al., 2009). A social community is a network of people with the same beliefs and offers social support to strengthen resilience to hardship and pleasure with particular accomplishments.

Engineering students are more likely to work in the industrial sector and hardly engage in politics, community service, or non-profit organizations. Students prefer working in the industrial sector since the pay is reasonably secure, allowing them to continue their lives and advance their professions. Consequently, engineering students are more concerned with their specific occupational interests and economic aspirations than with the greater society (Al Malah, 2019; Ruslan et al., 2021; Udeozor et al., 2021). Since engineers should solve societal issues, they receive an education that differs from other programs, such as social awareness and sensitivity, human and natural systems, and technological frameworks as the foundation for their decision-making. They must be instructed to have a positive attitude, serve others truly, and be attentive to social issues (Allen & Eby, 2011; Eby et al., 2007).

Institut Teknologi Indonesia offers Thematic Community Learning, a course intended to provide Engineering students with the skills and information needed to address societal issues based on certain themes. The course teaches engineering undergraduate students to be more aware of and sensitive to the community's needs (Downey et al., 2006). This

activity assists faculty members in carrying out their responsibilities as lecturers, such as community service. The presence of such courses in an engineering curriculum would boost the attraction of engineering as a viable vocation to the general public.

In line with Ministerial Regulation No. 3 of 2020 about National Higher Education Standards (Kemendikbud, 2020), the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia launched a new education program called Merdeka Belajar – Kampus Merdeka or MBKM (Independent Learning – Independent Campus). The program promotes students to learn about information within and outside their study programs on or off-campus. MBKM takes several forms, including (i) school-based teaching, (ii) internships, (iii) rural projects, (iv) student exchanges, (v) research, (vi) entrepreneurship, (vii) independent activities, and (viii) humanitarian projects. The numbers (i), (ii), (iii), (vi), and (viii) are closely associated with community service. Therefore, faculty members and students actively participate in community service activities.

Another approach to this assistance and community service activity is being researched and explored by the Chemical Engineering – Institut Teknologi Indonesia (CE – ITI). It aims to prepare graduates with good knowledge, skills, empathy, and concern for the under-served communities. Furthermore, CE – ITI actively engages partners because it obtained some financing for MBKM. When partners as part of the community want practical answers for their actions, instructors and students may assist in finding a solution. Community service activities assist CE – ITI students understand the ethical, cultural, and technical components of engineering work applied to community development (Jamieson & Shaw, 2020; Glassey, 2019).

One primary goal of this program is to instill in staff members and CE – ITI students a sense of care and importance for community service activities. The curriculum adheres to ABET's existing engineering requirements. ABET specifies that Engineering programs must ensure that their graduates have the broad education necessary to understand the impact of engineering solutions in the global economic, environmental, and societal context. Several conference papers have been presented to promote community service activities to other areas (Reddy et al., 2018; Ruth et al., 2019; Nair & Suryan, 2020; Natarajarathinam et al., 2021). Engineers with high social and cultural awareness are desperately needed to solve the difficulties of sustainable development for businesses and their stakeholders (Baaoum, 2018). The first necessary step in implementing a collaborative learning approach is establishing a group. Students engage in collaborative learning activities to share their knowledge and experience in small groups, where the instructor serves as a facilitator in the learning process (Kirschner, 2001). The learning groups are formal, informal, and collaborative base groups (Goodsell, 1992). Other forms of collaborative learning have become more prevalent in the literature, including interdisciplinary collaboration (Foley, 2016; Dvorkin et al., 2020; Winberg, 2008), a collaboration between two or more settings (Cheng et al., 2021; de Vreede et al., 2021), and international collaboration (Lecorchick et al., 2020; Desha et al., 2020).

This study aimed to examine community service activities conducted by faculty members and CE – ITI students in collaboration with students, members of family welfare development, and also small and medium-sized company. In this case, Averroes is a small-sized company, in the form of a Perusahaan Terbatas (PT.) or a limited company, that produces Cocozone oil through downstream research and community service from CE – ITI faculty members. The company obtains its raw material (virgin coconut oil, VCO) through collaboration with coconut producers. Cocozone oil is virgin coconut oil (VCO) ozonated with particular additions to provide active compounds such as antibacterial and antioxidant agents. Averroes would broaden its product line to improve product sales, with teachers as its supporters in the future. As a result, the CE – ITI faculty and students trained teachers and Averroes created natural soap based on cocozone oil and instructed them to establish selling pricing and marketing. This program aims to benefit all parties involved, including faculty members, students and partners. The engagement of

professors and students in these activities was explored using the Community Service Attitudes Scale (CSAS) created and validated by Shiarella et al., (2000). CSAS has an academic novelty because it has been used for the first time to analyze the attitudes of students and staff members toward community service in chemical engineering education.

2. Method

2.1. Participation of communities and small enterprises

Mondisa and McComb (2015) defined a social community as a setting where like-minded people participate in dynamic multi-directional interactions for social support. Human conduct and decisions in social trade, interaction, and engagement promote multi-directional social relationships with real and intangible costs and rewards (Blau, 1964; Cropanzano and Mitchell, 2005). This social contact helps the academic faculty members and students develop empathy and solidarity with others.

PT Averroes is a collaborator in this activity, which has resulted in a decline in the company's product sales. Sales of cocozone oil have decreased for a variety of reasons. The first is the COVID-19 pandemic, which lowered people's buying power and had macro- and microeconomic consequences. The second is a human resource shortage, which results in suboptimal marketing activities. Thirdly, the produced cocozone oil product remains a liquid, which is unsightly and less functional. As a result of the aforementioned issues, increasing sales necessitates product diversity, which includes cocozone oil as a raw ingredient for natural soap. The training provided by faculty members of CE – ITI would enable PT. Averroes to manufacture and sell natural soap made by family welfare development and instructors, with the proceeds assisting in maintaining their family's economy. Participated in the program were members of family welfare development, teachers of Pamulang Early Childhood Education, At-Taqwa Elementary School, and Assadah Junior High School, as well as PT. Averroes. The members of family welfare development and teachers selected for this training knew the negative economic impact of the COVID-19 epidemic for non-formal sector employees. The women learn skills in natural soap production as a memento for wedding parties or other events, whose sales would be handled by PT Averroes. This is because of PT. Averroes is the primary partner in Community Service activities and is mentored by CE – ITI and Business Incubator ITI academics. It produces and markets Cocozone Oil due to CE – ITI professors' research. Therefore, the interaction and collaboration between CE – ITI faculty members, CE - ITI students, community, and company can run well and continuation would be successful.

2.2. Student recruitment

The CE – ITI students that want to participate in the community service program must select an elective course called Thematic Community Learning worth two credits, where the course was just opened and introduced in mid-2021 as a follow-up to MBKM activities. The data of students enrolled in the course is entered into the institutional database and extracted by the person in charge of community service activities. Six students (fourth-year students or 7th semester) were picked based on the findings of the extract, though this is a small sum because the course is elective and not mandatory. Students in this community service program are requested to assist faculty members in the program's in-guidance and charges at the end of the event. Also, they are needed to fill out a survey to demonstrate their interest in the activity.

2.3. Training procedures and task distribution

Community service starts with the internal preparation of the team responsible for training, comprising lecturers, students, and laboratory assistants. The preparations were planned to lead students and

laboratory assistants throughout delivering materials and conducting the soap-making practical. On December 20–21, 2021, the training activities included a theoretical presentation on the 2nd floor of the Bakrie Building at the Institut Teknologi Indonesia and applying soap-making practices at the CE – ITI Chemistry Laboratory.

The soap manufacturing program was officially launched by ITI's Chancellor, which proceeded with lectures on Cocozone Oil as a Raw Material for Medicine and Cosmetics, Producing Natural Soap from Cocozone Oil, and hands-on experience making soap. Participants completed a pre-test before receiving the theoretical subject to evaluate their comprehension of the contents to be distributed. The second day of instruction focused on The Feasibility Study and Determination of Product Selling Prices, Marketing, and Branding Strategies. The activity's success was evaluated at the start and completion of each training activity, after which the participants took a post-test and completed a questionnaire. Participants contributed throughout the course by submitting questions, comments, and impressions. The CE – ITI Community Service Team assisted after completing the soap manufacturing training session. Mentoring took place at one of the training participants' homes, where numerous members of family welfare development gathered. Participants were to apply the soap-making procedure independently after receiving assistance.

It is critical to know the faculty members and CE – ITI students' roles in carrying out this activity. The faculties are in charge of these activities, with seven members contributing, each with the expertize shown in Table 1. This diverse expertize may complement one another and improve the training materials to be delivered to partners. Moreover, faculty members have specific duties, such as creating surveys, administrative papers, and scientific articles, contacting partners, instructing soap-producing procedures in laboratories, analyzing questionnaire data. The arrangement is based on their experience to reduce mistakes or inaccuracies in task implementation. However, this would build a sense of empathy for the surrounding community. Meanwhile, six students are assigned to various duties. One student served as the event's host, two students aided with the distribution of questionnaires and training materials, and three other students served as liaison officers. All students are entrusted with assisting participants during soap-making trials in the laboratory.

Table 1
List of faculty members, their expertize, and role in community service.

Name	Expertize	Role in Community Service
Dr. Ir. Sri Handayani, M.T.	membrane technology, extraction of natural ingredients	head of community service activities, prepare cooperation documents, guide the event
Dr. Ir. Enjarlis, M.T.	ozone technology	resource persons, establish relationships with partners from small enterprises, assist in guiding the event
Dr. Ir. Ratnawati, M. Sc.Eng	photocatalytic technology	resource persons, prepare cooperation documents, help guide the event
Dr. Ir. Joelianingsih, M.T.	biodiesel technology	prepare supporting documents
Marcelinus Christwardana, S. T., M.T., Ph.D.	electrochemical technology	prepare supporting documents
Dr. Ismojo, S.T., M.T.	material technology	prepare cooperation documents and supporting documents, help guide the event, establish cooperation with partners from the community
Linda Aliffia Yoshi, S. T., M.T.	membrane technology	prepare cooperation documents and supporting documents

2.4. Partner, faculty, and student survey

This program's survey is directed at partners, faculty members, and students, each with a different topic. The survey is divided into scoring and essays. In the scoring questions, respondents pick an answer from 1, the least acceptable, and 5, the most appropriate. In essay questions, respondents answered these questions based on their thoughts and personal experiences from this activity.

The survey for partners covers five major key points, including connectivity, resilience, a community of practice, social capital, and satisfaction. Connectivity is associated with a sense of belonging to a program and the ties formed with participants or faculty members and students. Resilience is related to the seriousness with which partners participate in the program to recover from obstacles or tackle community problems. In this case, a community of practice refers to like-minded people sharing their experiences and social resources. Social capital comprises the resources and advantages accessible due to connections and networks between partners or activity implementors. Satisfaction is associated with pleasant sentiments about the actions undertaken.

The survey for faculty members and students addressed ten factors, including caring, ability, connection, norms, empathy, cost, advantages, seriousness, the need to participate in community service, and desire to participate in service-related learning. Caring is associated with realizing that people need one another because their actions could alleviate problems. Ability is related to the capacity to help and share with others, while the connection is associated with the obligation to be active in a community of people in need. Norms are connected to how people feel a moral desire to help those in need, formed by personal or situational norms. Moreover, empathy is associated with the moral commitment to aid others, while costs are based on evaluating personal assistance to others through the program. The term benefit refers to evaluating the advantages of assisting people in need, while earnestness is associated with seriousness in offering assistance. The desire to participate in community service activities is connected to the goal to be involved, while the desire to join in service-learning concerns the intention to engage in these activities.

2.5. Data acquisition

The survey data was processed using various software, including Microsoft Excel and Origin Pro. The average data (M) is derived from the mean score of the responses, while SD represents the standard deviation of the scoring.

3. Results and discussion

3.1. Partner's survey responses

3.1.1. Community
Fig. 1a depicts the distribution of test results for the participants' training materials, including pre-test and post-test. Both tests were conducted by community partners consisting of school teachers and members of family welfare development. The post-test mean value grew significantly than the pre-test, rising from 59.44 to 90.13 (Fig. 1b). The pre-test score range of 20–100 and an average of 59.44, then on the program's completion, the score rises with the distribution from 60 to 100, with an average of 90.13. Some participants had an initial individual score of 20 and increased to 70, while others had an initial score of 30 and increased to 100. This demonstrates the participants' resilience in participating in the program to acquire knowledge properly. Another factor is their enthusiasm in participating in the program, their bond with lecturers and students, the individual relationship between partners, and satisfaction with the activities.

Fig. 2 illustrates program participants' satisfaction with three evaluation components, including training materials, mentors, and
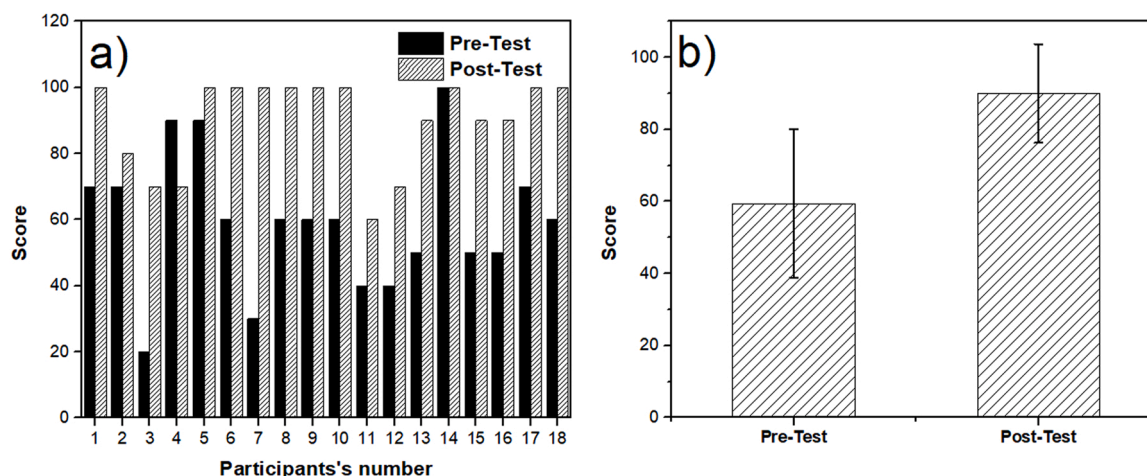
Fig. 1. a) Participants' pre- and post-test score and b) the average score.
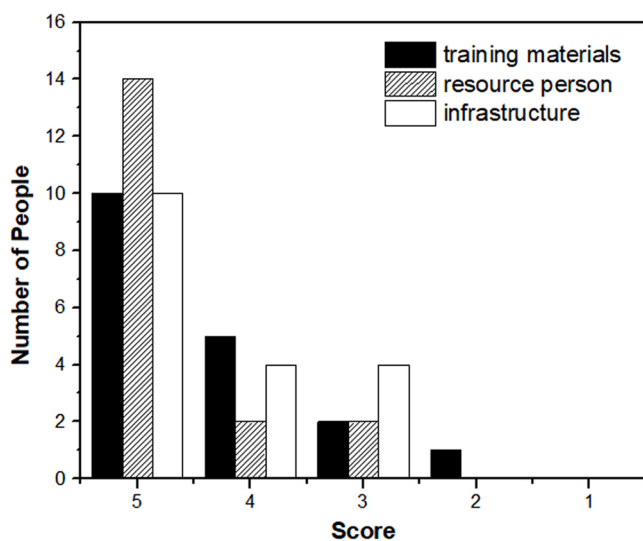

Fig. 2. Participants' satisfaction with training materials, resource people, and infrastructure.

infrastructure. Four questions were asked of the participants, with an average score of 4.64 based on their degree of satisfaction with the training material. Three and four questions were asked on the level of satisfaction with mentors and infrastructure, with an average score of 4.8 and 4.54, respectively. The findings show that the participants rated these three aspects as good to very good. Table S1 contains positive comments and recommendations from community members. Overall, this program has many good effects, such as they believe they receive much knowledge from the material offered, the experience of manufacturing things, and the underlying theory taught for personal growth and promoting interest in entrepreneurship. Participants were glad, eager, and passionate, and they wanted this instruction to be made more obvious. Also, some ideas were beneficial to re-implement this training, prompting the CE – ITI team to devise a long-term mentorship program. According to the survey on satisfaction, there is a strong bond between program participants, faculty members, and students. Partners have a sense of belonging to this program and solve their community problems. Furthermore, participants are a group of like-minded people sharing their experiences and social resources. The good interaction between partners and activity implementers has substantially affected the survey findings, showing that they were pleased, contented, and made many favorable remarks.

3.1.2. Small enterprise

PT. Averroes has several challenges as a Small-Sized Enterprise, making it delighted with the assistant from CE – ITI faculty members that professionally diversify cocozone oil products. It appreciates the assistance provided by the CE – ITI community service team, comprising staff members and students, in natural soap production instruments and website creation. Collaboration and connection between CE – ITI, PT. Averroes, school teachers, and members of family welfare development hopefully would increase in manufacturing, marketing, and selling soap products based on cocozone oil. Furthermore, the challenges faced by PT. Averroes may be resolved via the synergy of the three components and the welfare of associated community member suppliers of goods improve.

3.2. Students' and faculty members' survey responses

3.2.1. Caring

The caring aspect had a score of 4.50 ± 0.55, indicating that the students cared much and wished to share the information learned at the lecture on how to produce soap from natural ingredients with their partners. Faculty members offered students practical information on how to produce soap from natural substances as feedback during the COVID-19 epidemic. Also, care for the field's circumstances is essential for student success in responding to societal challenges.

The caring aspect for faculty members received a score of 4.57 ± 0.53, indicating their wish to help and provide information, skills, and instruments that promote others' economies. The study undertaken by the member is much needed by the community, an indirect expression of sympathy for hardships during the epidemic.

3.2.2. Ability

The score for the ability attribute is 4.67 ± 0.52, meaning that students improve their communication skills when talking with elderly persons politely. They acquire strong coordination, thoroughness and work fast and correctly. Students in this program are given homework that requires speaking in public and is educated to overcome uneasiness when talking with others.

The ability aspect of faculty members obtained a score of 4.71 ± 0.49, indicating that some learn to create soap from their peers and understand the ozone technology. They must communicate effectively since interacting with the community is different from communicating with students. Therefore, the faculty members learn about community concerns through communicating effectively.

3.2.3. Connectedness

The connectedness factor for students received a score of 4.33

$\pm$ 0.82, implying their ability to share their soap-making skills with the community through this initiative. Students gain experiences about what the community requires from older individuals, with whom they share wisdom, forming new connections with the community. Also, there is a sense of connection between students and lecturers and with the community. Students have completed higher education when they are linked to the community or society and gain to link society and the state. Therefore, they demonstrate their knowledge or abilities to the community.

The aspect of connectedness for faculty members obtained a score of 4.57 $\pm$ 0.79. Institut Teknologi Indonesia is in a community environment with various socioeconomic statuses to solve community problems. Faculty members believe they could help people and the environment. Although there is a link between faculty members, the community, activity participants, and extension workers, there is no relationship because the extension period is short. The relationship is restricted to initial contact, though the benefits include a better comprehension of the community's requirements, particularly the information gathered from the academics' survey.

3.2.4. Norm

The norm aspect obtained a score of 4.00 $\pm$ 0.89, indicating that students feel that morality and politeness play a role in this activity. They learn to socialize via effective communication and understand one another. Students' speaking attitudes toward older people become a challenge since they are trained and accustomed to being courteous and kind to elderly people as a representation of 'Eastern Culture.

The norm component of faculty members obtained a score of 4.57 $\pm$ 0.53, indicating that they believe honesty and moral integrity play a part in this program in line with students' feelings. This is because the implementation requires the human conscience's desire to do good and assist others. Politeness standards in dealing with the community guarantee that faculty members may behave according to community regulations.

3.2.5. Empathy

The empathy aspect received a score of 4.17 $\pm$ 0.75, meaning that this program increases students' empathy in addressing social problems represented by the community and Small Enterprises. Students feel that many people around them have different fates, triggering empathy to help those in need.

A score of 4.43 $\pm$ 0.53 was obtained from the empathy aspect by faculty members, implying their attitude to understand the state of society. Many people are unemployed in the current pandemic condition, meaning people need the expertize to obtain entrepreneurial opportunities. Therefore, knowledge is not limited to a few people but is more useful when shared with others.

3.2.6. Cost

The cost element has a score of 1.00 $\pm$ 0.00 since students do not pay for this program themselves. A similar result was reached from faculty members' scores of 1.00 $\pm$ 0.00 because the program was funded by the Ministry of Education, Culture, Research, and Technology. Although the state supports this community service activity, its importance is not diminished.

3.2.7. Advantages

The 'advantages' component has a score of 4.83 $\pm$ 0.41, indicating that students profit from new relations with the community and the capacity to speak before many people. Students' confidence increases along with their academic performance. Those that become masters of ceremonies in the program have additional benefits, such as experience in arranging tasks and individuals. Furthermore, they are better time handlers, learn storytelling, and speak with many new and older people with more life experience.

The advantages element for faculty members received a score of 4.86 $\pm$ 0.38, where they obtained information from surveys by peers. Another benefit of participation in this event is the ability to help the community, including understanding other people, engaging with the community more intimately, and sharing information. Additionally, this program assists faculty members in creating new ideas for future community service events with other partners, expanding contact between CE – ITI and the surrounding communities.

3.2.8. Seriousness

The seriousness feature for students received a score of 4.67 $\pm$ 0.52, implying its importance in this program. This must be performed seriously but with comfort, meaning there should be no stress in transferring the content or carrying out other tasks. Furthermore, seriousness helps effectively express the knowledge to be shared with partners. In contrast, non-serious activities appear to be playing and do not demonstrate empathy for others.

The seriousness score from faculty members is 4.57 $\pm$ 0.79, indicating this program's importance in attaining the targeted activity goals. Faculty members have a full schedule that includes community service activities and administrative and other responsibilities. However, some faculty members are limited by other ongoing tasks and cannot fully participate. This seriousness is required to ensure that the program is developed again in the following activity.

3.2.9. Desire to participate in community service

The 'Desire to Participate in Community Service' factor is 4.50 $\pm$ 0.84, indicating that students acquire new experiences, knowledge, and benefits by participating in such activities. However, due to the number of courses attended, some students consider participating in other activities.

Faculty members' 'Desire to Participate in Community Service' had a score of 4.71 $\pm$ 0.49. The faculty members believe that abdimas activities must be completed every semester because it is one of the academic requirements. Some professors have applied practical studies and feel it necessary to provide community service activities.

3.2.10. Willingness to participate in community learning

The 'Willingness to Participate in Community Learning' Aspect obtained a score of 4.33 $\pm$ 0.82. Students want to learn about the community to exchange views with new people. Furthermore, gaining additional experience from other students piques their interest in community learning. Students prefer direct engagement in community-related activities since they are bored with studying in school. They benefit from a new environment for learning and absorbing new information as they study with the community.

Faculty members received a score of 4.43 $\pm$ 0.79 on the aspect of 'Willingness to Participate in Community Learning.' They are motivated to assist those in need, gain experience as down-streaming studies, and connect academic members to the community near campus. Furthermore, this initiative indirectly contributes to increased public awareness.

3.2.11. Overall

Fig. 3 shows that the survey scores from all aspects by students are not significantly different from those of faculty members. However, faculty members' ratings are slightly higher in most areas because students are still learning and require similar programs to polish their soft and hard skills. Faculty members are regarded as mature enough to be in the application phase, using their knowledge to benefit the community.

3.3. The impact of MBKM activities on community service in the framework of collaborative learning

Eight forms of learning outside of study programs in the MBKM program were launched by the Ministry of Education, Culture, Research,
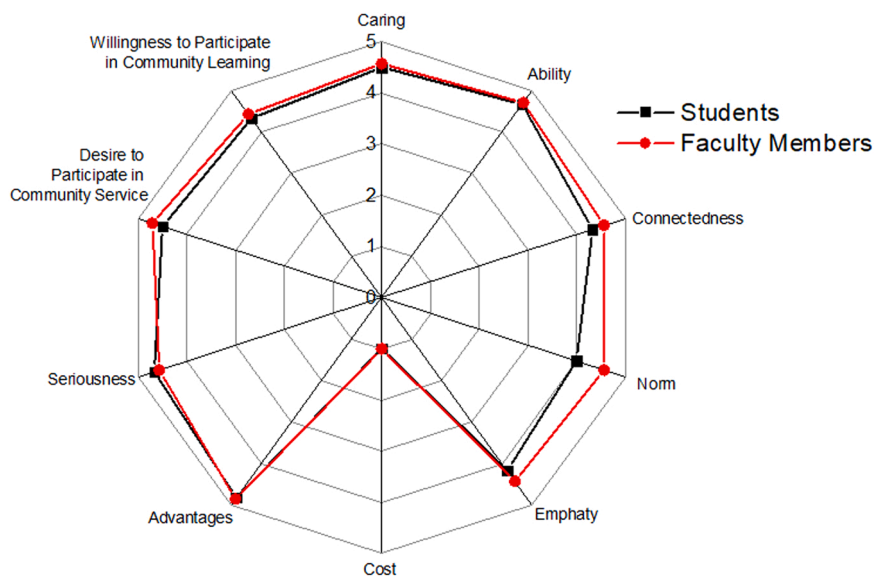
Fig. 3. Overall result of 10 aspects from survey by students and faculty members.

and Technology. Subsequently, this program is very good because it is a down-streaming of faculty members' surveys assisted by students. Consequently, the students and the community would be commercialized and help the emergence of start-up businesses, Micro, Small, or Medium Enterprises, improving the community's economy. Furthermore, this program is in line with the MBKM program in terms of lecturers' and students' surveys to be commercialized, students' instructional aid to the community, and the formation of entrepreneurial activities by the community and students. The program includes academic faculty members, students, and the community and is a collaborative learning experience that develops skills and a sense of community. Collaborative skills are required by society regardless of distinctions and may also increase student skills to the community based on current challenges. In this case, the participation of lecturers and students in the community service program demonstrates collaborative learning, making it simpler to address problems. Students completed the learning goals, while the community service fostered a supportive learning atmosphere. Stump et al. (2011) discovered a substantial relationship between active collaborative learning and university involvement. In comparison to the conventional way, collaborative learning significantly increased respect, self-awareness, self-evaluation, communication skills, responsibility, motivation, and learning scores (Hasanpour-Dehkordi & Solati, 2016). Cooperative learning strategies and case studies influenced students' problem-solving and decision-making abilities (Burkholder et al., 2021).

4. Conclusion

This aimed to determine the effect of community service activities as part of the Independent Learning - Independent Campus program on developing student competency via collaborative learning and the interaction between faculty members with partners. The students demonstrated a strong sense of caring, ability, connectedness, norms, empathy, advantages, seriousness, and a willingness to engage in community service and service-related learning. They are unaware of the cost since this activity is funded entirely by government funding, though this does not negate the significance of community service. Furthermore, faculty members had a similar pattern, although their scores were higher than those of the students. This is normal because students are still in the 'learning' stage of their education, which includes information on social life in society. From the partner's perspective, community service activities are very advantageous because they help escape the economic

slump caused by COVID-19. Partners are overjoyed because this coaching session marks the beginning of the university's connection with the community or society. Therefore, community service activities create educational opportunities for students to confront and resolve difficulties collaboratively. This is consistent with the collaborative learning notion, implying the need for higher education to establish critical abilities to foster collaborative learning among students. Collaborative learning is critical in resolving the issue of students participating in activities and not prioritizing their ego to enhance their knowledge, skills, and competencies. Since the Thematic Community Learning course was opened and offered in mid-2021, shortly after MBKM was launched, students are unfamiliar with it. This results in less effective collaborative learning amongst students who attend this event, despite the fact that collaborative learning between students, lecturers, and the community is generally successful. At a least, the first six students who participate in thematic community learning serve as a benchmark and may serve as a model for junior students interested in participating in the program the upcoming semester. It is expected that the number of students enrolled in thematic community learning courses will rise in the next semester, allowing for effective collaborative learning amongst students.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ece.2022.03.002.

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