Strengthening the competence of teacher training graduates through international collaboration e-mobility program

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Abstract

In the 21st century, prospective teachers must think critically, communicate, collaborate, be creative, and use digital technology. However, many prospective teachers still who do not have these abilities. This study aims to analyze the strengthening of competencies of teacher graduates through the e-mobility international collaboration program and the results obtained by participants. This research uses a post-phenomenological paradigm with an interdisciplinary sociological approach. The subjects of this study were deans, directors of international class programs, participants and managers of the e-mobility program. Data were collected through interviews, focus group discussions, observations, and document studies. Data analysis was conducted using the thematic model. Data validity checks were carried out through triangulation of techniques and sources. The results showed that strengthening teacher competencies was effectively carried out through the international collaboration of the e-mobility program. The e-mobility program learning activities are carried out through online lectures. International e-mobility collaboration provides international experience to participants, improving their understanding of learning materials, pedagogic skills, and information technology skills. The e-mobility participants' competencies are acquired mainly through indirect learning. The findings of this study contribute to teacher education institutions to strengthen 21st-century teacher competencies through international collaboration.

Contents

Contribution of this paper to the literature
The results of this study show that the indirect learning impact is found in cognitive, affective and psychomotor aspects, namely critical thinking, improved foreign language skills, cooperation, discipline, hard work, recognition of other people's cultures, mastery of information technology, and creativity. The impact of indirect learning can strengthen the competence of prospective teachers.

1. Introduction

In the 21st century, teachers are required to have personal, professional, social, and relational pedagogical competencies (Wahlgren, Mariager-Anderson, & Sørensen, 2016) and entrepreneurship (Huang, An, Liu, Zhuo, & Wang, 2020). Teachers are also required to have the ability to think critically, collaborate, communicate, be creative and innovative, master information technology, have skills in career life, and problem-solving (Almazroa & Alotaibi, 2023).

Teacher education institutions have made efforts to create competent teachers through pre-service training and in-service training programs. The pre-service training program is intended to prepare professional and transformative educators. Meanwhile, the in-service training education program is intended to update the knowledge and skills of teachers so that they can adapt to the demands of current developments (Yolcu & Kartal, 2017).

The pre-service training education program is carried out through classical lectures on campus to strengthen pedagogical and professional competencies and mastery of technology (Almazroa & Alotaibi, 2023) while the in-service training program takes the form of blended learning training, workshops, clinical assistance (Romijn, Slot, & Leseman, 2021) online courses and collaborative research (Yolcu & Kartal, 2017). Pre-service and in-service training programs can improve participants' social and emotional abilities, attitudes, and academic competence (Hsu & Lin, 2020; Murano et al., 2019).

However, traditional teacher education patterns through pre-training and in-service training are still considered less effective and need to be evaluated (Yolcu & Kartal, 2017). As a result, teachers lack adequate abilities to face work challenges in the 21st century such as mastering information technology, global communication, and understanding the culture of international society (Almazroa & Alotaibi, 2023). Currently, teachers are faced with the challenge of stress at work, (Camacho & Parham, 2019), lack of support for facilities and multimedia, low development of teaching materials and minimal ongoing training (Siddiquei & Kathpal, 2021), International cooperation between educational institutions and other agencies is also still minimal, sometimes limited by bilateral problems between the two countries (Hameed et al., 2022). The lack of cooperation between teacher education institutions and international institutions limits the exchange of knowledge and expertise that is very necessary to overcome global challenges in the field of education (Carattini, Fankhauser, Gao, Gennaioli, & Panzarasa, 2023). The World Bank emphasizes the need to improve the quality of pre-service teacher education and in-service training (Selected Drivers of Education Quality, 2019).

Teacher development in Indonesia from 1970 to 2000 was carried out through tiered education, training, workshops, seminars and teacher working groups centered in teacher education institutions (Revina, Pramana, Bjork, & Suryadarma, 2023). Furthermore, teacher development in Indonesia is also carried out through the Teacher Professional Development (TPD) program, but this program also has not had a significant impact on teacher performance in Indonesia (Lim, Juliana, & Liang, 2020). Some of the reasons for the lack of success of the TPD program are the background, relevance of training materials and activities, teacher competence, teacher motivation and response, and follow-up (Revina et al., 2023). Another factor that causes poor teacher quality in Indonesia is poor teacher management in Indonesia (Rosser & Fahmi, 2018).

Teacher education institutions can develop international collaborations with other institutions to overcome these challenges. A good pre-service training program is through collaboration with other parties and in-service teachers (Kervinen et al., 2022; López-López, Lucio-Arias, Díaz-Nova, & Silva, 2023). International cooperation in the field of education can address the problem of teacher shortages, expand access to education, increase teacher knowledge and skills in line with international standards, help build education systems, promote student-oriented teaching approaches, and inspire changes in school culture, enabling countries to learn from the experiences and successes of each other country, improve its education system and achieve (Roshid & Seraj, 2023).

One form of international cooperation between teacher education institutions is student mobility. Collaborative international mobility provides students with international experience, expanding and improving their knowledge and skills (Ortiz-Marcos et al., 2020; Shayery et al., 2022). Student mobility also provides networking opportunities and an exchange of expertise and experience to collaborate with other institutions, sharing knowledge and skills of scientists more quickly compared to non-mobility scientists (Aman, 2020). The student mobility program can expand views, knowledge, teaching and research methods and work practices in the field, develop transversal skills such as communication, language, critical thinking skills on intercultural issues, and research skills (Berlinski, Busso, & Giannola, 2023; Martin-Beltrán, Durham, & Cataneo, 2023; Tran & Bui, 2023). Student mobility can increase motivation and drive future social change (De La Torre, Perez-Encinas, & Gomez-Mediavilla, 2022). International mobility can improve the ability to write in international journals (Alonaizan et al., 2023). Although international e-mobility collaboration still has weaknesses (Rostovskaya, Maksimova, Mekeko, & Fomina, 2020), the advantages still outweigh the disadvantages.

Barja-Ore, Liñan-Bermudez, and Mayta-Tovalino (2023) research results show that the scientific international collaborative literature on virtual reality applied to medical education is increasing (Barja-Ore et al., 2023). Gaidukevich (2022) research on teacher training places more emphasis on strengthening learning methodologies (Gaidukevich, 2022). Online international collaboration studies were carried out in the property and petroleum fields (Durand & Balhasan, 2023). International mobility collaboration is carried out in the field of student research (Müller, Cowan, & Barnard, 2023). International mobility collaboration is carried out to strengthen language skills (Salim & Alnoori, 2021) and research on the impact of international collaboration on the psychological aspects of participants (López-López et al., 2023). The results of 96 research show that student mobility has an impact on

strengthening international networks (47 research), scientific productivity (34 research), occupational situation (26 research), scientific impact (23 research), competence and personality (13 research), scientific knowledge (13 research), research infrastructure and funds (8 research) and symbolic capital (8 research) (Netz, Hampel, & Aman, 2020).

The Erasmus mobility program has an impact on students' professional and scientific development, students' personalities, their social life and other aspects of student life such as eating habits, spending free time, planning future careers and planning family life (Dolga, Filipescu, Popescu-Mitroi, & Mazilescu, 2015). However, exchange programs for employees or teachers can delay promotions and interfere with teaching assignments (Ryazanova & McNamara, 2019).

Some of this research examines international collaboration in the fields of medicine, engineering, psychology, property, and petroleum. There are studies on international collaboration in the field of education, namely in the fields of language, research, and strengthening learning methodologies. Meanwhile, studies regarding strengthening the overall competency of prospective teachers through international e-mobility collaboration have not yet been found. This paper examines strengthening the competency of prospective teachers through international e-mobility collaboration which has not been carried out so far. The research questions in this article are as follows: a) How to strengthen teacher competency through the e-mobility program? What is the learning method? What is the learning material? b) What teacher competencies do participants gain after participating in the e-mobility program? What teacher knowledge, attitudes and skills are acquired? The results of this research are very useful for teacher education providers to produce graduates who have abilities that meet the demands of the 21st century.

1.1. Significance of the Research

The competence of teachers in Indonesia is still low (Mufanti, Carter, & England, 2024; Yusri, Mantasiah, & Anwar, 2023) so there is still a need for continuous efforts to improve the competence of teachers (Hidayat, Basthomi, & Afrilyasanti, 2024). One of the efforts to improve the competence of teachers is through pre-service training (Pollmeier, Kleickmann, Zimmermann, Möller, & Köller, 2024). Pre-service training learners are still in their productive years, have plenty of free time, and are not yet busy with family and community affairs. In-service teacher training has been less effective (Hsu, Lai, & Chen, 2024; Zhang, Zhou, Wu, & Cheung, 2024).

Online learning makes it easy for participants to follow because online learning is very flexible (Müller & Mildenberger, 2021), efficient (Eom, Lee, & Kwon, 2024), fun (Carpenter et al., 2024) and can improve participants' digital technology skills (Imjai, Aujirapongpan, & Yaacob, 2024).

International collaboration is essential for learning in today's globalized world (Rotundo et al., 2022) for the participants to have a wider social network, improve collaboration skills (Issa & Hall, 2024; Nafari, Honig, & Siqueira, 2024) and understand the culture of other countries (Kwak & Chankseliani, 2024).

2. Literature Review

2.1. Teacher Competencies

Teacher competence is the knowledge, attitudes, and skills that teachers must have with learning, namely how to learn well, learning materials, utilization of learning tools, learning media, understanding of students, and assessment (Alan & Güven, 2022; Alfalah, 2023). In the Republic of Indonesia law number 14 of 2005 concerning teachers and lecturers, chapter IV article 10 states that there are four types of teacher competence, namely personal, social, pedagogical, and professional competence.

Teacher personality competence is a teacher's performance that is shown by a good personality, being strong, friendly, emotionally stable, open-minded, and having a higher level of intercultural sensitivity (Aksin, 2023). Teachers' social competence is demonstrated by their ability to interact and communicate effectively with students, parents, coworkers, and the community (Eddy et al., 2024). Teachers' pedagogical competence is shown by the ability to have a deep understanding of learning, how to teach effectively, manage classes, develop learning media, manage diverse learners, and manage an effective learning environment (Vîşcu, Cădariu, & Watkins, 2023). Meanwhile, teachers' professional competence is shown by mastering the subject matter taught, organizing learning materials, utilizing information technology in learning, understanding the structure of the curriculum, and improving the quality of learning with classroom action (Kristiawan, 2020).

Industrial era 4.0 marks a new era of transformation in education with the utilization of various advanced technologies, Internet of Things (IoT), Artificial Intelligence (AI), and blended learning. This 4.0 revolution brings benefits and increases productivity in the field of education and learning. On the other hand, teachers are required to have adequate digital information technology skills (Abulibdeh, Zaidan, & Abulibdeh, 2024).

Information technology and digital competency is a key additional competency so that teachers can meet the learning needs of today's learners (Wang, 2022; Zhang et al., 2024) and prepare the next generation to use digital technology in their lives (Instefjord & Munthe, 2016).

Digital competence is the teacher's ability to understand software and hardware in the field of information technology, operate it, understand the impact of using digital information technology on the behavior of students (Tomczyk, 2024), critical, creative, responsible and meaningful for the lives of learners and their environment (Galindo-Domínguez, Delgado, Campo, & Losada, 2024; Lucas, Bem-Haja, Siddiq, Moreira, & Redecker, 2021), pay attention to legal aspects, ethics, privacy, security and appreciation of the positive role of digital technology in life (Chiu et al., 2024). Teacher abilities that include knowledge, attitudes, skills, and digital literacy are summarized in the term Technological Pedagogical and Content Knowledge (TPACK) developed by Mishra and Koehler (Nguyen, Mouw, Mali, Strijbos, & Korpershoek, 2024).

3. Research Methods

3.1. Research Design

This research uses the post-phenomenological paradigm with an interdisciplinary sociological approach. The post-phenomenological paradigm views that individuals today have merged with technology so that technology

becomes a mediator between humans and their world (Shaw, Hughes, Hinder, Carolan, & Greenhalgh, 2020). The interdisciplinary sociology approach uses various perspectives from the social field, including economics, social strata, culture, religion, ethnicity, and nation. This research is divided into the following four stages: the preparation stage, the data collection stage at the Faculty of Tarbiyah and Teaching Science Salatiga State Islamic University, the data collection stage at University Malaysia Sabah, and the analysis stage. In the preparation stage, the research instruments were prepared by the research team and research assistants who included interview guidelines, materials for focus group discussions, observation guidelines, and document study guidelines. After the data collection instrument was compiled, it was validated by linguists and education experts, then the instrument was improved on the advice of expert validators. The second stage was data collection at the Faculty of Tarbiyah and Teaching Science of Salatiga State Islamic University through interviews, observations, focus group discussions, and document studies. The third stage is data collection at the University Malaysia Sabah through interviews, focus group discussions, document studies, and observations. Before collecting data at the University Malaysia Sabah, it begins with obtaining a foreign travel permit. The fourth stage is the data analysis stage, namely reducing, displaying data, and drawing conclusions. The stage of checking the validity of the data is carried out at this stage.

3.2. Research Subject

The research subjects used as informants are the e-mobility managers of the Faculty of Tarbiyah and Teaching Science Salatiga State Islamic University, namely the dean of the Faculty of Tarbiyah and Teaching Science Salatiga State Islamic University, deputy dean for cooperation, director of international class special programs, e-mobility participants and e-mobility program managers at the University of Malaysia Sabah, namely the director of international relations cooperation, lecturers, and staff. The selection of research subjects was carried out through a purposive sample, namely respondents who were considered to have information related to the implementation of the international collaboration e-mobility program. The respondents had expressed their willingness to be used as research informants and were willing to provide the information needed by the researcher before the data collection process was carried out. The condition of the research respondents can be seen in Table 1.

Table 1. Research subject.

Respondents	Amount
Dean of teacher training faculty	1
Deputy dean for cooperation	1
The director of special international class programs	1
E-mobility program participants	73
E-mobility program manager	5
Amount	81

Participants of the international e-mobility program consisted of students from the education, science, and mathematics study programs. They attended lectures at the Faculty of Psychology and Education, Faculty of Science and Natural Resources, and Faculty of Computing and Informatics. The distribution of international e-mobility participants and the distribution in the faculty with the courses followed are as follows:

Table 2. Distribution of international e-mobility participants in faculties and courses attended.

Origin of participants	Faculty attended	Course name	Amount
English education	Faculty of psychology and education	• Teaching of listening and speaking • Teaching and reading skills • Approaches to language teaching • The social context of language learning • Comparative literature • Literature in English • Introduction to morphology	43
Natural science education program	Faculty of science and natural resources	• Laboratory safety and Accreditation • Forensic chemistry • Material development • Biophysical chemistry • Immunology • Virology • Early science and technology for children • Modern physics	17
Mathematics education program	Faculty of computing and informatics	• Software quality and testing • Computer graphics • Mathematical method in physics	13

Source: International classes faculty of Tarbiyah and teaching science, State Islamic University Salatiga manager.

According to the distribution of participants in Table 2, the most participants were students from the English language study program (58.9%), the Science Education study program (23.2%), and the Mathematics Education

study program (17.8%) because students from the Education program already have better language skills than students from other study programs, so they can easily communicate in international forums and have high self-confidence.

3.3. Data Collection and Validity Check

Data were collected through interviews, focus group discussions, observations, and document studies. Interviews with the dean, vice dean for cooperation, director of the international class special program, and manager of the e-mobility program were conducted directly and structured to find out the e-mobility program policy. Before the interview, interview instruments were prepared in the form of interview guidelines that had been validated by language experts and education experts. Interviews, focus group discussions, and document studies were conducted with e-mobility program participants to obtain detailed information about the activities and results obtained by participants after the activity. Focus group discussions were conducted with mobility program managers at the University of Malaysia Sabah to obtain information regarding the management and implementation of the e-mobility student program. Document studies were conducted on the results of e-mobility participants' studies to determine the effectiveness of the program and the MoU between the two parties. Observations were made of learning facilities at the University of Malaysia Sabah, and the process of implementing e-mobility student learning. Data validity checks were carried out during data collection through source and technique triangulation. Source triangulation is done by comparing data obtained from one informant to another, both internal and external informants while technical triangulation is done by comparing information from interviews with the results of observations and the results of document studies available at both institutions.

3.4. Data Analysis

Data analysis was done through thematic analysis (AlMashaan & AlMaian, 2024) which consists of data reduction, data display, and conclusion drawing stages. The data reduction stage is carried out by selecting the necessary information according to the research theme and discarding unnecessary data. The data display stage is carried out by systematically describing the research information in the research report by the order of the research focus. The conclusion-drawing stage is done by summarizing the research findings by the research focus. When analyzing data, checking the truth of research information is also carried out by comparing data from one informant with other informants, comparing interview results, observation results, document study results, and focus group discussion results. In this way, valid information will be obtained.

3.5. Research Ethics

This research involves humans as research subjects, so research ethics need to be maintained. The researcher has asked for the informants' willingness to be used as research subjects and is willing to provide actual information about the international collaboration e-mobility program. In presenting the research results, the researcher describes the actual information based on the information from the research respondents. Researchers maintain the confidentiality of informants' identities to ensure the security and integrity of the information submitted. The researcher submitted the results of the interview notes, observations, and focus group discussions to the respondents to check the accuracy of the information. The results of this study were also examined by the Research Ethics Commission at Salatiga State Islamic University to ensure that the information submitted was valid and did not harm other parties (B-0030/Un.29/L1/PN.03.1/01/2025). The results of this research have also been presented, examined, and approved by the international organizer of the collaborative e-mobility program, namely the University Malaysia Sabah (UMS UMS/PPPG.1.2.2/600-3/18/30).

4. Results

4.1. Implementation of Activities

Based on interviews with lecturers and managers of the student mobility program at University Malaysia Sabah (12/02/2024), it was found that e-mobility student activities at University Malaysia Sabah were carried out as regular lectures, assignments, active debate, and practicum. Participants are allowed to take two courses with a weight of 4 credits carried out in two weekly meetings. Inter-faculty debate activities are carried out incidentally, and each participant can join online classes. At the same time, the practicum is carried out mainly for science subjects (bio-physical chemistry) and is equivalent to regular lecture hours. Assignments are given to deepen and broaden the understanding of course material.

The observations (12/02/2024) show that lectures are held online using the Google Meet or conference application. Focus group discussion with e-mobility program participants (22/02/2024) obtained information that for group projects, project-based websites are used such as Google meetings, Google Docs, Google presentations, WeBex, Telegram platform, Project Canva, Quiz, Padlet, and Menti.com. For independent projects, participants are assigned to create a narrative related to a problem and then upload it on the website. Problem-based learning and project-based learning approaches are used in the learning e-mobility program at the University of Malaysia Sabah. Before the lecture, lecturers send teaching materials, such as e-books, PowerPoint presentations, or video links, to be studied in advance. There are several types of assignments, such as quizzes, midterm or end-of-semester exam assignments and other assignments such as interpretation of literary works, making videos, reading poetry, and role-playing in a drama.

The lecture material is directed at strengthening cognitive, affective, and psychomotor aspects. Participants receive deepening material from the chosen course for strengthening cognitive aspects. For example, teaching reading skills, biophysical chemistry, approaches to language teaching, comparative literature, forensic chemistry, introduction to morphology, philology, and others. Participants felt that they were getting more in-depth material. Course materials to strengthen affective and psychomotor aspects are obtained through lectures and presentations. In lectures, participants interact with other participants from various countries. They must be able to communicate, tolerate, cooperate, and respect others. When presenting, participants must focus along with gestures and use interactive communication with the audience. Presentation media, ability to explain, and

timeliness are also assessed in the presentation. Learning evaluation is carried out during and after the learning process. The aim is to ensure that participants are active in learning and understand the material presented by the teacher (focus group discussion, 22/02/2024).

4.2. Competencies Obtained by E-Mobility Program Participants

Information was obtained by e-mobility program participants including cognitive learning, experience, social, personality, cross-cultural understanding, soft skills, and psychomotor through interviews and focus group discussion (22/02/2024). Various abilities can be seen in Table 3.

Table 3. Skills acquired by the Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga's students after participating in the e-mobility program at the University of Malaysia Sabah.

No	Ability	Description	Category
1	Gain learning experience.	Knowing how to study well, knowing creative and fun learning, valuing and dividing time for learning.	Learning experience
2	Improve English language skills.	Improve speaking, listening, and writing skills in English.	Cognitive
3	Increase friendships both from Indonesia and friends from other countries.	Friends from Malaysia, China, Iran, Thailand, Cambodia, and Vietnam, who are friendly, kind, and cooperative.	Social
4	Shaping a better person.	Discipline, responsibility, helping, cooperation, respect, and appreciation of others.	Personality
5	Add cultural insights from other countries.	Understand the culture of other countries, respect each other.	Cross-cultural understanding
6	Improving soft skills.	Critical thinking, creativity and communication	Soft skill
7	Improving capabilities in information technology.	Mastery of presentation media, mastery of online learning media.	Psychomotor
8	Improve work accuracy.	Thoroughness in compiling material and thoroughness in making presentation media	Psychomotor

Meanwhile, the results of the final assessment of international e-mobility participants in the academic field are as follows:

Table 4. Final results of international mobility student participants from Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga and University Malaysia Sabah.

Score	Frequency	Category
4.0	5	Passed
3.8	8	Passed
3.5	6	Passed
3.3	12	Passed
3.2	11	Passed
3.1	9	Passed
3.0	8	Passed
2.8	6	Passed
2.6	1	Passed
2.3	2	Passed
2.0	3	Passed
1.8	2	Not pass
Amount	73	

Source: Study results document of e-mobility student participants.

Table 4 shows that the participants who passed the e-mobility international collaboration program were 71 students (97.2%) while the participants who did not pass were 2 students (2.7%).

5. Discussion

5.1. Implementation of Activities

Student e-mobility activities are carried out in the form of regular lectures, assignments, active debates, and practicums. This activity is carried out like lectures at the home campus; the difference lies in the lecturer and curriculum.

International student mobility activities in the form of lectures, assignments, active debates and practicums can help students strengthen their competencies. Regular lectures can develop cognitive aspects as long as teachers pay attention to students' cognitive load, strengthen intrinsic motivation, organize material from simple to complex, and update current material (Jordan et al., 2020).

Assignments can broaden and deepen understanding of teaching material, improve writing and research skills, increase learning motivation, and expand sources of knowledge (Spitzer, Moeller, & Musslick, 2023). Active debate and discussion with peers can develop communication skills, language, tolerance, and courage (Almazroa & Alotaibi, 2023) while practicum can deepen students' understanding of the teaching material they have studied, help apply teaching material in the practical world, strengthen students' social ties, improve skills, build self-confidence and motivation, and develop expertise (Grant, 2022). These various learning activities significantly improve the competence of the Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga's international e-mobility students at the University Malaysia Sabah in the cognitive, affective, and psychomotor fields.

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The faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga's international student mobility program with University Malaysia Sabah is conducted online with advantages and disadvantages. Both parties can improve their abilities in information technology and various learning applications such as Google Meetings, Google Docs, Google Presentations, WeBex, Telegram platforms, Project Canva, Quiz, Padlet, and Menti.com and higher access to multimedia applications (Basar, Mansor, Jamaludin, & Alias, 2021).

Online learning can improve the pedagogical skills of participants, facilitate the search for learning resources, more flexible time duration and learning evaluation, increase learning motivation (Ho et al., 2023), efficient (Heap, Thompson, & Fein, 2021) and many educational institutions already have the infrastructure to support online learning (Ho et al., 2023; Martin, Budhrani, & Wang, 2019).

The convenience of online learning has resulted in a rapid increase in the number of mobility students at Salatiga State Islamic University compared to the previous year when offline learning was used. Offline learning is less flexible and requires high costs. The increase in the number of mobility student participants at Salatiga State Islamic University is given in Figure 1.
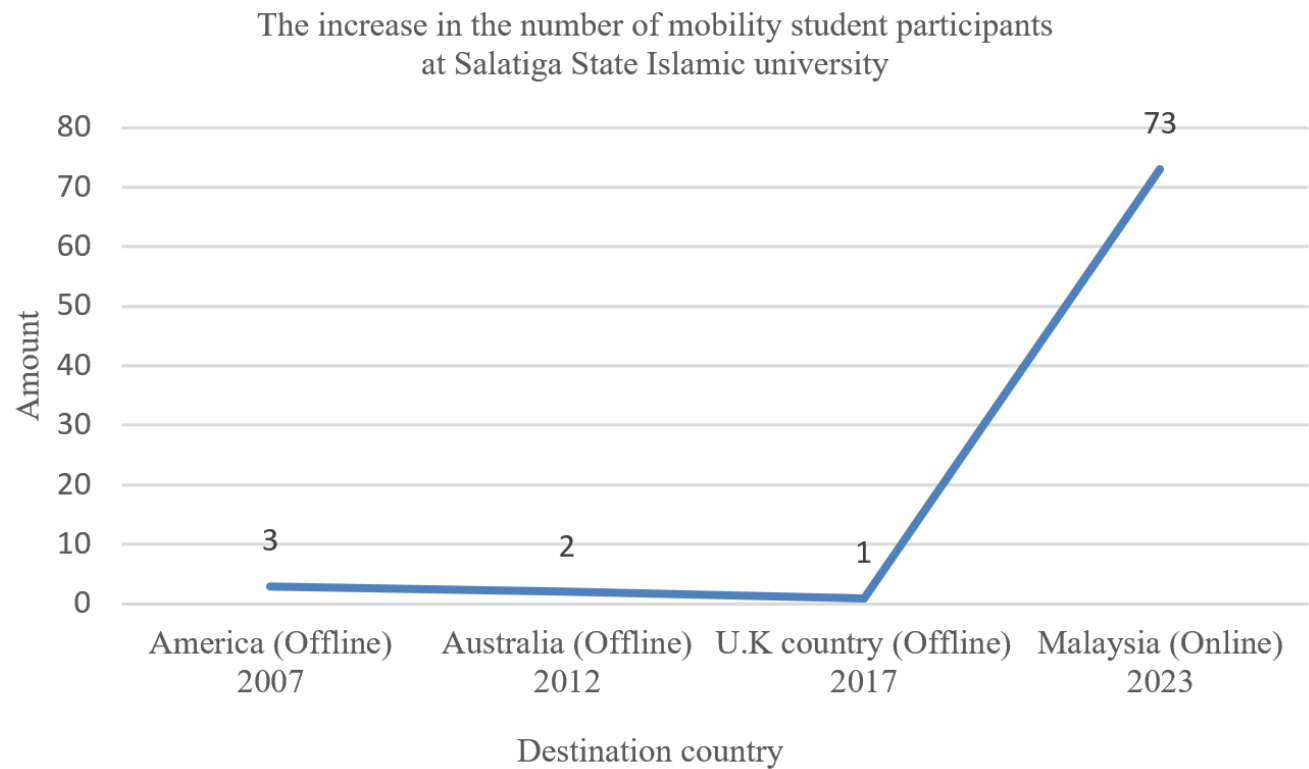
Figure 1. The situation of student mobility participants at the Salatiga State Islamic University.
Source: Documents of Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga.

According to Figure 1, there is a significant difference between online student exchanges and offline student exchanges. When the exchange was conducted offline, the participation of participants decreased from 3 (2007) to 2 (2012) and down to only 1 (2017) while after the exchange was conducted online, there was a significant increase to 73 students (2023).

On the other hand, online learning also has delimitation including teachers and students not meeting directly in one forum, not being able to accommodate students who have weaknesses in access to technology, students who are geographically isolated having difficulty in accessing, focusing more on theoretical knowledge, and less on developing practical skills (Basar et al., 2021). This weakness is not found in the e-mobility student program between the Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga, and University Malaysia Sabah. Meeting in an online forum through video conferencing on camera allows participants to interact face-to-face. All participants have good access to information technology, and the course practicum is conducted online through video conference on camera so that all participants can see the practicum directly. The lecturer can also directly see the students' condition during the learning process.

Problem-based and project-based learning approaches in lectures encourage learners to develop critical thinking, problem-solving, and communication skills, work together, and find and evaluate learning materials (Umar & Ko, 2022). In problem-based and project-based learning, learners are invited to identify various social problems and create problem-solving projects. Lecture assignments in literary interpretation, role-playing, and video-making encourage learners to develop imagination, creativity, innovation, and collaboration. Participants must be able to present material in front of the audience and present a good presentation with good gestures. This encourages students to master the material in depth, make the best presentation media, and display perfect self-expression. Through paper presentations, international mobility students can also understand the culture of each participant from various countries.

Learning materials must reinforce the following three aspects: cognitive, affective, and psychomotor. Participants gain more profound knowledge because one of the benefits of e-mobility students is knowledge sharing (Aman, 2020). This situation can occur because the different curricula adopted by each university are different and complementary. That is the real benefit of mobility student participants in deepening the material. In addition, interactions between participants from various academic, social, ethnic, and racial backgrounds allow participants to develop international networks, gain social and cultural experiences, and build tolerance. As in social cognitive theory, individual interactions can develop knowledge, attitudes, and skills. Meanwhile, learning evaluation is carried out at the end of learning to determine the active involvement of international mobility

student participants and the effectiveness of learning activities. This method encourages the strengthening of the discipline and activeness of participants through e-mobility program activities.

5.2. Skills Acquired

The abilities of e-mobility student international collaboration participants can be grouped into academic and non-academic skills obtained through direct and indirect learning.

5.2.1. Academic Ability

Mobility student participants obtain cognitive academic skills through various lecture activities. The final learning results are outlined in the transcript of grades issued by the University Malaysia Sabah. The graduation data shows that the pass rate of e-mobility student collaboration participants is 98.6% (71 participants) while failed participants were 1.4%. According to the information obtained from the participants, the participant who did not pass the exam was sick. The results of the final academic competency test for e-mobility student participants are shown in Figure 2.
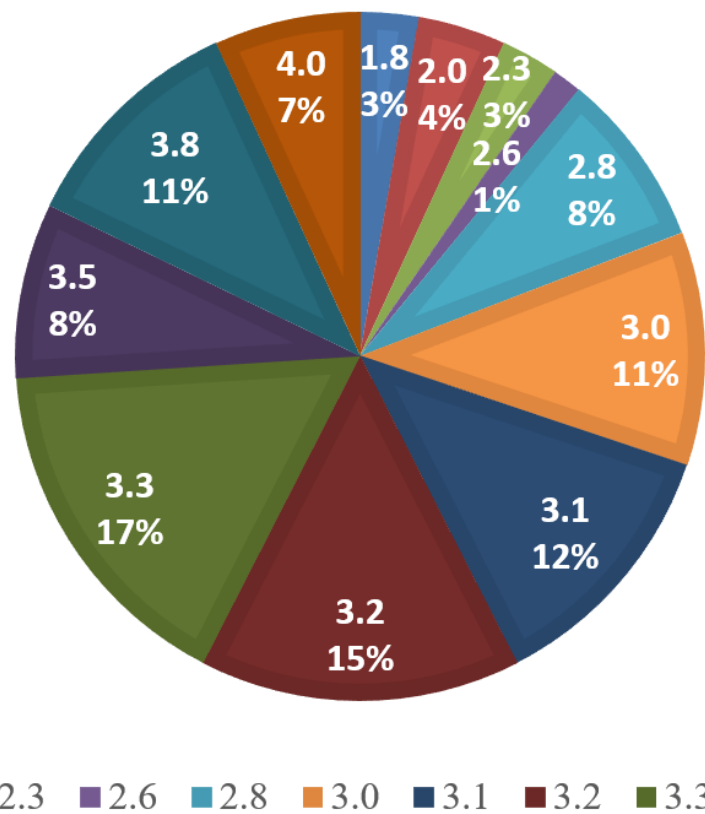

Figure 2. The final results of international e-mobility student participants from State Islamic University Salatiga and University Malaysia Sabah.
Source: Study results document of e-mobility student participants.

Looking at the pass rate above, the international collaboration of e-mobility students is successful. This is indicated by the collective success rate of 97.2% exceeding 85% (Triyanto, 2018) which falls into the highly effective category.

Table 5. Category of classical learning effectiveness.

Percentage	Category
>80	Very effective
61 − 80	Effective
41 − 60	Effective enough
21 − 40	Less effective
N < 20	Ineffective

The graduation rate of 97.2% means that (see Table 5) 80% is included in the very effective category. This means that the e-mobility international collaboration program learning is very effective both in process and results in improving the academic abilities of participants (László Duma, 2023).

5.2.2. Ability through Direct and Indirect Learning

The competencies obtained by participants in the collaborative e-mobility program between the Faculty of Tarbiyah and Teaching Science, State Islamic University Salatiga, and University Malaysia Sabah include learning experiences, increasing cognitive, social, and personality abilities, cultural understanding, soft skills, and motor skills. Participants gain these abilities both directly and indirectly in learning activities. For example, presentation activities directly have an impact on deepening and expanding knowledge but indirectly can improve information technology abilities, communication skills, creativity, and work accuracy. Discussion activities have a direct impact on broadening and deepening participants' knowledge and increasing self-confidence and critical thinking (Crisianita & Mandasari, 2022) but indirectly, they can improve critical thinking skills, communication, and cultural understanding. Thus, it can be said that the impact of indirect learning is greater than the impact of direct face-to-face learning, especially in the formation of affective and psychomotor aspects (Seng, Mustafa, Abd Halim,

Hanim, & Rahmat, 2023). Indirect learning also has an impact on strengthening students' knowledge (Kassaw & Demareva, 2023) and improving the performance of low-ability children (Berlinski et al., 2023). The effect of indirect learning is obtained through peers, remedial programs, and school learning activities.

Table 6. Direct and indirect learning impacts.

No.	Activities	Immediate learning outcomes	Indirect learning impact
1	Lectures	Deepening of lecture and cognitive material	Critical thinking, discipline, mastery of information technology, knowing how to learn, creative and fun learning.
2	Discussion and debate	Deepening of lecture and cognitive material	Critical thinking, English communication, cooperation, respecting people's differences and understanding other people's cultures.
3	Presentation	Deepening of lecture and cognitive material	Critical thinking, creativity, accuracy, English communication, information technology skills and understanding other people's culture.
4	Assignment	Deepening of lecture and cognitive material	Critical thinking, creativity, cooperation, written communication, discipline and hard work.

According to Table 6, the learning impact can occur directly and indirectly. Direct learning impact is the impact or learning outcomes obtained by students after participating in learning in accordance with the learning plan while indirect learning impact is the impact or results obtained by students and is not realized and not stated in the learning planning document.

When looking at the competencies obtained by participants in the international e-mobility program, collaboration contains competencies according to the demands of 21st-century teacher competencies (Almazroa & Alotaibi, 2023) such as critical thinking, collaboration, communication and creativity and innovation, information technology skills, discipline, hard work, respect for time, foreign language skills, international networks, and respect for the cultural diversity of others, creative and fun learning experiences. This shows that the e-mobility international collaboration program supports strengthening the competencies of 21st-century teacher candidates. The e-mobility international collaboration program is exceptionally able to shape the ability to build global networks, tolerance, mastery of the field of information technology, and other skills.

In today's global era, mobility students can develop a person's personnel and professionals, enrich cross-cultural understanding, language, and experience, expand international horizons, and improve work skills (Bista, Sharma, & Gaulee, 2018). People often experience career obstacles due to language issues and cross-cultural understanding. Mobility programs can be a medium for participants to increase knowledge, and experience and exchange international experiences and culture (Rostovskaya et al., 2020). A person can become aware of himself after interacting and exchanging experiences with people from different cultures. Mobility program participants can explore many things, and adults tolerant of diversity (Pluzhnik & Guiral, 2020). Mobility programs are also able to improve language skills, where language competence and cross-cultural understanding can help individuals facilitate the expansion of international networks (Ożańska-Ponikwia, Carlet, & Pujol Valls, 2019). In this e-mobility program, participants gain international experience through online networks. They socialize, build networks, tolerate, discuss, and exchange cultural experiences through online networks. They are a generation living in an age where technology is the primary medium to interact with the world.

When compared with previous studies about the impact of e-mobility on participants (Ożańska-Ponikwia et al., 2019), there is no visible impact of the e-mobility program on employment, research, and finance, considering that the participants are students and have not thought seriously about career and work. They are expected to be motivated to continue their study abroad in future development.

They also did not receive any financial impact as this collaborative program was purely about strengthening academics, attitudes, and skills, and participants had to pay the organizers. In this research, participants felt that there was an increase in their ability in the field of information technology, strengthening foreign language competence and gaining creative and fun learning experiences. This experience is beneficial for them in developing themselves as future teachers in the 21st century.

Related to the negative impact of the student mobility program (Ryazanova & McNamara, 2019) the participants were not disturbed by this activity because the learning activities were carried out online. Even though online learning has limited educational interactions, it is easier for participants to adjust time and other activities.

Regarding teacher competencies, the e-mobility program participants obtained additional competency strengthening to prepare future teachers. The strengthening of these competencies includes aspects of personality and professional, academic, social, and motor skills. Strengthening personality aspects such as discipline, hard work, creativity, critical thinking, and conscientiousness, professional elements such as deepening and expanding material understanding of English language skills, pedagogical competencies such as knowing how to learn effectively, creative and fun learning; social competencies such as respect for other people's differences, understanding other people's cultures, working together, public communication and motor skills such as mastery of information technology and various e-learning application programs.

Table 7. Linkage of e-mobility participants' competency acquisition with teacher competency strengthening

Types of teacher competencies	Description
Personality	Discipline, hard work, creativity, critical thinking and thoroughness.
Professional	Deepening and expanding understanding of the material and English language skills.
Pedagogy	Know how to learn effectively, creatively, and fun learning.
Social	Respecting other people's differences, understanding other people's cultures, working together and public communication.
Technological skills	Mastery of information technology and various e-learning application programs.

Table 7 explains that the e-mobility international collaboration program is able to strengthen personal, professional, pedagogical, social competencies, and digital technology capabilities. The description of each competency as written in the description section are needed in education in the 21st century era.

The technical competencies prospective teachers need to emphasize are creativity, innovation, and mastery of information technology. Creativity-innovation is an urgent need for teachers and learners in this century (Stephenson, 2023). Education must now contain creative values in every way to support students' careers in the 21st century (Weng, Chiu, & Tsang, 2022) both through direct and indirect instruction. Research results show that learning using technology can develop learners' creativity in an interactive learning environment (Li, Kim, & Palkar, 2022). Technological skills are essential for individuals today because technology has penetrated all human lives.

6. Conclusion

The international e-mobility student collaboration between State Islamic University Salatiga and University Malaysia Sabah effectively strengthens prospective teachers' competencies. The international e-mobility student collaboration for State Islamic University Salatiga students at University Malaysia Sabah is conducted online through assignments, discussions, debates, project-based learning, problem-based learning, and practicum methods. For group projects, project-based websites were used, such as Google Meetings, Google Docs, Google Presentation, WeBex, the Telegram platform, Project Canva, Quiz, Padlet, and Menti.com. For independent projects, participants are assigned to create a narrative related to a problem and then upload it on the website. The types of learning assignments are quizzes, mid- and end-of-semester exams, interpretation of literary works, making videos, reading poetry, and playing drama. For strengthening cognitive aspects, participants receive in-depth material according to the chosen course in depth. Strengthening affective and psychomotor aspects is achieved through lectures and presentations, participants interact with other participants from various countries. Each participant is required to communicate in English, tolerance, cooperation, and respect for others. Learning evaluation includes process and results to measure the participants' activeness and the results achieved during the learning process.

Competencies obtained by participants in e-mobility program include cognitive learning experience, social experience, personality, cross-cultural understanding, soft skills, psychomotor skills, and digital technology. These competencies are produced through direct learning in the form of cognitive abilities, deepening material through lectures, discussions, active debates, presentations and assignments. Meanwhile, competencies obtained through indirect learning in the form of learning experiences, social experiences, personality, cross-cultural understanding, soft skills, psychomotor skills, and digital technology are critical thinking, discipline, mastery of information technology, various e-learning application programs, knowing how to learn, creative and fun learning, English communication, cooperation, respect for people's differences, understanding other people's cultures, creativity, thoroughness, hard work, written communication through lectures, discussions, active debates, presentations and assignments.

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