

Development of a Collaborative Online Training Program to Enhance Teaching Students' Digital Skills for the Diploma in Teaching Professional Program

Angkana Karanyathikul

Education Faculty, Valaya Alongkorn Rajabhat University under the Royal Patronage Pathum Thani Province, Thailand

Corresponding Author, E-mail: angkana@vru.ac.th

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Abstract

The research aimed to 1) develop and evaluate the quality of a collaborative online training program to enhance digital skills for students in the Graduate Diploma in Teaching Profession program 2) investigate the effects of implementing this program on digital skills. 3) To examine the satisfaction of students. This study employed a pre-experimental research design using a one group pretest posttest design. The population consisted of 178 graduate diploma students in teacher education enrolled during the second semester of the 2024 academic year, distributed across six classes. The sample comprised 25 students from one class enrolled in the same program and semester. The sample was selected using cluster random sampling. The research instruments included 1) The collaborative online training program to enhance digital skills of four modules. 2) The digital skills assessment. 3) A satisfaction survey. The statistical analyses employed in this research included means, standard deviations, dependent samples t-test, and one-sample t-test. The research results were found as follows; 1) The collaborative online training program was developed through a needs analysis and design phase. The quality evaluation results showed the program was at the highest level, with mean of 4.67 and a standard deviation of 0.63. 2) After the experiment, it was found that the effects of implementing a program to enhance digital skills were significantly different at the 0.05 level. The results surpassed the 80% threshold. 3) The students' satisfaction was at its highest level. The study highlights that a collaborative online

training program effectively enhanced the digital skills of students in the graduate diploma in teaching profession program, and the students expressed the highest degree of satisfaction with the training.

Keywords: Digital Skills; Collaborative Online Learning; Graduate Diploma in Teaching Profession; Training Program

Introduction

In the current era of rapid social change resulting from leapfrog technological development in all aspects, human resources must be developed to keep pace with the changes that occur. The development of digital technology and the COVID-19 pandemic situation have significantly impacted the education system, causing teaching and learning formats to shift increasingly toward online modalities (Mathuros, 2021). Online society, therefore, plays an increasingly unavoidable role across private, civil society, and government sectors (Sathianthai, 2020). Although pre-service teachers may have positive attitudes toward ICT, they often lack confidence and essential capabilities for effective use. Furthermore, teachers urgently need to develop digital skills for effective teaching and learning management, enabling them to utilize digital technology as essential tools in the digital age, such as learning platforms, Big Data applications, and artificial intelligence (AI) to create learning experiences that emphasize higher-order thinking. The development of teachers' professional digital skills is therefore of paramount importance (Panich, 2022). One significant problem is that traditional teacher professional development models may not be able to effectively respond to the demands of developing digital skills in the contemporary era. The instructors must be endowed with adequate digital capabilities for teaching and learning in the digital age, including an ability to apply digital technology for supplementing student learning and creating and developing digital media for studying, as well as measuring learning with digital technology. UNESCO (2023) has pointed out that digital skill has been one of the primary capabilities needed for teaching professionals in the 21st century, with a demand for appropriate learning modalities.

Collaborative learning fosters digital skill enhancement through teamwork and the exchange of ideas, resulting in profound and applicable learning; research provides explicit guidance for the creation of these efficacious online activities. (Reyes et al., 2023). Within the context of teacher development,

collaborative learning can assist student teachers in practicing the utilization of digital technology and artificial intelligence (AI) in supportive learning environments that foster continuous skill development. The development of collaborative online training programs focused on enhancing digital competencies constitutes a promising approach for preparing student teachers to utilize technology effectively.

This research addresses the lack of a flexible, collaborative, and contextually relevant online training program to enhance digital skills for Graduate Diploma in Education students. This is because teachers in schools face daily challenges and lack sufficient time to develop additional skills. However, this gap needs to be bridged through online collaborative learning, allowing students to interact with each other as if they were in face to face training while also sharing and learning together from anywhere. This is a crucial foundation for teachers' lifelong learning. Therefore, teachers need to use technology to enhance their digital skill to cope with the changing trends in digital education. If students pursuing a graduate diploma, who are already working in the field, are given the opportunity to develop their professional skills through this flexible online collaborative learning format, which is adaptable in both time and place, it will greatly enhance their lifelong learning and be a highly effective teaching and learning method. Additionally, the research findings will benefit in-service teachers who wish to develop their digital skills without being limited by location for training.

Objectives Research

1. To develop a collaborative online training program to enhance digital skills for students in the Graduate Diploma in teaching profession program.
2. To investigate the effects of implementing a collaborative online training program to enhance digital skills of students in the Graduate Diploma in teaching profession program.
3. To examine the satisfaction of students in the graduate diploma in teaching profession program with a collaborative online training program to enhance digital skills.

Literature review

Training is a key strategy in educational and organizational development that emphasizes skill acquisition through experiential learning. Scholars such as Khan (2005) and Mayer (2024) emphasize that training as a mechanism for performance improvement and self-development, while Khlaisang

(2025) distinguishes online training by its flexibility and learner autonomy. Unlike conventional training models, online collaborative training provides greater adaptability and engagement through real-world tasks and peer interaction. The assertion is that training serves as a systematic learning management process aimed at enhancing specialized competencies in core functions, which enables personnel to develop skills and cultivate self-awareness through experiential learning. Training modules are systematically organized to foster personnel learning and development. Traditional classroom training mainly focuses on teachers delivering information to students, which can lower students' motivation to learn on their own. Khan (2005) described online training as an instructional program delivered in a hypermedia format that utilizes multiple web-based resources to create a learning environment that supports interaction, flexibility, and learner autonomy. Similarly, Mayer (2024) defined online training as instruction delivered through the internet or intranet, grounded in the principles of systematic instructional design. This form of training provides increased access to underserved populations, introduces new tools to enhance learning, and offers flexibility by removing the limitations of time and place.

Online training has evolved from static content delivery to dynamic learning environments. Khan (2005) introduced the idea of hypermedia-based environments, while Mayer (2024) emphasized instructional design as the backbone of online learning. More recent research (Dolezal et al., 2025) highlights the integration of interactive tools and collaborative components in online training, offering learners real-time feedback, discussion forums, and multimedia-enhanced content. Digital skills are thus essential for achieving educational goals effectively. According to Bawden (2001), digital skill refers to the ability to use computers and networks, including multimedia tools, in ways that support learning and information applications. It also involves the ability to search for relevant information from a wide range of sources. Similarly, they defined teachers' digital competence as the ability to systematically search, gather, process, and use information. Digital competence is vital for teachers adapting to 21st-century educational challenges. Bawden (2001) and Kiss (2017) defined it as the capacity to search, assess, and use information. In the context of today's knowledge-based society, digital skill is a critical competency for teachers, enabling them to adapt to technological changes and enhance teaching and learning effectiveness. Mesinthree (2016) emphasized that digital skill is essential for individuals functioning in a learning society, where workers must be continuously prepared to acquire new knowledge and skills. Media literacy refers to learners' ability to access, analyze, and produce media

with awareness of meaning, form, and context. It includes understanding how media messages are constructed and why, recognizing the influence of media and popular culture, and utilizing media effectively to express ideas. According to Dankbaar and de Jong (2014), essential digital competencies can be categorized into six key domains: 1) Tools and Technologies, the ability to effectively use various digital tools and platforms. 2) Acquire and use not only the skills to search for information via Google or other search engines but also the capacity to critically evaluate and select high-quality information from the vast amount available online. 3) Teach and learn, Both educators and learners need digital competencies to participate in modern, technology-integrated teaching and learning environments. 4) Communication and collaboration In a hyper-connected digital world, individuals must adapt to new forms of communication and teamwork that differ from traditional methods. 5) Create and Innovate, Digital technologies enable users to develop diverse forms of innovation, fostering creativity and the ability to produce novel solutions. 6) Identity and Wellbeing As digital platforms present various security and privacy risks, it is crucial to educate individuals on personal data protection, digital identity management, and online safety.

Collaborative learning is an instructional approach adapted for computer networks, aiming to enhance learning quality by having students work in small groups, where success relies on the active participation and contribution of each member through the exchange of ideas and mutual support. Collaborative learning, as proposed by Reyes et al. (2023) and later supported by Thongdeelert (2003), encourages knowledge co-construction through group tasks and dialogue. In digital environments, that structured collaboration enhances both satisfaction and skill acquisition.

For instance, social networking technologies have been adopted to enhance students' learning experiences and provide diverse, learner centered approaches to instruction. These tools also assist educators in achieving instructional goals by accommodating students' varied learning styles. Social Networking Sites (SNSs), including Facebook, YouTube, Twitter, Google+, and Instagram, have become widely popular for supporting learning and enabling users to exchange and respond to shared interests and content (Lockyer & Patterson, 2008; Ellison, 2007). Cloud-based applications, such as Dropbox, Google Drive, OneDrive, and SkyDrive, further extend collaborative learning by allowing users to access and work with shared files from any location with internet access.

Therefore, collaborative online learning is vital for improving the effectiveness of students' digital skills development. When a high-quality training program is organized, it can promote learning that is

limited by time and place and also support the exchange of ideas and experiences, co-creation, and the use of collaborative learning activities. These interactions are extremely important for achieving the goals of collaborative learning in a digital environment. Collaborative online learning is vital for improving students' digital skills development, offering flexibility and supporting interaction. Comparative studies, such as Goel and Shukla's (2025) research, indicate that offline (traditional) training excels in fostering greater confidence and engagement. However, online training is significantly better regarding accessibility, cost-effectiveness, and enhancing digital literacy and technical skills. The online format often suffers from perceived lower engagement and a lack of timely or personalized feedback. Consequently, no single current format is universally superior, leading most teachers to prefer a hybrid/blended model that strategically combines the strengths of both online and offline approaches. Although collaborative learning is used to enhance digital skills, there are few empirical studies focusing on online collaborative training for pre-service teachers in Thailand who must study and work simultaneously. This research will fill this gap by synthesizing instructional design, digital competency frameworks, and collaborative models into a practical, flexible, and adaptable training program. By addressing the noted weaknesses of low engagement and lack of personalized feedback in traditional online training, and building upon its strength in developing digital skills, The training modules reflect the theoretical foundations mentioned and aim to bridge learning theory and practice through digital collaboration among peers, overcoming individual limitations.

Conceptual Framework

This research employed a pre experimental research design using a one group pretest posttest design. A framework based on the concepts of collaborative online learning and digital skills development. The details are as follows:

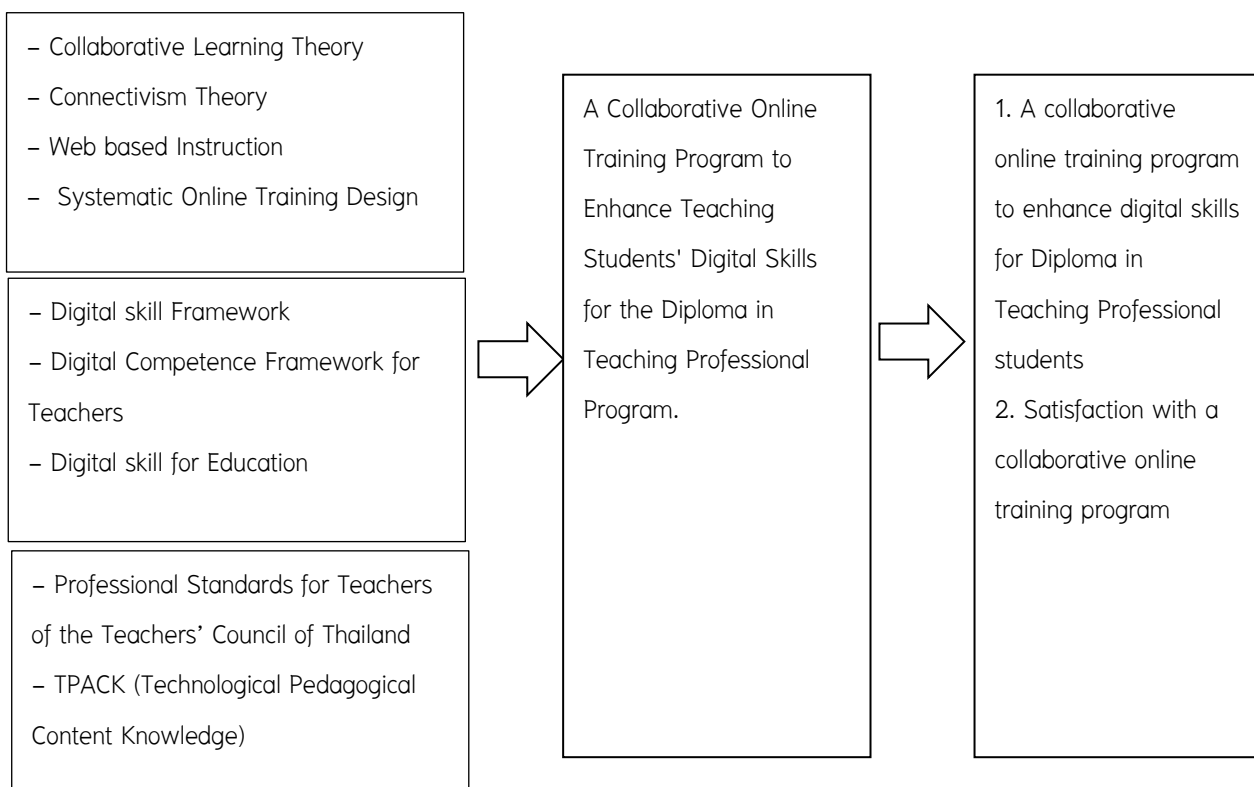


Figure 1 The conceptual framework of the collaborative online training program to enhance teaching students' digital skills for the Diploma in Teaching Professional Program.

Methodology

This research is a quantitative study using a one group pretest–posttest pre–experimental research design. The research area is Education Faculty, Valaya Alongkorn Rajabhat University under the Royal Patronage Pathum Thani Province, Thailand. The population were 178 students enrolled in the graduate diploma program in teacher education during the second semester of the 2024 academic year, distributed across six classes. The sample comprised 25 students from one class enrolled in the same program and semester. The sample was selected using cluster random sampling. Before conducting the t–test, the normality of the pretest and posttest score distributions was examined using the Shapiro–Wilk test. The results indicated that the data were normally distributed ($p > .05$), thus satisfying the assumptions for parametric analysis. The total experiment duration was 4 weeks (16 hours), with all training conducted via the Google Classroom platforms; extraneous variables were controlled by restricting access to the online learning materials only to the sample group and standardizing the instructor and training schedule. The research tools used are of 3 types: 1) A training plan consisting of 4 modules totaling 16 hours, designed as

an online collaborative learning program to enhance digital skills for students. The implementation schedule allocated 4 hours per module, focusing on Using AI for Instructional Design, Using AI to create teaching materials, Using AI for Evaluation, Using AI for professional development. Each module involved mandatory small group discussion forums, shared document creation, and peer feedback to ensure collaboration. The expert evaluation results for each training program showed a mean score between 4.20 and 4.80, reflecting a satisfactory to excellent level of performance. With a total mean score of 4.63 and a standard deviation of 0.63, the training program was considered to be of the highest appropriateness. 2) A digital skills assessment questionnaire 15 items using a 5–point rating scale. The Index of Item–Objective scores between 0.60 and 1.00. All questionnaire items met the acceptability criteria, though certain items necessitated language refinement for improved clarity. Reliability testing was conducted using Cronbach's Alpha coefficient, yielding a reliability value of .75, which meets acceptable criteria. 3) A satisfaction survey 15 items employing a 5–point rating scale. Reliability testing using Cronbach's Alpha coefficient revealed a reliability value of 0.89, which meets the criteria for appropriate implementation. Data Analysis in this Study: 1) Dependent samples t–test to compare changes in students' abilities before and after using the collaborative online training program; 2) One–sample t–test to compare students' digital skills academic achievement with the predetermined standard of 80%. mean and standard deviation were used to assess student satisfaction.

Research Results

For research objective 1, the research results indicate a collaborative online training program for developing digital skills is of the highest quality, both in terms of subcomponents and overall. As shown in the table 1

Table 1 Developing and evaluating the quality of collaborative online training programs to enhance digital skills

Evaluation dimension items	M	S.D.	Quality level
Content and structural appropriateness	4.67	0.51	Highest
Program media and technology quality	4.60	0.63	Highest
Collaborative learning training activities	4.60	0.63	Highest
Teaching and learning implementation capability	4.73	0.60	Highest
Overall	4.67	0.59	Highest

As presented in Table 1, the overall average is at the highest level ($M = 4.67$, $S.D. = 0.59$). When considering the sub-items, the overall average is at the highest level for all questions, which reflects that this program can be used very well to develop the digital skills of students.

For research objective 2, the research results indicate the use of a collaborative online training program to develop students' digital skills, including skills in using AI for instructional design, AI for creating teaching materials, AI for assessment, and AI for professional development. These skills were measured and evaluated through pre-test and post-test. The posttest scores were significantly higher than the pretest scores at the 0.05 level of significance, and the scores after training were compared to an 80% criterion. The result was statistically significant. As shown in tables 2 and 3

Table 2 The impact of implementing collaborative online training programs on the development of students' digital skills, as measured by pre-test and post-test results.

Test	n	M	SD	$\bar{D}$	$S.D._{\bar{D}}$	t	Sig
Pre-test	25	17.68	2.56	17.28	2.64	32.75*	0.000
Post-test	25	35.20	1.41				

*The significance level: $p < .05$

As presented in Table 2: After training in the collaborative online training program designed to enhance digital skills, students in the Graduate Diploma in Teaching Profession program showed a significant improvement in their digital skills. The results indicated a t-value of 32.75 and a p-value of 0.000 ($p < 0.01$), demonstrating that the post-training digital skill scores were significantly higher than the pre-training scores at the 0.05 level of significance. The effect size (Cohen's d) was 8.48, indicating a substantial effect of the collaborative online training program on students' digital skills. demonstrates high program effectiveness.

Table 3 The impact of implementing collaborative online training programs on the development of students' digital skills, compares the results of post-test scores against the 80% criterion of a total score. The results surpassed the threshold.

Group	n	Full scores	80% Criterion	M	SD	t	Sig. (1-tailed)
Experimental group	25	40	88.00	35.20	1.41	11.31*	0.000

* $p < .05$ The criterion for 80% achievement level was set at scores above 32 out of 40 possible points

As presented in Table 3, the mean post-test score was 35.20 out of 40, representing 88.00% achievement. The result was statistically significant ($t(24) = 11.31, p < .01$), indicating that students exceeded the target mastery level. This confirms the training program's success in enabling students to reach and surpass the expected competency standards.

For research objective 4, the results of this research indicate that the satisfaction of students towards the collaborative online training program for digital skills development, the average student satisfaction was at the highest level.

Table 4 To present the mean scores, standard deviations and satisfaction levels of students.

Aspect	<i>M</i>	<i>SD</i>	Satisfaction level
Content and structural	4.71	0.56	Very high level
Media and technology quality	4.64	0.65	Very high level
Collaborative learning training activities	4.67	0.62	Very high level
Practical application	4.61	0.67	Very high level
Overall satisfaction	4.70	0.67	Very high level
Total /Overall	4.66	0.63	Very high level

As presented in Table 4, students expressed very high levels of satisfaction with the program overall ($M = 4.67, SD = 0.63$). The highest satisfaction score was for content and structural quality ($M = 4.71$), followed by collaborative learning activities ($M = 4.67$). The dimension with the lowest mean score was Practical application ($M = 4.61$), highlighting it as the area requiring the most focused improvement in future iterations of the program. These results suggest that the training program was well-received by participants and effectively met their expectations regarding digital skills development in a collaborative online format.

Discussion

Research results on the development of a collaborative online training program to enhance digital skills for graduate diploma in teaching profession students

1. Results from research objective 1 found that the developed collaborative online training program achieved the highest overall quality level (mean = 4.67), confirming the appropriateness of its

content, structure, media, technology, collaborative learning activities, and implementation capability in teaching and learning (refer to Table 1). This result can be interpreted as the program's design, adhering to comprehensive criteria and verified by experts, being crucial for ensuring quality, especially in the context of online learning, where the quality of media and activities directly impacts learner engagement and learning outcomes. This finding is consistent with the ideas from recent literature emphasizing the importance of robust course components, interactive elements, and multimedia resources in fostering student engagement and learning in online environments (Reyes et al., 2025). Furthermore, the quality of collaborative learning activities reflects the program's potential to foster interaction and co-construction of knowledge, which is central to collaborative learning.

2. Results from research objective 2 found that students' digital skills scores significantly increased after participating in the collaborative online training program ($t = 32.75$, $p < 0.01$). This improvement is directly attributed to the collaborative learning mechanisms embedded in the program. Specifically, the requirement for shared problem solving in the Instructional Design and Teaching Materials modules compelled students to actively apply new AI tools, while peer feedback enforced a deeper understanding and refinement of their digital output. The successful program design effectively met student needs by incorporating collaborative group activities and appropriate technology, aligning with instructional design principles that promote sustainable digital skill development through practical application. (Ahmad, 2025). It also supports the idea that collaborative learning can promote digital skill development through knowledge exchange, shared experiences, and collaborative problem solving. The implication of this result is that well-designed training programs emphasizing active learner participation are highly effective in enhancing competencies essential in the digital age. The study results indicate that the students' average achievement score after participating in the program ($M = 35.20$ out of 40 points, or 88.00%) was significantly higher than the 80% proficiency criterion (32 points), demonstrating not only improved their digital skills but also proficiency for effective application in practice.

3. Results from research objective 3 found that graduate diploma teacher education students' overall satisfaction with the collaborative online training program for digital skills enhancement was at the highest level ($M = 4.66$). This high level of satisfaction indicates that the program effectively met learners' expectations and needs, across aspects such as content, quality of media and technology, collaborative learning activities, and practical application. This finding is consistent with the research of which suggested that learner satisfaction is a significant indicator of learning effectiveness and

contributes to continued engagement (Salam & Farooq, 2020). The high satisfaction level also reflects learners' acceptance of the program, a crucial factor for scaling up the program or applying it in other contexts in the future."

This study confirms that collaborative online training with high-quality training programs and effective training components will help teacher education students at the graduate diploma level in the teaching profession achieve a high level of digital skills and be highly satisfied with this type of training.

New Knowledge from Research

The development of a collaborative online training program to enhance teaching students' digital skills for the Diploma in Teaching Professional Program has principles based on integrating digital technology and developing digital skills for a flexible, accessible, and collaborative online format. The success demonstrates that the modules focusing on instructional design and creating teaching materials were the most critical components for practical skill acquisition, as they directly required collaborative application of the new AI tools. Learners should get the opportunity to exchange knowledge with others and not feel isolated during training, and the program should be suitable for current teachers facing time and location constraints. It helps promote lifelong learning and professional development. The program is designed by integrating collaborative learning theory, the digital competence framework for teachers, training design concepts, and the use of AI tools for teaching. The development of the four main dimensions of digital skills, namely instructional design, production of teaching materials, learning assessment, and teacher professional development, is essential for teachers in the current era. It increases opportunities for flexible and continuous learning. The online training program allows student teachers to learn and practice digital skills anytime, anywhere, which is conducive to the long-term professional development of teachers. Learners are highly satisfied, especially with the content's modernity, technology integration, and practicality. The success of this program demonstrates that learning through online platforms can be an effective tool for teacher professional development in the digital age, particularly in preparing student teachers to apply technology appropriately in teaching and learning management.

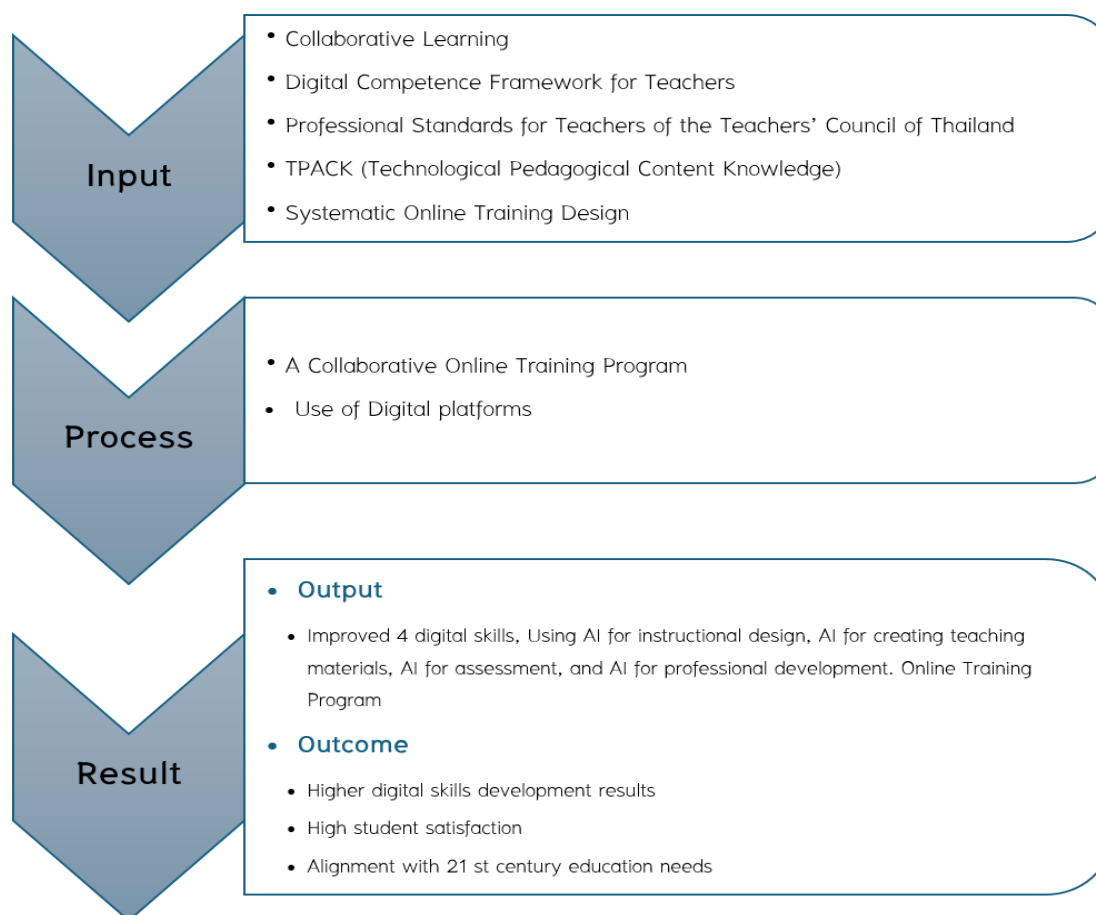


Figure 2 The development of a collaborative online training program to enhance teaching students' digital skills for the Diploma in Teaching Professional Program
(Source: Constructed by researcher, 2025)

Conclusion

The study found the development of a collaborative online training program to enhance digital skills for Diploma in Teaching Professional students. It was effective in strengthening digital skills in four dimensions: teaching design, media production, evaluation, and professional development. The results of the expert evaluation indicate that the program is of the highest quality in terms of content, structure, and operation process. The post-training data found that the digital skills of the students increased statistically significantly, with an average score higher than the prescribed 80 percent criteria. In addition, the participants also showed a high level of satisfaction. Particularly in terms of content

modernization, technology integration, and practical implementation, the results reflect the value of online training that focuses on collaborative learning combined with the use of digital technology. The research effectively illustrates that organized online collaboration is an exceptionally efficient method for expediting the acquisition of particular digital competencies (AI tool application) essential for 21st-century education. This can help teachers grow so that they can better meet the needs of 21st-century education.

Recommendation

From the research results, the researcher has suggestions as follows:

1. Suggestions for applying research results

1.1 Results from research objective 1 found that the online collaborative learning training program is appropriate in terms of content and program structure, is up-to-date, and meets the needs of learners, especially regarding knowledge of information and digital technology and the application of artificial intelligence in teaching and learning.

1.2 Results from research objective 2 found that the study results after using a collaborative online training program to improve digital skills were higher. Therefore, relevant agencies should take action. As follows The program should be encouraged to be used alongside teaching in other subjects, especially those related to learning management, educational technology, or assessment practices, to promote the sustainable integration of knowledge and skills.

1.3 The results of research objective 3 found that students were generally highly satisfied with the training program. Therefore, relevant university-level agencies should provide policy support to promote the development of collaborative learning training programs by making digital skills training a core component of teacher development programs to increase readiness for teaching in the digital age.

2. Suggestions for next research

For the next research issue, studies should explore the design and impact of blended or hybrid learning approaches, particularly how these formats can combine the strengths of face-to-face interaction and online flexibility to further enhance digital competencies.

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