



The development of a training module for private preschool teachers in facilitating 21st century skills: A microlearning-based approach

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Abstract

The objective of this mixed methods research was to develop and evaluate a 21st century skills training module for private preschool teachers that contained facilitation skills development and a microlearning-based follow-up support toolkit. In the first phase, data were collected via focus group discussion with 8 experts purposively sampled with these selection criteria: at least 5 years of experience; fields of expertise: facilitation; 21st century skills training; monitoring and evaluation; preschool education, and parenting. Data were analyzed via content analysis. The results were used to develop the training module. In the second phase, data were collected via quasi-experiment with 20 participants sampled via multistage random sampling from 30 schools and purposively sampled into the control and experimental groups – the selection criteria being the participants' own choice. Demographics included: 13 preschool teachers and 7 teacher assistants – all female – with at least 2 years of experience. Data were analyzed via descriptive and inferential statistics – t-test. The results showed significance from the pretest (average M : 3.88; average SD : 0.83) to the posttest (average M : 4.43; average SD : 0.73) in terms of achievement, which improved through facilitation skills development; the results also showed significance when comparing acceptance of the experimental group (average M : 4.44; average SD : 0.73) to the control group (average M : 3.22; average SD : 0.96), which was through follow-up support. The contribution of this research recommended utilizing both facilitation skills development and follow-up support for 21st century skills workshops.

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Introduction

The Sustainable Development Goal 4 (SDG4) of the United Nations is one of the most crucial initiatives in the 21st century. One of the areas that the SDG4 addresses is education, and one of the educational skillsets that is of high priority in the SDG4 are 21st century skills because the United Nations has been conducting their ‘21st Century Skills for Sustainable Development project’ since October of 2021 (The Division for Sustainable Development Goals: United Nations, 2024).

Unlike knowledge that can be memorized, 21st century skills require experiential learning for learners to internalize the skills effectively, and one technique to create experiential learning is called facilitation. Therefore, many sources agree on the use of facilitation to help learners develop 21st century skills (Cretu, 2017; Pradeep et al., 2019; Teo, 2019; The Partnership for 21st Century Learning, 2019). Facilitation is a set of skills and requires practice to develop proficiency (Crawford et al., 2017; Ritchie et al., 2020). Additionally, follow-up support techniques could further improve skills’ development through extended practice (Crawford et al., 2017; Duchaine et al., 2011).

Unfortunately, most 21st century skills training workshops in Thailand are one-time lectures lacking either facilitation skills development or follow-up support. Thus, teachers who attended those workshops would have difficulty trying to develop 21st century skills in their students at work (Fabiano et al., 2013; Nilsson & Bergendahl, 2020; Thompson et al., 2012).

This study aimed to develop an effective 21st century skills training module for private preschool teachers and to evaluate the effects of facilitation skills development and a microlearning-based follow-up support on achievement and acceptance of teachers’ facilitation of 21st century skills. The structure of the paper is as follows: Literature Review, Methodology, Results and Discussion, and Conclusion and Recommendation.

Literature Review

21st Century Skills & 21st Century Skills Workshops

Thailand’s ‘Basic Education Core Curriculum: 2560 BE’ for the preschool level, does not contain any indicator regarding 21st century skills; hence, teacher-training programs in Thailand also lack methods to help students develop 21st century skills (Taniw & Petpon,

2023). The appropriate 21st century skills scope to cover was only the 4 C’s: critical thinking, creativity, collaboration, and communication – based on the content of the national curriculum and supported by Cretu’s (2017) research. However, a review of 21st century skills training workshops in Thailand have shown that none of them contained both facilitation skills development and follow-up support together (Kamphaeng Phet Rajabhat University, 2024; Kasetsart University, Kamphaeng Saen Campus, 2019; Likitponrak, 2020; Office of the Basic Education Commission, 2023; Pibulsongkram Rajabhat University, 2019; Silpakorn University, 2019; TrainKru, 2020; The Association of Primary Social Studies Teachers, 2019; The Siam Commercial Foundation, 2024).

Facilitation Skills Development

Facilitation is a multi-process technique that guides learners to learn experientially and internalize knowledge or skills on their own accord – generating ownership and empowerment (Fabiano et al., 2013; Pradeep et al., 2019; Ritchie et al., 2020, Zimmerman, 2017). Within the scope of this research, facilitation was narrowed down to include only 2 techniques: positive communication and the questioning technique, which were the 2 most important facilitator skills as summarized in Ritchie et al.’s (2020) research. Measurement of facilitation in this research would be done through the Context, Input, Process, and Product (CIPP) model, which was selected due to its developmental nature, which is applicable with the process of skill development (Azhar, 2015; Aziz et al., 2018).

Microlearning-based Follow-up Support Toolkit

Follow-up support can help to retain learnt knowledge or skills and improve implementation at work (Centers for Disease Control and Prevention, 2019; Crawford et al., 2017; Fabiano et al., 2013; World Health Organization, 1999). Microlearning is a workload-appropriation concept that can be applied to any form of learning; therefore, a microlearning-based follow-up support toolkit – that is not too demanding or time-consuming for participants – could yield better implementation at the workplace (Emerson & Berge, 2018). Within the scope of this research, the microlearning-based follow-up support toolkit was implemented in the form of an activity log. Recommendations from The Food and Agriculture Organization of the United Nations (2012) suggested that follow-up toolkits should be designed to be conducive to actual use. Acceptance–participants’

willingness to implement facilitating 21st century skills at the workplace—would be measured by the revised theory of planned behavior (TPB) model—selected due to its focus on the intentions of behavioral change (Ajzen, 1991).

Methodology

This research utilized an inductive sequential exploratory mixed methods design: the qualitative 1st phase was undertaken by means of a focus group discussion to develop a training module; and the quantitative 2nd phase was by means of a quasi-experiment to evaluate the training module.

1st Phase: Qualitative

The qualitative phase came first and was the more prominent of the 2 phases. Within the 1st phase, the population was experts from 5 different fields: facilitation; 21st century skills training; monitoring and evaluation; preschool education; and parenting. 8 experts were purposively sampled to join the focus group discussion with the selection criteria as: minimum of 5 years of experience in their representative field and a minimum of 1 expert per field.

The main research instrument was the focus group discussion script formulated based on the research questions and synthesis of literature. Data collection utilized literature review and focus group discussion. Data analysis used coding and content analysis on the literature review notes and the focus group discussion transcript. The focus group discussion sound recording was transcribed in the Thai language for accuracy and then translated into English.

2nd Phase: Quantitative

The quantitative phase followed but was less prominent. The population of the quantitative phase included 1,690 private preschool teachers and teacher assistants who worked in preschools in Pathum Thani (Pathum Thani Provincial Statistical Office, 2018). Multiple sampling methods were used in this phase. Multistage random sampling was used to randomly select 30 private schools from the total of 87 that fall into the criterion of containing the preschool level. Further criterion sampling was used to request the 30 private schools to only send teachers who had 2 years or more of teaching experience. Schools were asked to submit up to a maximum of 7 names, 20 of which

would then be randomly selected as the 2nd stage of the multistage random sampling. Finally, after the 20 final participants were selected, purposive sampling was used to divide them into the experimental and control groups with the selection criteria being: self-volunteering to be in either of the 2 groups. After the workshop, the 2 groups had a 30-day follow-up support period wherein the experimental group would have to utilize the microlearning-based follow-up support toolkit and receive coaching from the researcher via social network group chat. The 30-day period was selected based on Ebbinghaus' Forgetting Curve, which states that the majority of learnt knowledge will be forgotten in 31 days (Murre & Dros, 2015). As The Food and Agriculture Organization of the United Nations (2012) recommended, the researcher wanted the follow-up support period to be conducive for both groups; past the 30-day mark, the control group may have forgotten the contents of the workshop altogether – this was the reason why the microlearning-based follow-up support treatment could not be replicated to match the control group's acceptance to the experimental group's acceptance after the 30-day follow-up support period had passed.

The research instruments utilized included 2 questionnaires: the achievement questionnaire formulated based on the CIPP model and the acceptance questionnaire formulated based on the TPB model. Data collection was done through a quasi-experiment. Data analysis used descriptive and inferential statistics – specifically the t-test. However, qualitative questions did require coding and content analysis to analyze. Scales of interpretation for the achievement questionnaire included: 7 nominal and 14 ordinal questions, and for the acceptance questionnaire included: 13 nominal and 16 ordinal questions.

The other supplementary instruments included: a pre-workshop survey, an observation protocol, and an action plan – formed due to the recommendations from the focus group discussion. Data collection for the pre-workshop survey was conducted along with the attendance-confirmation package that was sent to each participant. Data collection for the observation protocol and action plan was conducted during specific sessions in the workshop. The observation protocol's scale of interpretation included both ordinal and nominal, whereas the pre-workshop survey and action plan were qualitative – nominal. The observation protocol was used by workshop facilitators to grade the facilitation skill level of participants. The pre-workshop survey and action plan were filled in by the participants themselves. Data analysis was conducted using content analysis for all 3 supplementary instruments.

The conceptual framework displaying the relationships between the variables is in Figure 1 below.

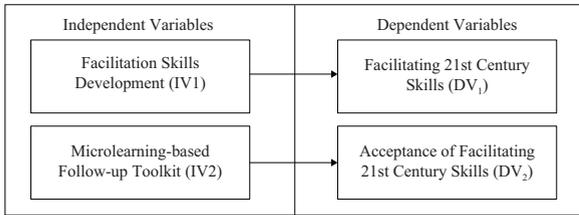


Figure 1 Conceptual framework

Results and Discussion

This research produced 2 major groups of results: Training Module Development and Evaluation of the Training Module.

Training Module Development Results

The training module development process started from the review of literature. The results of the literature review allowed for a synthesis of the drafts of the training module, follow-up support toolkit, and evaluation forms. These 3 drafts were then taken to be discussed in depth in a focus group discussion with 8 experts, where the experts were able to comment on the drafts to suggest

edits. The 8 key informants’ demographics were as follows: 2 teachers, 2 parents, 2 measurement and evaluation experts, 1 training and facilitation expert, and 1 21st century skills content expert. The transcript of the focus group discussion was analyzed with coding and content analysis, and the resulting codes and themes were used to revise the training module. The resulting codes, when arranged in order of reoccurrence, are as shown in Table 1.

The main contents of the final version of the training module after revision can be seen in Figure 2, which shows the 4 stages of the training module and the innovations of the training module: facilitation skills development and a microlearning-based follow-up support toolkit.

Table 1 Reoccurrences of codes

Codes	Reoccurrences
Observation protocol	48
Action plan	14
Workshop output	10
Pre-workshop survey	8
Data; Role model	6
Demonstration; Other skills	5
Acceptance posttest; Facilitation practice	4
Facilitation; Follow-up support	3
Documents; Rewards	2
Catering; Workshop flow	1

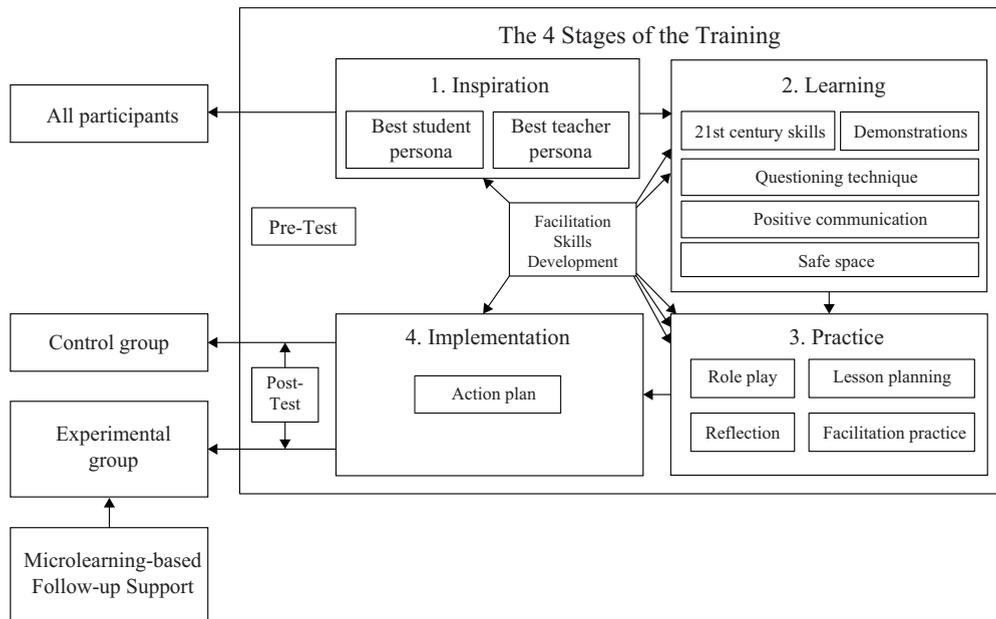


Figure 2 Contents of training module

All the sessions in the training module were designed to facilitate the development of facilitation skills to the participants. This means that the workshop facilitators will mainly use questions, and the activities require participants to practice using both positive communication and the questioning technique. For example, in the session called ‘The Questioning Game’, the objective of the activity is to get the participants to practice asking open-ended questions. The workshop facilitators begin the session by asking the opening questions for the activity: “How often do you ask your students questions?” and “What types of questions have you used the most?” The activity is played in pairs where the players are only allowed to ask open-ended questions to each other without answering. The game is won when one person is unable to ask any more open-ended questions and thus, loses. Or, when the activity time is up, the person who asked more questions wins. At the end of the activity, the workshop facilitators will ask questions to summarize the activity: “Do you think it is easy or difficult to ask open-ended questions? Why?” and “If it is difficult, what are some of the things you can do to ask open-ended questions more easily?” All sessions follow this pattern, where the workshop facilitators ask opening questions first, then conduct the activities, and then summarize the learning.

Furthermore, the microlearning-based follow-up support toolkit was an activity log printed out on A4 paper. Each person in the experimental group was provided 4 copies of the toolkit. The top of the page required the participants to fill in the sequence number of conducting facilitation (1st to 4th) and a blank to write down the date. The middle of the page is a 4 Cs checklist where the participants can draw a check mark on the 21st century skills that they facilitated. Under the checklist, there are blank lines to explain how the selected 4 C was facilitated. There is space at the bottom of the page for participants to place a photograph of the activity. Additionally, the microlearning-based follow-up support toolkit was directly translated into a Thai version with the exact same format for actual use

Training Module Development Results Discussion

The results of the literature review synthesis and focus group discussion addressed Objective 1 of this research: to develop a training module in facilitating 21st century skills for private preschool teachers.

The drafts of the training module, follow-up support toolkit, and evaluation forms produced from the literature review synthesis were adequate but still needed improvement. The synthesis process of the drafts could

have benefited from a needs assessment; Brown (2002) posits that a training needs assessment can improve effectiveness of all training programs.

For the focus group discussion, one of the major benefits was that one of the experts was a facilitation expert, and he naturally helped to facilitate during some parts of the focus group discussion making the focus group discussion flow smoothly (Ritchie et al., 2020). The transcript of the focus group discussion was content-analyzed, and the emergent themes were used to modify the training module, follow-up support toolkit, and evaluation forms. The most major modification was the inclusion of an observation protocol—for the purpose of triangulation to crosscheck the participants’ facilitation skills (Noble & Heale, 2019). An example related research to benchmark with would be Santos and Carvalho (2017) teacher professional development research, which utilized multiple types of questionnaires, a learning management system, multiple observations, and semi-structure interviews for triangulation. Additionally, having the key informants of the focus group discussion review the evaluation forms’ drafts and provide comments also indirectly helped to improve the validity and reliability of the instruments (Scholtes et al., 2010).

Before the workshop began, a distributed pre-workshop survey provided the workshop facilitators with brief snapshots of the participants to adjust their lessons as needed. Sufi et al. (2018) stated that demographic information, learning expectations, and self-analyses of skill levels are some of the most important pieces of information to know before any workshop is conducted. In the case of this research, the self-analyses made the facilitators include more supplementary materials due to the overall lower level of knowledge about 21st century skills.

Training Module Evaluation Results

After the training module finished its final revision, a quasi-experimental workshop was conducted to evaluate the training module. The training module innovations proved relatively effective in improving both the achievement of facilitating 21st century skills during the training and the acceptance of applying skills learnt from the training workshop to actual use at work. The demographics of the 20 participants are as follows: the experimental group had 2 Pre-K teachers, 1 Pre-K teacher’s assistant, 3 K2 teachers, 1 K2 teacher’s assistant, 2 K3 teachers, and 1 K3 teacher’s assistant; the control group had 2 Pre-K teacher’s assistants, 2 K1 teachers, 2 K2 teacher’s assistants, 2 K3 teachers, and 2 non-homeroom teachers.

A 19-item pretest and posttest of achievement was conducted on all the participants to determine the difference in achievement received from the workshop. Of the 12 quantitative items, dependent t-test inferential statistics yielded 8 items with significant improvement in results at posttest at a 95 percent confidence level. A summary of the pretest and posttest of achievement is presented in Table 2.

After the workshop, each member of the experimental group of participants received 4 copies of the microlearning-based follow-up support toolkit to

complete during the 30-day follow-up support period. A 20-item posttest of acceptance was conducted after the 30-day period to measure how much difference the follow-up support had on the level of acceptance between the 2 groups. Of the 17 quantitative items, independent t-test inferential statistics yielded 15 items with significant results of the experimental group having higher results than the control group at a 95 percent confidence level. A summary of the posttest of acceptance between the experimental and control groups is presented in Table 3.

Table 2 Training module evaluation results: achievement pretest and posttest: Paired *t*-test, *n* = 20, critical value = 2.093

Items	Pre-test	Post-test	<i>df</i>	<i>t</i> (<i>p</i> value)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		
3. Facilitation to create 21st century skills can be done in school.	4.20 (0.696)	4.65 (0.489)	19	.016*
5. When should we start development of 21st century skills?	4.25 (0.550)	4.50 (0.513)	19	.096
7. Who are the most important to helping preschool students develop 21st century skills in school?	3.81 (1.167)	4.50 (1)	19	.002*
9. 21st century skills are important to preschool students.	4.30 (0.733)	4.65 (0.587)	19	.069
10. It is easy to develop 21st century skills in preschool students.	3.40 (0.681)	4.05 (0.605)	19	.006*
11. What affects preschool students' development of 21st century skills the most?	3.25 (1.446)	3.9 (1.553)	19	.073
12. Teachers can help facilitate development of preschool students' 21st century skills.	4.25 (0.716)	4.6 (0.598)	19	.069
17. I understand how 21st century skills are important to preschool children.	3.80 (0.768)	4.45 (0.759)	19	.006*
18. Facilitation is important to the development of 21st century skills in preschool children.	3.85 (0.745)	4.55 (0.686)	19	.000*
19. I understand how preschool students learn 21st century skills.	3.75 (0.786)	4.25 (0.716)	19	.047*
20. Facilitation is necessary for the development of 21st century skills in preschool children.	3.90 (0.788)	4.65 (0.587)	19	.002*
21. I can facilitate the learning of 21st century skills in preschool students.	3.75 (0.851)	4.45 (0.686)	19	.002*

Note: **p* < .05.

Table 3 Training module evaluation results: Acceptance posttest: Independent *t*-test, *n* = 20, critical value = 2.101

Items	Experimental group	Control group	<i>df</i>	<i>t</i> (<i>p</i> value)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		
1. 21st century skills are useful for preschool students.	4.70 (0.675)	3.70 (0.823)	18	.008*
2. Students develop 21st century skills better through the use of facilitation (questioning techniques and positive communication) rather than memorizing.	4.70 (0.675)	3.40 (1.174)	18	.007*
3. I am willing to adjust my teaching to facilitate (use questioning techniques and positive communication) to help learners develop 21st century skills.	4.70 (0.675)	3.80 (0.789)	18	.013*
4. I am proud that I am a facilitator (person who uses questioning techniques and positive communication) to help learners develop 21st century skills.	4.80 (0.632)	3.50 (0.850)	18	.001*
5. My students enjoy learning more when I facilitate (use questioning techniques and positive communication) rather than teach traditionally.	4.80 (0.632)	3.70 (0.823)	18	.004*
7. School administrators support me in facilitating (using questioning techniques and positive communication) to help learners develop 21st century skills.	4.70 (0.675)	3.70 (0.823)	18	.008*
8. You have shared knowledge about using facilitation (questioning techniques and positive communication) to help learners develop 21st century skills to how many people?	3.30 (1.059)	2.00 (1.826)	18	.067

Table 3 Continued

Items	Experimental group	Control group	df	t (p value)
	M (SD)	M (SD)		
9. I can facilitate (use questioning techniques and positive communication) to help learners develop 21st century skills to my students in many situations.	4.50 (0.707)	3.70 (0.823)	18	.032*
10. I am comfortable in using the procedures for the development of 21st century skills at the school I work at.	4.80 (0.632)	3.30 (1.059)	18	.001*
11. I will facilitate (use questioning techniques and positive communication) to help my students develop 21st century skills.	4.80 (0.632)	3.70 (0.823)	18	.004*
12. I feel good about facilitating (using questioning techniques and positive communication) to help learners develop 21st century skills.	4.80 (0.632)	3.70 (0.823)	18	.004*
13. I am confident in facilitating (using questioning techniques and positive communication) to help learners develop 21st century skills.	4.60 (0.700)	3.50 (0.707)	18	.003*
14. Within the last month, how many times did you facilitate (use questioning techniques and positive communication) to help your students develop 21st century skills?	3.10 (1.101)	1.10 (1.101)	18	.001*
15. I can regularly integrate facilitation (the use questioning techniques and positive communication) to develop 21st century skills in my classrooms.	4.60 (0.699)	3.20 (1.033)	18	.002*
16. I can regularly facilitate (use questioning techniques and positive communication) to help learners develop 21st century skills in teachable moments that are not part of the lesson plan.	4.50 (0.707)	3.40 (0.700)	18	.003*
17. I have used facilitation (questioning techniques and positive communication) to help learners develop all 4 Cs of the 21st century skills.	3.80 (0.632)	1.80 (1.229)	18	.000*
18. Please rate your own self-improvement level in terms of the ability to facilitate (use questioning techniques and positive communication) to help learners develop 21st century skills.	4.20 (0.919)	3.50 (0.850)	18	.094

Note: * $p < .05$.

Training Module Evaluation Results Discussion

Overall, the final version of the research instruments was effective at measuring what they had been designed to measure: achievement and acceptance. Additional research instruments also proved to aid the researcher in the set-up and operations of the workshop.

Achievement results from facilitation skills development

The results of the achievement pretest-posttest questionnaire addressed Objective 2 of this research: to evaluate the training agenda in improving the achievement of private preschool teachers in facilitating 21st century skills.

From [Table 2](#), the questions for ‘Workshop Achievement’ shows that providing room for participants to develop facilitation skills had a lot of significance towards achievement in facilitating 21st century skills, which can be seen in the high t-values for all the questions in this group. And the questions for ‘Importance of Facilitation’, the demonstrations within the workshop helped participants to understand and internalize the

importance of facilitation when it comes to developing 21st century skills in learners (Zimmermann, 2017). For the questions on ‘Importance of 21st Century Skills’, there were more insignificant items than significant items, and the significant items’ t-values were not overly high, but that could be due to the participants already having knowledge of or already understanding the importance of 21st century skills prior to the workshop. Additionally, during the workshop’s demonstration lessons, the participants had a chance to showcase their newly learned skill of facilitation of 21st century skills onto their classmates. Budin (2017) stated that positive thinking, knowledge, and the chance to put that knowledge into practice all contribute to a person’s confidence level.

Acceptance results from microlearning-based follow-up support

The results of the acceptance posttest questionnaire addressed Objective 3 of this research: to evaluate the follow-up component in improving the acceptance of private preschool teachers in facilitating 21st century skills.

Most of the items in the acceptance questionnaire helped to prove the effectiveness of the effectiveness of the microlearning-based follow-up support toolkit designed in the form of an activity log (Emerson & Berge, 2018). Many items had very large t-values, which showed how much of an improvement the presence of follow-up support had on the participants' acceptance of facilitating 21st century skills at their workplaces (Adell et al., 2014).

Summary of Mixed-Methods Methodologies

This mixed-methods research followed an inductive exploratory sequential design, and its mixed-methods objective is: To develop a training module containing facilitation skills development and a microlearning-based follow-up support toolkit that aims to improve private preschool teachers' achievement and acceptance of facilitation of 21st century skills. The interpretation of the mixed-methods results is in chronologically backwards order. Although the training module was developed in phase 1 – from literature and focus group discussion, the quasi-experiment findings from phase 2 were used to interpret back to evaluate the training module. And the results of the questionnaires from phase 2 were mainly positive – meaning that both the facilitation skills development and the microlearning-based follow-up support toolkit had positive effects on the achievement and acceptance of participants in facilitating 21st century skills, respectively. Thus, the training module developed by the focus group discussion in phase 1 had shown that it was able to increase both the achievement and acceptance of the participants in facilitating 21st century skills.

Conclusion and Recommendation

The main target audience for this research to benefit would be those who aim to conduct 21st century skills training workshops and teacher training programs that aim to provide skills for their students to be able to develop 21st century skills in their learners. The research has proposed 2 novel innovations: facilitation skills development and a microlearning-based follow-up support toolkit. These 2 innovations, though not unique on their own, but when paired together within a single training module or workshop, could address the common drawbacks of many training modules and workshops on the topic of 21st century skills. Facilitation skills

development helps with the achievement of participants in developing 21st century skills in their learners through experiential learning. And the use of a microlearning-based follow-up support toolkit improves the acceptance for participants of the knowledge and skills gained from the training workshop to be implemented at their workplace.

Consider that skills require experiential learning, and that facilitation is one way to produce such experiential learning in learners, so make sure that the participating teachers have a means to develop those facilitation skills during the workshop (Ritchie et al., 2020). And after the workshop is completed, consider using some form of follow-up support as soon as possible to allow participants to continue practicing at their workplace with adequate guidance from some form of coaching (Crawford et al., 2017).

Recommendations include introducing a microlearning snippet—a recent addition to the microlearning-based follow-up support toolkit—that provides users with opportunities to learn something new each time they use it. Additionally, using microlearning snippets during follow-up support has been shown to produce positive behavioral changes (Khan, 2019).

Conflict of Interest

The authors declare that there is no conflict of interest.

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