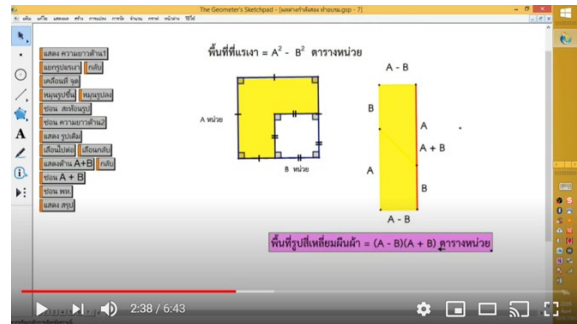


3.2 Examples of qualified online lessons

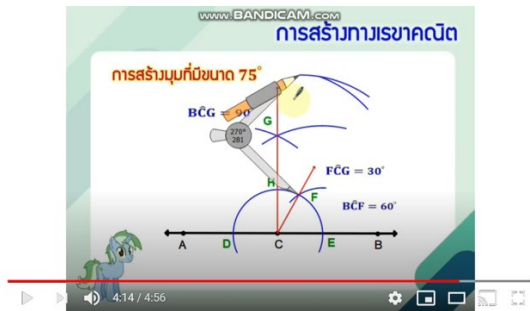
Among 156 submissions, 85 lessons are qualified. Some of the qualified lessons are illustrated in Figure 1. The lesson in Figure 1a shows the subtraction of two negative integers. This lesson was recorded using slideshow with animation. The lesson in Figure 1b shows how to factor the difference of two perfect squares. This lesson was created using the Geometer's Sketchpad and recorded using a screen recording program. The lesson in Figure 1c demonstrates how to draw a 75° angle using a straightedge and compass. This lesson was created using an online geometry application and recorded using a screen recording program. The lesson in Figure 1d shows how to find the sample space and events of a random experiment. This lesson was recorded using slideshow with animation. All qualified lessons are published on the SSRUIC MOOC website, as illustrated in Figure 2.



a.



b.



c.



d.

Figure 1 Examples of qualified lessons

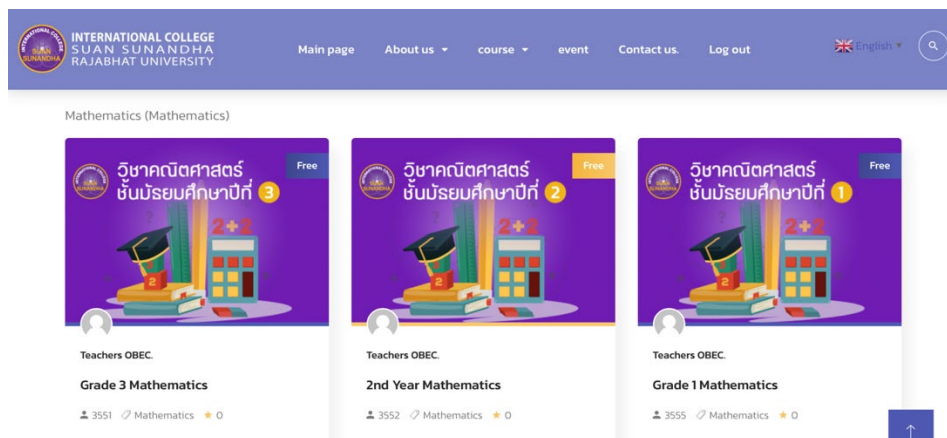


Figure 2 Online learning platform created for this project

3.2 Attendance and satisfaction

A total of 224 participants responded to the questionnaire. They were 67 Grade-7 teachers (29.91%), 72 Grade-8 teachers (32.14%), and 85 Grade-9 teachers (37.95%). Note that teaching levels were considered based on the lessons they submitted. In practice, many teachers teach more than one level. For the analysis, participants were classified into groups according to the activities they attended (3 phases, as mentioned above), as illustrated in Table 3. It was found that the highest proportion of participants (37.5%) attended only on-site workshops. However, there was also a large group of participants who attended all the activities (33.04%).

The average satisfaction in each aspect was shown in Table 4. The aspect with the highest satisfaction level was "Benefits in practicing and revising" in Phase 3. And the aspect with the lowest satisfaction level was "Knowledge gained from online materials" in Phase 1. However, the overall satisfaction level was at 4.16 (Very good), and the standard deviation was 0.68.

Table 3 Distribution of the participants attended in the blended online learning activities

Group	Participated activities			No. of participants
	Phase 1	Phase 2	Phase 3	
Group 1	✓	✓	✓	74 (33.04%)
Group 2	✓	✓	-	3 (1.34%)
Group 3	✓	-	✓	37 (16.52%)
Group 4	-	✓	✓	17 (7.59%)
Group 5	✓	-	-	4 (1.78%)
Group 6	-	✓	-	6 (2.68%)
Group 7	-	-	✓	83 (37.05%)
Total				224 (100%)

Table 4 Participants' satisfaction (N=224)

Aspect	Satisfaction level	
	Mean	SD
Phase 1		
Knowledge gained from online materials	3.97	0.69
Adequacy of the materials provided	4.22	0.65
Benefits in learning and working	4.34	0.64
Phase 2		
Knowledge gained from online sessions	4.06	0.71
Schedule and time management	3.78	0.82
Benefits in creating online lessons	4.08	0.69
Phase 3		
Knowledge gained from the on-site workshop	4.22	0.65
Meet the needs	4.31	0.65
Benefits of practicing and revising	4.46	0.62
Overall	4.16	0.68

4. Conclusion and Discussion

The primary purpose of this blended online training program was to equip mathematics teachers with the required knowledge and skills to face reformation in education. This professional development program employed TPCK activities to support teachers to create online lessons.

In this training program, the organizer let participants choose their preferred topics and production techniques. As shown in Table 1, the strand with the highest number of submissions was the Number and Algebra. This was probably because this chapter will soon be taught in the upcoming semester. This implies that participants were willing to implement the lessons they produced in the actual teaching/learning. The most preferred production method was slideshow recording using PowerPoint, as shown in Table 2. This was corresponded to [14] stating that time and available resources are important factors that influence the use of educational technology.

From Table 3, the teachers who did not attend Phase 1 and/or Phase 2 were allowed to attend Phase 3, which is on-site training. This caused the unequal numbers of participants in the analysis (156 for objective 1 and 224 for objective 2). From the results, it was found that many participants (37.5%) attended only on-site workshops. This can be described based on qualitative feedback saying that teachers already had a huge workload during the pandemic. Although there was no face-to-face session, teachers still needed to manage online classes (e.g., via video conferencing and digital TV channels). However, participants remained focused on producing online lessons as summarized from the satisfaction survey results, as shown in Table 4. However, due to the high workload mentioned above, the produced online lessons did not cover all strands in junior high school mathematics shown in Table 1.

5. Limitation and suggestion

As suggested above, time and existing workload are important factors that obstruct the development of online lessons. Facilities and equipment also play a crucial part since advanced video production techniques require hi-end devices and strong internet. However, the organizer provided alternatives to support teachers with limitations. Teachers were able to participate even though they only had basic equipment. We also emphasized the use of free software and online services.

The teacher training program is important in professional development to enhance the necessary skills to meet the new challenges in education. The rise of new teaching strategies and technology encourages the interaction between teachers and students and shifts the focus of global education from traditional classroom settings to online, on-demand, and autonomous learning.

One important in conducting a multi-phase blended online training program is to keep the evaluation process as a key-driven step to assist the design of the incoming phase. The design-based approach consisting of planning, designing, implementing, and evaluating for each phase can be applied for future works (see [15]).

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