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Building Bridges to a Sustainable Future: Inclusive Collaboration and Innovation in Education, Science, and Culture

The Effectiveness of Online Course Models for Professional Development of Mathematics Teachers

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Background and Rationale

- Teacher and student factors have a dominant influence on mathematics achievement in Southeast Asia besides family, school, and policy-maker factors (Martina, Maat, & Iksan, 2021)
- The results of PISA 2022 show that students' anxiety levels towards mathematics are higher compared to 2012 (OECD, 2023).
- Only a few research on the impact of mathematics teacher professional development on teaching quality and student learning outcomes in non-Western contexts (Yang and Kaiser, 2022)
- This encourages the need to improve the quality of mathematics teaching through teacher training and studies in a Southeast Asian (non-western) context.

Challenges in Providing Teacher Training (UNESCO)

- need time to attend training so they have to leave the classroom
- It costs money, especially if there are a lot of teachers
- Holding online or hybrid training is considered more efficient
- Teachers' access to computers and the internet is limited

However, almost everyone has a smartphone and navigating the digital space is very easy using a smartphone.

Factors that influence the effectiveness of online training (Jung, 2001)

The integration of classroom learning plans in the process of developing and implementing online learning

Practical needs-based

The integration of various Internet features

Various technology features

Active interaction with instructors

Facilitator Skills

Effective online training

- Teacher training must be more in line with the realities in the classroom, which can differ from one class to another so that sustainable training design is needed (Sabilah & Sioson, 2024)
- In training, teachers must develop a sense of independence and confidence in their teaching abilities (Revina, Pramana, Bjork, & Suryadarma, 2023)
- SEAQiM developed two online course models that allow teachers to practice and reflect on their learning in addition to gaining new knowledge
- These models were developed as an improvement on the model that was implemented in 2023.

Online Course Model developed by SEAQiM

In-On-In Model

Topics:

1. Regular Course on Integrating ICT in Mathematics Education for Junior High School Mathematics Teachers
2. Regular Course on Southeast Asia Realistic Mathematics Education (SEA-RME) for Primary School Teachers.

1st In-stage: participants receive material from the resource person via Zoom (synchronous via Zoom)

On-stage: participants apply the material in their respective classes which is carried out on the fourth and fifth days. When participants carry out the implementation, Google Classroom is prepared as a means of communication and discussion between participants and resource persons (asynchronously).

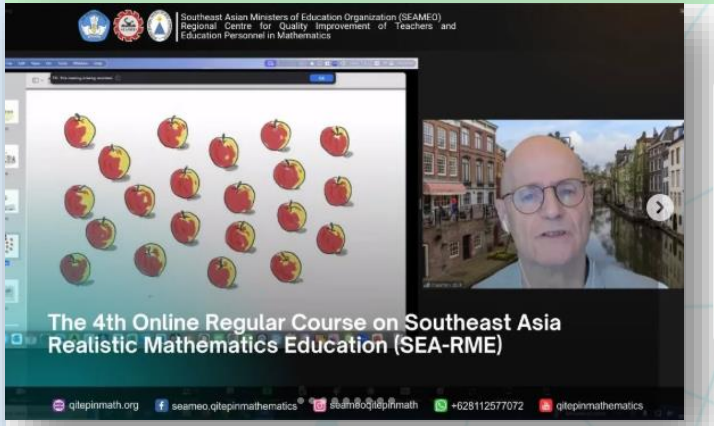
2nd In-stage: participants reflect on their classroom learning practices facilitated through Google Classroom.

The Open Online Course Model

Topic:

Mathematics Learning to Develop Students' Agency: Numbers and Operation (Batch 2)

- Participants follow several lessons of material delivery and each lesson will end with an assignment (asynchronous via Moodle)
- At the end of each lesson, a synchronous session is held to discuss with the facilitator via Zoom.



The Research Questions

1. What is the customer satisfaction index achieved by the two models?
2. Are there differences in participants' training needs between the two models?
3. What are participants' suggestions for improving training services?

Methodology

Quantitative method by using a survey

Data collection: questionnaires (Google form), Likert scale and open questions

Data analysis technique:

- Statistic descriptive (mean and standard deviation)
- CSI= $\frac{(average\ (mean\ per\ indicators\ of\ X1+X2+X3)\times(\frac{10}{How\ many\ point\ per\ indicators})\div 10)}{3}\times 100\%$

  *X*1=Course deliberations

  *X*2=Content, delivery and outcome

  *X*3=usefulness of the course sessions
- qualitative data analysis (Miles, Huberman & Saldaña, 2014)

Participants of Survey

Course	Participants					Total Number
	Cambodia	Malaysia	Myanmar	Thailand	Indonesia	
ICT	2	2	1	2	21	28
SEA-RME	2	2	1	1	16	22
Students' Agency	Primary School	Junior High School	Senior/Vocational High School	College Student	Education Personnel	
	50	26	6	34	1	117
Total survey participants						167

Findings

CSI Comparison Between Two Online Course Models

No	Customer Satisfaction Index	In-On-In Course Model		Open Online Course Model
		ICT	SEA-RME	Students' Agency
1	Course Deliberation	92,50%	98,66%	93,75%
2	Content, Delivery, and Outcome	89,67%	96,13%	89,56%
3	Usefulness of Course Sessions	91,14%	100,00%	90,69%
4	Time Management per topic	40,21%	67,34%	56,28%
	Average per Course Theme	78,38%	90,53%	82,57%
	Average per Course model	**84,46%**		**82,57%**

Qualitative Data Analysis Result

No	Aspect	In-On-In Course Model
1	Course Time	The time is so short to do the implementation because all teachers need to respond to their works in their school too
		Participants had difficulty focusing on the activity because they were given other tasks from school.
		The activity schedule should be outside of teaching hours
2	Learning strategies	Too many assignments, too little time for real teaching, or no need for real teaching but just peer teaching

No	Aspect	Open Online Course Model
1	Course Time	Participants can adjust the time
		The duration for studying each lesson needs to be increased to give participants who experience technical difficulties the opportunity to complete their assignments.
2	Learning strategies	Need a solution for participants who experience problems when studying independently
		The language used needs to be adjusted so that it is easy for teachers to understand
		Participants can access training materials in the form of videos even though the session has finished because the explanations in the videos are very helpful for participants who want to re-learn the material that has been passed.
		Participants want to be able to communicate with other participants using platforms other than Moodle.
		There are no individual assignments for participants to be able to develop learning according to the applicable curriculum so that it can be directly applied in class.
		Lack of discussion in delivering the material
3	Assessments	Answering questions from videos does not necessarily measure participants' understanding of the training material.
		Participants who pass the deadline because they forget or have other matters are still given a second chance to continue the course. Using a system that automatically stops participants from learning is not the right consequence. This is because it has closed the opportunity for participants who want to learn not intentionally stop learning.

Conclusion

1. The customer satisfaction index achieved by the In-On-In online course model is 84.46% (excellent) and the open online course model is 82.57% (excellent).
2. The In-On-In online course model requires a schedule that is adjusted to the teacher's duties at school. The open online course model with LMS is more flexible because it can be followed anywhere and anytime, however participant requires flexibility in the duration of each lesson. The open online course model requires more independence from participants compared to the In-On-In online course model. Both course models need to provide participants with the opportunity to practice in their respective classes.
3. Learning time needs to be adjusted to the teacher's activities. Participants want enough time to learn ICT content before they are ready to try it in class. A drop-out system in the Open Online Course needs to be considered so that participants who experience technical difficulties can catch up.

Recommendations

Teachers participating in online courses experience challenges related to time management. Therefore, improving the professionalism of mathematics teachers related to useful technology in the classroom requires support from various parties. Furthermore, it is necessary to design the sustainability of the program through collaboration between various stakeholders and actively involving teachers.

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