



**Southeast Asian Ministers of Education Organisation
Regional Centre for Education in Science and Mathematics**

***Online Teaching and Learning in Primary Mathematics:
Professional Development Program for SEAMEO Countries***

Ida Karnasih

ikarnasih2001@yahoo.com

**Teoh Boon Tat, Michael Liau Tet Loke
SEAMEO RECSAM, Penang, Malaysia**

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Ida Karnasih, Teoh Boon Tat, Michael Liau Tet Loke
SEAMEO RECSAM, Penang, Malaysia
ikarnasih2001@yahoo.com

Abstract

Online teaching and learning in mathematics education in primary school have emerged as major issues for consideration. Technology in its myriad proposal and applications must of necessity be developed satisfactorily and sufficiently to be use to mandkind. It is imperative that primary school and institution be aware of what is happening and be able to immerse themselves completely in research and change. To use on online learning is important in many areas. Such needs and clarifications have been spelt out precisely and pragmatically as the surfacing option to be addressed globally. Thus, such regional conseptualizations and conctruct can be solved through online taeching and learning, and through exposures and instructions in professional development program in RECSAM for Southeast Asian Teacher And Educator. This paper reports online teaching and learning course conducted at RECSAM. Undoubtedly this paper exmine factors which wil help to promote, foster and develop online teaching and learning implementation in primary mathematics classroom to face needs as they arise.

Key words: *Online teaching and leraning, professinoal development, RECSAM, Primary Mathematics*

INTRODUCTION

SEAMEO RECSAM as a centre of excellence for training, research and development as well as pedagogical consultancy in Scieince, Mathematics and Technology Education has the mission to achieve regional, national and internation recognition in the SEAMEO member countries. For this mission the Centre is committed to nurture and enhance the quality of Science, Mathematics, and Technology education by developing and delivering flexible, innovative and relevant program.

One of the management philosophies of SEAMEO RECSAM is to design innovative and challenging programs and activities which addres the needs of Countries in line with contemporary advances in mathematics, science and technology implementing quality, innovative and relevant training programs. SEAMEO RECSAM in its programmes &activities for the 8thfive-year plan (2003, p.3) has put “*Integrating Information and Communication Technology (ICT) in teaching & learning*” as the major theme of the course programs with sub-themes: (1) hand-held tecnology; (2) courseware and software applications; (3) internet- based learning. And (4) multimedia. The course offered are

incorporated in the training curriculum in each of the courses offered, including classroom teaching and learning, enrichment programs, theory into practice as well as action research or lesson study.

It has been programmed for the recent and future training in SEAMEO RECSAM to train teachers with high *potential capabilities* and *creativity* in the teaching and learning of science and mathematics using technology. To achieve this aim, this Centre is trying to enhance the scientific, mathematical and technological literacy as well as the innovative capacity of the trainees, also including providing support for the development of a new generation of excellent teachers for mathematics education in the SEAMEO region. On line learning has become one of the initiatives in the training programs of the in-service teacher education at SEAMEO RECSAM under sub theme Internet- Based-Learning. In the subsequent section, this paper illustrates the various concepts and traits as well as program implementation of one specific course on “online learning mathematics for primary teacher.”

This article attempts to inform educators, teacher and curriculum developers on the program, the implementation and the evaluations of the professional development program in SEAMEO RECSAM on online teaching and learning course, a one month professional development program for primary school mathematics teacher/educator from South-East Asian region. The focus of this paper is on what experience should be given to the trainees in enhancing their knowledge and skills in developing an instruction on online learning and its implementation in primary mathematics training programs to geographically scattered populations of student and teacher in South East Asian countries, it is best to know if the program, the method of course delivery is a successful and appropriate method for training teachers at primary level. The benefits for the trainee teachers and their evaluation of the programs are explained in this paper.

REVIEW OF LITERATURE

What is Online Learning?

Online learning, also referred to as Web-based learning, is learning that takes place via computer connected to the internet. Typically the learner logs into a system and accesses information from an instructor or tutorial. The learner then follows an established sequence. At each step the learner interacts with the computer to access more information or supporting resources from the Internet (Harriman, 2004).

Online learning, also known as “online education”, uses the anytime, anywhere power of the internet to deliver classes where and when it is convenient for participants/students. The online learning environment functions much like a classroom setting but without everyone in the same place at the same time. Participants have access to lecture materials, interaction with their instructor and classmate, and assignments administered through their online class. Classes run on the same schedule as on – classes the difference is student’s/participant’s decide when during the week students or participant’s work on class content and weekly assignment while still progressing through the course at a set rate.

Online classes help student/ participants who need a flexible schedule and achieve their educational goals. The flexibility within the framework of online learning make student enjoy the ability to work on their classes when it is convenient, while still participating in a fully interactive course structure. It requires discipline and dedication within a flexible

schedule. Student interact with their instructor and classmates. Within their online classes there are several communication tools that will keep students/participants in touch with their instructor and classmate. Threaded discussions act much like classroom discussion, but without having to have everyone in one place at one time.

Facilitator will post topics for discussion to which student/participant and their classmates will respond. Student will also have many opportunities to respond to comment from their fellow classmates. Email will allow them to send private messages to their instructor or their classmates. They also can use a Chat Function that allows them to communicate with other in real-time, though this is used sparingly as it requires all participating parties to be online at the same time. Assignment can also be uploaded or email to their instructor with other student through the online class.

Synchronous and Asynchronous Learning

Synchronous and Asynchronous Learning were conducted during the course. Synchronous Learning has the obvious advantage of providing immediate access and feedback from instructor. This face-to-face (real or virtual) access to the facilitator has the cost to the learning measured in commitment to a schedule and in some cases to a location. Synchronous Learning was done to get the benefit of the live interaction of a commitment to schedule and or/location.

A synchronous learning is done to provide the trainee teachers and the facilitator with a choice of location and time. While it is flexibility, which is often the focus of interest, there are a number of hidden advantages to a synchronous learning. The physical distance that is often seen by many as a disadvantage can have positive effects by making trainee teachers and facilitator more objective, less fearful of comment or criticisms, less prone to cultural barriers (especially as a world wide online culture develops), and more inclined to think through problem before responding (Harriman, 2004)

Blended Learning Model

The course conducted in SEAMEO RECSAM on online for the professional development program is *blended learning*. Blended learning is viewed as mid-way along a continuum that at one extreme has traditional face-to face instruction, and at the other extreme totally web-based instruction (Graham, 2006). It is an integrated component of a course designed to produce a more effective learning outcomes associated with blended learning as compared to

entirely face-to face instruction and fully online learning. Some result of the studies on blended learning show that:

1. Students in blended learning courses outperform those in face-to face and internet only courses (fRanks, 2002).
2. On average, blended learning courses have higher success rates and lower withdrawal rates than their comparable face-to face courses (Dziuban, Hartman, Juge, Moskal & Sorg, 2006). Additionally, the majority of faculty teaching in those courses indicated that more and higher quality interaction occurred in their blended courses than in their comparable face-to face sections.
3. Student liked that blended learning provided scheduling flexibility and varied learning opportunities, while maintaining traditional classroom experiences such as in class discussion. Both faculty and students in the study felt that the online component of

blended learning encouraged the development of critical thinking skill (Owston, Garrison & Cook, 2006).

4. Blended learning format was an effective model for meeting the needs and learning styles of busy teaching professionals (Curtis & Swenson, 2003).
5. Blending online instruction with the field experiences pre service teacher education candidates was able to create engaging and meaningful learning experiences for their teacher candidates (Reynolds & Greiner, 2006)

Blended learning offers advantages which may be relevant to professional development. These include: allowing instructors the opportunity to develop e-learning skills in small increments; making training materials available to learner before or after face-to-face workshops; and preserving the investment in traditional teaching materials that have worked well in the past (Driscoll, 2002).

The benefit of Online Learning

The benefits of online learning may vary depending on teaching approach. The perception of whether something is a benefit or a challenge is based on learning style and learner needs. However, below is a list of the most common things learners have listed as benefits of online learning. Harriman (2004, p.1)

1. Allows the learner to study when and where they are most productive
2. Allows the learner to update his/her skills without interruption of career or personal commitments.
3. In many instances allows for the tailoring to individual needs or schedules
4. Allows employed learner to put new knowledge to work for their company even while they learn.
5. Open door of opportunity to those that could not attend a traditional campus
6. Allows learner to become part of a community, class, or cohort of learners with similar needs. Those communities may continue to exist in forums after completion of course.
7. Allows for real time exchanges as well as synchronous exchanges eliminating time and distance barriers to communication.
8. Allows the integration of internet resources.

The benefit of Online Discussion

One of the important aspects in online learning is online discussion. Online discussions provide opportunities to support, continue and/ or extend class discussions. Next paragraphs describe specific ways in which the online discussions enhance teaching and learning.

a. Online discussions build a community for reflection and learning

A primary outcome was that the online discussions helped to build a sense of community among the participants and enhanced opportunities for reflection by providing a forum for dialog that might not have occurred in face-to-face discussion.

b. Online discussions support individual reflection

Many teacher educators have reported success in using journal to promote reflection and learning in pre-service teachers. They found that participating in an online discussion facilitated reflections similar to the reflective thinking brought about in

journal writing for, while providing the additional benefit of sharing their reflections with other. Specifically, the online venue helped facilitate the participant constructions of their teaching and learning philosophy in that it required to think about and clearly state their viewpoint, and then to continue to clarify these views as other shared their experiences and supported or challenged their perspectives.

c. *Online discussions support interactive, shared reflection time frame*

Not only did the online discussions provide the foundation for future in class interactions, they also enabled in class discussions to continue beyond class time. The interactive nature of the online discussions combined with the lack of restrictions on time provided the opportunity to extend course discussions and activities, to build on others ideas and perspectives and more deeply challenge their own notions about the nature of mathematics and their belief about mathematics teaching.

d. *Additional assessment opportunities to inform instruction*

Online learning provided important assessment information for the facilitators in considering how participants understanding some of the issues and which instructional approach were most helpful in their learning.

Computer Technology and Online learning in Mathematics Classroom

Advanced computer technologies have been used in mathematics classroom at an increasing pace. There is already growing body of literature that supports and believes in the use of emerging technologies for purpose of teaching and learning (Beevers & Peterson, 2003; Wolf, 1988). For instance, Piaget and other (Forman & Pufall, 1988; Wolf, 1988) trust in the potential of instructional technologies in cognitive development in the sense that they can provide interaction, the intense pursuit of knowledge through action on experiments with material objects, as well as thinking skills on those object. Wolf (1988) adds, "Computer are only promising as our ability to realize engaging and demanding interactions through them" (p.213). Thus, socialized constructivist learning and environment can be established through communication tools (Luca & McLoughlin, 2004). Consequently, the mounting use of technology for the purpose of providing socialized learning environments has resulted in a need for a shift in our pedagogy of teaching and learning mathematics.

Distance modes of learning have become popular worldwide over the past three decades, especially in the areas of mathematics and mathematics education (Arnold, Shiu & Ellerton, 1996). Online learning has become a recognized method of education for student, and a great number of colleges and universities offer online mathematics courses. Online learning offers a solution to meeting educational needs at all levels. The computer communications revolution of the 21st century brought a "paradigm shift in attitude towards online education," and "our new understanding of the very nature of learning has affected the definition, design, and delivery of education" (Harasim, 2000, p.42). Improving the pedagogical skills of teachers of mathematics, particularly in primary and secondary school mathematics, is a key priority of most countries in South Asian. Although there is general consensus on the element of what constitutes an effective teacher professional development for mathematics teacher, the challenge is how to design and implement a program that embodies these principles (Luock-Horsley, Love, Stiles, Mundry & Hewson, 2003).

The success of online mathematics education initiatives depends on the identification of ways to encourage teacher to make significant shifts in their beliefs and practise that are deeply tied to school mathematics traditions. Rosenshine & Stevens (1986) point out that all

teachers will at some point use all the important teaching skills. However, the effective teacher is the individual who in response to student need uses the skills at the right time in the right amount. This professional development programs also try to encourage and change teacher's perceptions towards the use of online teaching and learning throughout the course prescribed.

Computer have increasingly been used as tool for computational purposes, for enhancing thinking and understanding of abstract concept in mathematics. Van Weert (1994) argued that computer will also force mathematics educations to change its focus, its organization and its technology. Furthermore he explained that through the use of the technology computer focus will change from teaching to learning, its organization of learning and the learning tasks of individual student.

During the 1990s many distance education course developers believed that the main goal of any mathematics education course was for the teacher to enable student to learn basic knowledge and skills (Arnold et al., 1996). These course developers viewed mathematics as a body of fact, definitions as described, and theorem that were independent of human reasoning. This kind of orientation, as described by Ellerton and Clements (1990), has given rise to the notion that mathematics curriculum for distance courses "should be hierarchical in nature" (p.719) and that mathematics teachers should emphasize the importance of the basic mathematical facts and skills.

Research on the learning of mathematics has demonstrated that conceptual understanding is one of the significant components of one's proficiency in mathematics (Bransford, Brown & Cocking, 1990). Moreover, conceptual understanding is needed in mathematics associated with reasoning and communication, distance or online learning in mathematics should be concerned with this aspect of field.

Brown (1978) suggested that there are four types of mathematical learning: (1) simple recall, (2) algorithmic learning, (3) conceptual learning and (4) problem solving. Nowadays, there is a trend in revising the conventional view of mathematics learning as the mastery of fixed set of facts and procedures to processes that encourage explorations and investigations, sense making, reasoning and communication and from representation in mathematics classroom. Bringing about these changes in mathematics instruction requires that teacher possess beliefs about mathematics teaching and learning that is significantly different from school mathematics traditions (Batista, 1994; Thompson, 1992). With these trends, the online teaching and learning also have to help students to enhance and to achieve these needs.

Professional Development Course On Online Teaching And Learning

One approach that appears promising now that the Internet is widely accessible to teacher is to design programs that combine traditional face-to-face professional development sessions with self-directed online learning called *blended learning*. The blended learning program can combine the increased motivations, socialization, intense focus and spontaneity that can occur in live sessions with the online sharing thoughts and reflections, extended discussions and learning at times and locations convenient to the learner (Bronk & Graham, 2006).

Research has shown that professional development is most effective when it is long term, collaborative, school based, focused on the learning of all students, and linked to the curriculum that teachers have to teach (Hilbert, Gallimore & Stigler, 2002). When professional development is conducted in this way, teachers of mathematics and science are more likely to

change their instructional practices, gain greater subject matter knowledge, and improve their teaching skills (Garret, Porter, Desimone, Birman & Yoon, 2001). The potential for the professional development to have a direct positive impact on student achievement is also increased (Cohen & Hill, 2001; Darling-Hammond & Youngs, 2002; Wenglinsky, 2000). Moreover, Loucks-Horsley et al. 2003 emphasize that current conceptions of professional development that focus on teacher collaboration and experiential learning mirror contemporary reform of mathematics and science education. They contend that teachers who participate in professional development activities of this nature are better prepared to introduce best practices into their classroom as they have experienced this kind of learning themselves.

Many different professional development strategies have been employed to incorporate at least some of these principles. The choice of strategy depends upon the particular purpose of the professional development—whether it is to be developed awareness to new approaches or content, build content and pedagogical knowledge, translate new knowledge into practice, practice teaching in new ways, or to reflect on teaching and learning (Brown & Smith, 1997). Strategies that have been used for mathematics and science include professional network, study groups, intensive summer institutes, partnerships with scientists or mathematicians, coaching, lesson study, examining student's work, and linking professional development closely to new curriculum materials (Loucks et al., 2003)

RECSAM'S PROGRAMS ON ONLINE LEARNING

Regular Course on Online Learning

The idea for online learning courses has been planned on RECSAM's Programmes and Activities for the 8th Five-Year plan for Primary and Secondary school teacher to enhance the skill mathematics and science/technology. Scholarships are given to the participants from eleven SEAMEO member countries consisted of one participant for each country for each course. For the period of 5 years (2005-2010), there are only two online learning courses offered in RECSAM for mathematics.

1. PM 2233: Enhancing online Teaching and Learning for Primary Mathematics Teachers
2. SM 2233: Enhancing online Teaching and Learning for Secondary Mathematics teacher

The main goals with regard to training education in online learning are: (1) to improve teacher attitudes, knowledge, and classroom practice on online learning and (2) to improve teacher's performance and skills in designing and implementing the online learning in primary mathematics. The course endeavors to provide opportunities for primary school mathematics teachers to explore systematically on how to leverage ICT, especially the Internet and Intranet for teaching and learning. The main objective of this course is to introduce participants various online strategies that can be used to teach and learn in primary mathematics. The course was offered for four weeks to eleven mathematics teachers from SEAMEO member countries included: Brunei, Cambodia, Indonesia, Laos, PDR, Malaysia, Myanmar, Philippines, Singapore, Vietnam, Thailand and Timor Leste. But Timor Leste until now has never sent any participants yet.

The Implemented Curriculum

Course Description

The course code is PM -2233, entitled “Online Teaching and Learning Mathematics for Primary Teacher”. The main objective of this course is to introduce participants to the various online strategies that can be used to teach and learn in primary mathematics. The course stresses on a good grasp of the use of ICT in online teaching learning, classroom practice and action research. Emphasis is given to discussions and activities to demonstrate the strategies involved in the teaching and learning of mathematics through the use of Internet and Intranet. Within the duration of four weeks, several modules are offered in these courses which cover for 120 hours. All of the modules in the course developed by facilitators related directly to the RECSAM ‘s 8th Five Year Plan for Fiscal Year 2005- 2010 (RECSAM, 2003, P.62-64).

The online teaching and learning for mathematics for Primary teachers course focuses on strands in : General Components (13,33%), Core Components (83,33%) and Enrichment activities (3,3,%). The course is designed and controlled so that the organization and dynamics of the online course environments provide effective learning. It takes into account for the facilitators the pedagogical and organizational issues that occur due to the nature of the technology based-learning environments

For this course, the general component consisted of three topics: (1) Basic ICT; (2) Multiplier Effects; and (3) Classroom Action Research for Professional Development. The ICT Pedagogy component comprises of : (1) Trends and Issues in Mathematics & Online Math Education; (2) Search engines: Effective & Productive Use; (3) Web Design: Knowledge as Design in Web Design; (4) data processing tool: Spreadsheets; (5) Assessment: and (6) Theory into practice; Instructional Design and Project Work. Online components consisted of topics: (1) Best Practices: Online Collaborative Approach; (2) Online Inquiry Approach; (3) Online cooperative Approach; (4) Online Problem Solving; (5) Essence of effective E-Learning: E-learning system, synchronous Mode and Asynchronous Mode: and (6) Online Mathematics offline

Regular Class Activities

Some topics including the general components topics in the course were conducted using regular class face-to-face only without online activities, but other topics on Basic ICT, ICT pedagogy and online learning topics were conducted using blended learning activities. For the regular class activities RECSAM use the constructivist paradigm of teaching and learning . More hands – on and self regulated learning were implemented for teaching the topics.

Online Discussions With Trainee Teacher

For the implementation of the online topics, the course facilitator began with a whole group introduction to the upcoming modules in the classroom followed by the activities in the lab. For the online activities, frequently, facilitator Ask the group to break up into small working groups to try out an activity or discuss a topic. Once in a while during or after class, facilitator broke into the group into one of four or five teams that paralleled the online discussion group in which they participated. This gave trainee teacher an opportunity to work at hands-on activities, share their experiences in trying out their ideas in their classrooms, and

discuss the topic presented during the morning. At the final session in each class, team of teacher reported the activities they developed to the whole group after online sessions.

Course Assignment

There were several course assignments to be completed for online learning courses: individual assignment for different topics from different facilitator, Writing Multiplier Effects Proposal And Project Work.

1. Individual assignment was done concurrently with the topic taught by different facilitators.
2. The multiplier effects proposal was developed by each participant. It was a program to be conducted by each participant. It was a program to be conducted by each participant in his/her own institutions in his/her own country after the training.
3. For the project work, participants were divided into two groups to develop project work included: the preparatory session, lesson plan, worksheets, assignment teachers' and student' guide, teaching and learning aids, findings, discussions and suggestions.

At the final session of the course, teams of teacher presented project they developed to whole group. Two samples of the participants' project work in this course were:

- a) "Enhancing online Teaching and Learning of Fractions in Primary Mathematics"
- b) "Enhancing online Teaching and Learning of Geometry in Primary Mathematics"

Theory into Practice Activities

The theory into practice section consisted of: (1) instructional design with its subtopics: Principles, Analysis, Design, and development, and implementation or lesson try-out and Evaluation and Improvement; (2) Project Work. There were two activities implemented for the practical activities on try out: preparatory session and lesson try-out.

Preparatory session for School Try-outs

Thirty students of Year 5 and 6 from Sekolah Kebangsaan Batu Lancang attended a preparatory session on Thursday 16 November 2006, 8.30 am to 12.00 noon. These students were divided into two groups equally in gender and year, assembled in two different labs: Smart Mathematics Lab 1 and Cambodia Lab respectively. During session, the course participants got first hand experience in getting to know the student, their computer skills and related knowledge in mathematics. Students were introduced to RECSAM eLearn using Moodle. Students without emails were required to register on RECSAM eLearn site where the students were login from home and was given to them as <http://210.187.10.224.moodle>.

Lesson Try-Outs

Asynchronous online try-outs were carried out for three days from 20 to 22 November 2006. The students login and undertook activities planned by the participants. They also post answer in discussion boards set up. Synchronous sessions were held from 8.00 pm to 9.00 pm during these days, when the students login to file questions regarding problem faced during day in chat rooms. Participants were hand to handle their questions and to motivate them in their lessons.

Enrichment Activities

In addition to held knowledge and skills gained from the lectures and workshop, the course participants had also acquired some first-hand information and experiences through field trips and informal visits to places of interest in Penang and Malaysia. The objectives of visits and field trips were: (1) to understand the multiracial, multicultural, and multi religious setting of Penang and Malaysia in fostering the local and national educational system, such as outdoor nature study at Penang Hill and a study visit to the Universiti Sains Malaysia Science Gallery; (2) to expose the participants to mathematics and science in various fields related to daily lives through field trips and interactive hand-on/minds-on activities at the Kuala Lumpur Science Centre, Petrosains, Petronas Twin Tower, and The USM Science Gallery.

COURSE EVALUATION

The course evaluation briefly describes about the participants' perceptions and reactions toward the course, participants' feedback on the quality of contents/ materials used, participants' use of knowledge and skills after the course, the applicability of knowledge and skills gained from the training, and the plans of actions after the course.

Participants' Perceptions Toward the Course

Pretest was given by the course supervisor on the first day of the course, consisted of 28 questions in Section A to determine trainees' perceptions of their knowledge and competency with regard to the contents and topics of the course. The test used a 6-point Likert Scale as follows: 1-none at all; 2-very low; 3-low; 4-moderate; 5-high; 6-very high, and 10 open questions in section B to determine their perceptions on course objectives. Used a 6-point Likert Scale as follows: 1- totally disagree; 2-moderately disagree; 3-slightly disagree; 4-slightly agree; 5-moderately agree; 6-totally agree. A similar instrument, with an additional section on participants' reflections and feedback, was administered as posttest given the trainee teacher at the end of the course. The result of the pretest and posttest with the score gain can be seen in Table 1. The mean scores for both pretest and posttest were computed. The results are shown in Table 1.

As shown in Table 1 and Table 2 all the participants perceived that they had improved their course knowledge and skills, as well as in the course objectives after the course input. Based on the 6-point Likert scale of 1-6, Table 3 shows the course content mean score increased from 2.34 to 4.88 with a gain of 2.54 and the course objectives mean score increased from 3.38 to 4.90 with a gain of 1.53.

Participants	Perceptions of Course Content			Perception of Course Objectives		
	Pre test	Post Test	Gain	Pre Test	Post Test	Gain
1. Participant 1 (Brunei)	3.57	5.07	1.50	4.40	5.60	1.20
2. Participant 2 (Thailand)	1.64	4.93	3.29	1.60	4.60	3.00
3. Participant 3 (Myanmar)	3.39	5.43	2.04	4.90	5.10	0.20
4. Participant 4 (Indonesia)	1.00	4.39	3.39	3.50	4.60	1.10
5. Participant 5 (Philippines)	3.00	4.86	1.86	5.40	5.80	0.40
6. Participant 6 (Thailand)	1.46	4.89	3.43	1.10	4.40	3.30
7. Participant 8 (Singapore)	3.11	5.00	1.89	3.70	5.10	1.40
8. Participant 9 (Malaysia)	1.54	4.43	2.89	2.40	4.00	1.60
MEAN SCORE	2.34	4.88	2.54	3.38	4.90	1.53

*Table 1: Pre test and post test scores of participants' perceptions
Participants' Reaction Toward the Course*

During the posttest, participants were asked to complete an additional section of free response questions on their perceptions of suitability of the course input, usefulness of project work and enrichment session to enhance the acquisition of knowledge and skills in this online course. Participants' response different aspects of the activities can be summarized as follows.

Course Content

For the course, these are some plan and suggestions from participants:

- Participants plan to use some content areas from the course such as: the moodle, online learning tools and strategies, web design, preparing different types of assessments, e-learning communication tools, online cooperative approach and online problem solving, but one participants suggested that web design should be left out because it does not support the project work as the skills are not required.
- Participants suggested some content areas should be added, such as online project work for students, problem based learning project. Action Research with more depth and with hands-on activities, analysis and interpretation of pupil's performance on online learning, and creating more interesting lessons by using Adobe Photoshop.

Project Work

For the project work, all participants agree to have project work to be done in the course because:

- It acts as a reference for projects done back home
- It gives participants a good hands-on experience & be prepared in implementing the project in school
- It will make the online lesson more interesting

Moreover, they suggested to improve the project with the actual online lesson that must come straight after the preparatory session to maintain the enthusiasm.

Reward System

For the reward system, all participants agreed to have reward system, because:

- It motivates the students to participate actively
- It enables students to build good feeling of competency between each others
- It reduces the gaps between the participant

Moreover, participants suggested to do the improvement by stating the virtues in detail with their characteristics.

Online Mathematics Offline

For these activities, all participants responded that the activities were suitable for the course. They suggested to improve the activities by having it in the first or second week to allow them to build up their friendship and to know the way other do and would know how to work together with other.

Computer Facility

Most of the participants responded that computer facility was enough for everybody to use and the equipment required is adequate. Some participants suggested to open computer lab for longer period of time and night time, and they suggested RECSAM to provide laptops to be used by participants.

Participants' Feedback on the Quality of Contents/Materials Used

From the course, some participants got new knowledge and skill in online teaching and learning mathematics for primary school, and some participants who had experiences before got improvement in implementing the online teaching and learning. Table 2 below explained some participants comments on their learning from the course attended.

The participants' evaluations of the quality of contents/materials used in their respective courses are summarized in the Table 2. (Wahyudi, 2006). The mean scores ranged from 3.38 to 4.25 (SD ranged from 0.46 to 0.84). the lowest score was on item 5 which indicate that this area is in need of further improvement. Similarly, participants also perceived item 6 as being the second lowest (mean 3.63). the other items were perceived the quality of contents/materials of their course as being good with the mean scores were around 4.00.

In addition, the participants were also asked to respond to the questionnaire that focused on the learning environment set up by the course supervisors, the questionnaire, 'My Learning Environment' (MLE), consist of six scale: participants cohesiveness, instructor/course supervisor support, participants' involvement, task orientation, cooperation and equity by the supervisor/instructor (Wahyudi, 2006).

Quality of Course Instruction	Mean	SD
1. Relevance of content to the course	4.25	0.46
2. Appropriateness of readings suggested	4.13	0.64
3. Suitability and quality of materials used	4.25	0.46
4. Appropriateness and quality of audio-visual materials used	4.13	0.64
5. Appropriateness and quality of laboratory sessions	3.38	0.74
6. Appropriateness and quality of laboratory materials	3.63	0.74
7. Appropriateness and quality of instructional materials	3.88	0.84
8. Appropriateness and quality of instructional support provided	3.33	0.84
9. Overall quality of course content/ materials provided	4.13	0.64

Table 2. *Participants' Perceptions of the Quality of Contents/ Materials of Their Course*

Positive responses toward the MLE have been given by the participants. Some of the score were above 4.00 means that participants felt satisfied with the learning environment prepared for this course by RECSAM. These are some examples of participants' responses:

"I help other class members who are having trouble with their work."

"The instructor/course supervisor considers my feeling".

"I give my opinion during the class discussions".

"I am ready to start this class on time".

“I cooperate with other participants when doing assignment work”.

“I receive the same encouragement from the instructor/course supervisor as other participants do”.

Participants’ use of knowledge and skills

Generally, participants agree that their knowledge and skill gained from the course, however, a few of the participants were of the opinion that some of the topics included in their course were not relevant to their needs. These views were obtained from their answers to the question: were the contents/topic of this training course relevant to your need? If not full relevant, please give your views. More over, a participant gave a comment on some topics as follows: “There were discussions in some topics that were not so much focusing to the activities most needed by the participants for the course”.

Applicability of Knowledge and Skill Gained from the Training

From eight participants attending the course, only four participants had experience on using internet in teaching mathematics. They were participants from Brunei, Myanmar, Philippines and Singapore but only one participants from Singapore had used online in teaching and learning mathematics. After the course, all of the participants expressed their views that they can either partly or fully apply the knowledge and skill gained from their respective training course in their respective jobs. The information was obtained from their responses to the question: *Would you be able to apply all the knowledge and skill gained from the training course in your job? If No, please specify the obstacles that you would face.* Although more than half of the participants responded to ‘partly applicable’ however, there was no comment from the participants regarding the obstacles that may impede the application the knowledge learnt during the course.

Plans of Action after the Course

The following shows the participants’ plans of action after completion of their respective course. These data were obtained from their responses to the question:

What do you expect to do after completion of this course:

Responses from participants of the course:

- I will use online learning and teachers and school administrators.
- I have to re-eco the course to teacher and school administrators.
- I want to give knowledge and training teachers in my school.
- I will hold a workshop referring to the Ministry of Education that we have done in our course work and done it with my colleagues back I Brunei.
- After the course, I could give this course to other teachers in my school. And could carry online learning to my students.
- I am expected to write a report and submit to Ministry of Education after completion of this course.

The responses showed that generally all participants expressed their willingness to disseminate the knowledge and skill they have gained during the course.

CONCLUSIONS AND RECOMMENDATIONS

The training could be considered as a successful one, but there were some problems encountered on this course. One of the challenges faced in managing online courses was the computer proficiency skills of the participants. Although clearly stated as a prerequisite that the participants needed to have at least one year's experience in using the Internet, some participants who had registered for this course had not had any experience in using the computer what more in using internet. As a result after consulting with some fellows specialists, two participants were offered to shift over to another paralel course PM-3222 entitled *Using the ICT in Teaching and Learning for Understanding in Primary Mathematics*. The rationale for the shift was solely to increase the probability that the participants be able to maximize the use back home what they have learnt in RECSAM.

Another challenge was the participants' proficiency in English, Most of the participants had comendable profeciency in listening skills but lacked oral and written skills in English. As a result, only those who were able were actively involved in the project work. The cooperative soirit was nevertheless excellent but somehow restricted by the language.

Besides being exposed to the Moodle as a course Management System which have many useful eatures, the participants were also introduced to the Yahoo! Messenger as a synchronous communication tool, Yahoo! Group and Google Documents & Spreadsheets for collaboratives tools. Some of these thirrd party tools are found in certain aspects much better than the managemant system.

Four weeks is a short time to leran an online course. Preferabaly more time is allocated for a more through exposure to such a course. More online teaching and learning primary or secondary mathematics are needed in the future training in RECSAM. Training through e-Learning is also to be considered to reach more participants from Southeast Asian countries get involved in the training.

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