

Development of Teaching Management Model based on the STEM Education in Phrapariyattidhamma School General Education Division

Phramaha Taratip Varavijayo (Vorasayan)¹, Intha Siriwan²
Yudthawee Kaewtongyai³, Lampong Klomkul^{*4}

^{1,2,3,4} Faculty of Education, Mahachulalongkornrajavidyalaya University, Thailand

¹Taratipvaravichayo@gmail.com, ² intha.sir@mcu.ac.th, ⁴ lampong.klom@mcu.ac.th

^{*}Corresponding Author e-mail: lampong.klom@mcu.ac.th

Abstract

The purposes of this research were 1) to study teaching management based on the STEM Education in Phrapariyattidhamma School General Education Division, 2) to develop teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division, and 3) to propose teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division. The sample group in this research were teachers, monks and novices in Phrapariyattidhamma School General Education Division with 150 samples by using simple random sampling. In documentary study, the researcher studied concepts, theories and related research in accordance with the development of teaching and learning management model based on the concept of STEM education Phrapariyattidhamma School Department of General Education. Semi-structured interview was used for interview 10 key informants. Focus Group Discussion with 8 experts was also conducted, and questionnaires was used for collecting about the usefulness, feasibility, suitability, validity with teachers, monks, novices, to examine the draft development of teaching management model based on the STEM education in Phrapariyattidhamma School General Education Division. Quantitative data were analyzed by using descriptive statistics whereas qualitative data was analyzed by using content analysis. Results of the research were as follows: 1) Teaching management based on the STEM Education in Phrapariyattidhamma School General Education Division consisted of 4 subjects which were Science (S), Technology (T), Engineer (E), and Mathematics (M). 2) Teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division was developed. Students who used the STEM Education concept based on the problem-based learning management showed that after studying, it was significantly higher than before at .05 level. 2) The students' skills and process after learning management and teaching based on STEM Education using problem-based learning was at high level. The students' opinions towards learning management according to the STEM Education using problem-based learning was at high level. 3) Teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division was proposed for teaching and learning management with effectively.

Keywords— Teaching Management Model, STEM Education, Phrapariyattidhamma School, Problem-based Learning

I. INTRODUCTION

The Core Curriculum of Basic Education, B.E. 2551 (2008), adheres to the principles of educational reform in accordance with the spirit

of the National Education Act B.E. 2542 (1999) and its amendments (No. 2), B.E. which is the power of the nation to be a balanced human being in terms of physical, knowledge,

morality, consciousness of being a Thai citizen and being a global citizen, adhering to the democratic regime of government with the King as head of state. Students have the right to freedom in a democracy able to create a form of acquiring knowledge on their own. Each person can create and acquire basic knowledge and skills through different methods, including different approaches from the instructor. with the attitude necessary to vocational education and lifelong education, focusing on the learner on the basis of the belief that everyone can learn and develop themselves to their full potential. The curriculum has set the subject groups for learning science, technology, engineering, and mathematics because all 4 subjects play an important role in the present and future world society. Technology involves everyone in everyday life and in various occupations, as well as interacting with the environment, having different experiences and being able to exchange opinions with each other and the tools and products that humans use to facilitate life and work. These are the results of knowledge in the new normal era, combined with creativity and other sciences, helping humans to develop a way of thinking, both rational, creative, analytical, critical, and have important skills in researching knowledge having the ability to solve problems in a systematic way able to make decisions based on diverse information and verifiable eyewitnesses. It is a culture of the modern world which is a knowledge-based society, so everyone needs to be developed to know in order to have a knowledge and understanding of the nature and technology created by humans, to be able to use knowledge rationally, creatively, and with morality, the subject group of Science, Technology, Engineering, Mathematics aims for learners to learn that emphasizes linking knowledge to process possess important skills in researching and building a body of knowledge through a wide range of processes for seeking knowledge and solving problems involve students in learning every step of the way. A wide range of hands-on activities are conducted, such participation is appropriate for the level [1].

Education in Science, Technology, Engineering, Mathematics is another important educational management because it has an effect on economic and social development. It is one of the tools that is of great importance for human resource development. Nowadays, Thailand has seen the importance of technology and media more and more, as technological advances have been involved in people's daily lives, there is a need to improve education so that all Thai people have knowledge and understanding in Science and Technology, Engineering, Mathematics according to individual potential human understanding of the environment helps humans to understand nature enabling human beings to develop a way of thinking and apply scientific knowledge to produce tools for life [2].

The present learning management focuses on making Thai people to be thinkers with the ability to think critically, reason and be alert to knowledge. scientific facts as well as being able to apply science and technology appropriately in their lives and livelihoods as well as contribute to the development of the country by focusing on students to develop their own abilities to their full potential. There is a balance of mind, body, intelligence and society being a connoisseur love to learn self-learning have good psychology responsible have the skills necessary for life including professional skills to be self-reliant and to cooperate with others creatively, but such learning management. Teachers have a role to play in organizing the learning context, asking challenging questions stimulate and encourage students to create new knowledge, which still has many obstacles that is most students lack the ability to think, lack of links to exploit. This makes learning science, technology, engineering, mathematics and learning achievement at an unsatisfactory level as the vision and direction of the National Economic and Social Development Plan No. 12 [3].

Education is an education that is consistent with the behavior of learners that have changed by applying modern technology. It is a tool to stimulate learning, focusing on learners to create innovations and research with science

and technology to increase the country's competitiveness in order to move towards Thai education. The Ministry of Education has provided additional support for important projects, including reducing study time, increasing learning time, and raising English language standards, develop and promote people with special talents in Science, Mathematics and Technology to develop researchers in various fields management of STEM education (STEM education), study cooperation "Weaving the power of the people's republic" [4].

Development of teaching and learning management model based on STEM concept in Phrapariyattidhamma School Department of General Education. It is another option that is used in learning because of the STEM format. It is an educational innovation that organizes activities for learners to study on their own according to their abilities, interests, and freedom to think. Everyone has the opportunity to use their ideas to the fullest taking into account the differences between individuals allows learners to engage in self-study activities rather than being instructed by the teacher or set by the teacher as the creator of learning opportunities. There are activities for individual learners or groups in which learners will proceed from the instructions that appear in the series on their own, step-by-step in accordance with the nature of children who are curious, want to invent things, organize activities for learners to participate in thinking, experiment step-by-step and know the results of their own actions. STEM activities resulted in students having higher learning achievements, learning process skills and attitudes than normal teaching and learning activities.

Development of teaching and learning management model based on STEM concept in Phrapariyattidhamma School Department of General Education enabling learners to find knowledge and answers to problems on their own and to think critically searching for reasons and seeking knowledge to link ideas to solutions to problems. Teaching and learning in Grades 1 to 6 found that there were 5 main problems [5], namely 1) the number of teachers

and educational personnel not enough for teaching and learning activities, 2) Students lack practice in connection and problem solving skills in real life, 3) According to the national achievement assessment found that the students had achievement at a level lower than the national level from the principle, 4) The teaching and learning management model has not been developed according to the concept of STEM in Phrapariyattidhamma Schools, 5) Media, equipment, learning activities still need to be better developed from the aforementioned problems and reasons. It is necessary to adjust the way of learning to change the teaching method. Therefore, it is necessary to develop a teaching and learning management model based on the concept of STEM in Phrapariyattidhamma schools, Department of General Education Educational management model that responds to prepare Thai people, new generation in the 21st century, because the nature of these four subjects promotes learners with the knowledge and ability to live well and with quality in the rapidly changing world of the 21st century based on knowledge and full of technological advances, it is also an important subject for enhancing economic competitiveness, improving the quality of life and prosperity of the country. Provide education that can develop students to apply knowledge in all fields both knowledge, thinking skills and other skills are used to solve problems, research, create and develop things in today's world, emphasis on deep understanding, engaging learners with data technological tools creating flexibility in subject matter creative challenges. The novelty and meaningful solution of lessons in STEM education is therefore suitable to enable the new generation of Thai youth to truly learn and live in the world of the future.

II. Research Objectives

The purposes of this research were 1) to study teaching management based on the STEM education in Phrapariyattidhamma School General Education Division, 2) to develop teaching management model based on the STEM Education in Phrapariyattidhamma

School General Education Division, and 3) to propose teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division.

III. Research Methods

Mixed methods research was used for research design. The sample group in this research were teachers, monks and novices in Phrapariyattidhamma School General Education Division with 150 samples by using simple random sampling. In documentary study, the researcher studied concepts, theories and related research in accordance with the development of teaching and learning management model based on the concept of STEM education Phrapariyattidhamma School

Department of General Education. Semi-structured interview was used for interview 10 key informants. Focus Group Discussion with 8 experts was also conducted, and questionnaires was used for collecting about the usefulness, feasibility, suitability, validity with teachers, monks, novices, to examine the draft development of teaching management model based on the STEM education in

Phrapariyattidhamma School General Education Division. Quantitative data were analyzed by using descriptive statistics whereas qualitative data was analyzed by using content analysis.

IV. Results

The researcher summarizes the research results according to the research objectives as follows:

1. The results of the study of the STEM-style teaching-learning management model for study in Phrapariyattidhamma School Department of General Education. The results showed that STEM education is cross-integrated teaching, subject group Interdisciplinary integration between disciplines such as Science (Science: S), Technology (Technology: T), Engineering (Engineer: E) and Mathematics. (Mathematics: M) by bringing the strengths of nature as well as teaching methods of each from different disciplines to blend together perfectly for learners to lead all fields of knowledge are used to solve problems, research, and develop things in today's world situations that rely on learning

management that teachers in many fields cooperate with because in actual work or in daily life, it requires knowing many aspects of working, all are not used separately knowledge is part. In addition, STEM education promotes development, essential skills in a globalized world or skills necessary for the 21st century as well. There are five stages of STEM education: 1) problem identification, 2) concept discovery, 3) planning and development, and 4) testing and evaluation; 5) presentation of results. The results of the preliminary document study were consistent with the interview results 10 qualified persons with the following results:

1) Developing personnel to have the correct knowledge and understanding in the learning management approach. The role of personnel involved in an appropriate manner including training, meetings, and study, visits to model schools both in the country and abroad organize a forum for exchanging knowledge creating a professional learning community (PLC), teaching practice, etc.

2) Exchange of knowledge, experiences, knowledge, ideas and resources among people, groups of people, organizations, and knowledge sources who are continually participating in the learning process. This results in the dissemination of new knowledge which creates a network of STEM-based learning management (STEM).

3) Modifications improve existing courses or create new ones to suit the needs of changing social conditions and to meet the needs of learners. The components of STEM Curriculum Development (STEM) are the setting of curriculum goals determining the activity structure to be used in different school activities to achieve the desired results.

4) Provide teachers and personnel to train monks and novices have skills in interdisciplinary activities and the theory of creative learning in conjunction with the Buddha Dhamma, Itthipada 4, among which teachers and educational personnel are convinced that learning will take place when learners have created their own knowledge from the existing knowledge or from the new knowledge received from local speakers and

delivered to teachers, educational personnel of the temple to study and send for training, practice teaching in the STEM education format and then come back to share and change the way you teach assembling new skills projects to monks and novices.

2. Develop a model of teaching and learning according to the STEM concept for teachers of Phrapariyattidhamma School. The Department of General Education consists of 4 parts: Part 1, the introduction part, which is 1) environment, 2) principle, 3) objectives. Part 2 model consists of: 1) five steps of STEM education: 1) problem identification step 2) Stage of finding relevant concepts, 3) Stage of planning and development, 4) Stage of testing and evaluation, 5) Stage of presenting results, Iddhipada 4, which are principles that are practiced in order to overcome problems and obstacles as a guideline to success in various tasks as expected which consists of Chanda (satisfaction), Viriya (perseverance), Citta (thoughtfulness) and vimangsa (Contemplation), and an example of STEM education management; Itthibath 4 and teaching management model based on the STEM concept for teachers of Phrapariyattidhamma School. It was assessed in 3 aspects: 1) learning atmosphere, 2) learning activities, and 3) benefits derived from learning. 1) Structure, 2) Decision Making, 3) Assessment Guidelines, and Part 4: Conditions for success depend on the context of Phrapariyattidhamma School. The Department of General Education is the vision, mission, and policy of teaching and learning in accordance with the concept of STEM in Phrapariyattidhamma School. Department of General Education.

3. Propose a model of teaching and learning in accordance with the STEM concept for teachers of Phrapariyattidhamma School. The Department of General Education consists of 4 parts. Part 1 is 1) Environment, 2) Principle, 3) Objectives. Part 2 Model consists of 5 steps of STEM education instruction: 1) problem identification stage, 2) implementation stage Finding related concepts, 3) Planning and development stage, 4) Testing and evaluation stage, and 5) Results presentation stage,

Iddhipada 4, which are principles practiced to overcome various problems and obstacles, as a way to achieve success, success in various tasks as expected which consists of Chanda (satisfaction), Viriya (perseverance), Citta (thoughtfulness) and Vimangsa (contemplation), and an example of STEM education management; Itthibath 4 and teaching management model based on the STEM concept for teachers of Phrapariyattidhamma School Department of General Education to be used by assessing in 3 aspects: 1) learning atmosphere, 2) learning activities, 3) benefits derived from learning. Part 3, the implementation process consists of 1) structure, 2) Decision Making, 3) Assessment Guidelines and Part 4: Conditions for success depend on the context of the Phrapariyattidhamma School. The Department of General Education is the vision, mission, and policy of teaching and learning in accordance with the concept of STEM in Phrapariyattidhamma School, Department of General Education by applying the teaching management model according to the STEM concept for teachers of Phrapariyattidhamma School Department of General Education to use for teaching and learning According to the concept of STEM education in Phrapariyattidhamma School Department of General Education.

1) Phrapariyattidham School Department of General Education, Wat Mahathat, Bangkok, Thailand.

2) Phrapariyattidham School Department of General Education, Wat Saket, Bangkok, Thailand.

3) Phrapariyattidhamma School Department of General Education Wat Prachanimit By distributing a questionnaire of 160 students, the results showed that overall, the students had their opinions on the model of teaching and learning in accordance with the STEM concept for teachers of Phrapariyattidhamma School, Department of general education at the moderate level, namely learning activities The benefits of learning.

V. Discussions

The results of the study of the STEM-style teaching-learning management model for study in Phrapariyatham School Department of General Education from the research study conducted for teachers and personnel to train monks and novices have skills in interdisciplinary activities and the theory of creative learning in conjunction with the Buddhaddhamma, Iddhipada 4, among which teachers and educational personnel are convinced that learning will take place when learners have created their own knowledge in line with the research of Chamras Inthalapaporn and others [6], full education for elementary school students by organizing a Focus Group Discussion to synthesize guidelines for learning management and assessment according to STEM education. It consisted of 5 experts, namely 2 STEM experts, 1 curriculum specialist, and 2 STEM experts in learning management and assessment and evaluation know and evaluate accordingly. STEM education teachers should do the following: 1) study the essence of Science, Mathematics, occupation and Technology, and Engineering design processes in an integrated manner; 2) Learning that focuses on problem-based learning (Problem-based Learning, 3) Manage project-based learning, 4) Organize learning activities that emphasize learners to work together in groups. There is an exchange of knowledge and feedback to the learners. 5) Measure and assess the learning outcomes according to actual conditions (Authentic Assessment), which the guidelines for learning management according to the STEM education line are authentic learning management. and from research results in training monks and novices to have skills in interdisciplinary activities and creative learning theory in conjunction with the Buddhaddhamma, Iddhipada 4, making the monks and novices confident and successful, consistent with the research of Polsak Saengpromsri and others [7]. A comparative study of learning achievement process skills advanced science and attitude towards studying Chemistry of students in Grade 5 who received STEM learning

management with normal. The results showed that the students who received the STEM learning management had better academic achievement, advanced scientific process skills and attitude towards studying chemistry after school was significantly higher than before at the .05 level. The students who received STEM learning management had learning achievement, process skills, advanced science and attitude towards studying Chemistry statistically significantly higher than students who received normal learning management at the .05 level.

The results of the quality inspection of the model by qualified persons. It was found that the developed model was appropriate at a high level. The results of the experiment using the model found that students with higher overall science knowledge scores than before studying and in line with the research of Anodat Ratchavet [8], studying the development of learning skills and innovation in the 21st century by a set of teaching methods based on the concept of STEM education regarding the separation of messages of Mathayomsuksa 2 students, it was found that the students had good communication and cooperation skills after teaching and learning according to the STEM concept from the study of research related to the teaching-learning management. The integration of the STEM study found that teaching according to the STEM approach is teaching that is integrated between disciplines and is linked to real life for students, enabling students to learn on their own, creating learning skills in the 21st century, for example: problem solving skills, creativity skills, communication and cooperation skills, and from the study of the STEM-based teaching evaluation approach. It was found that learning outcomes were measured and evaluated based on actual conditions, such as observations, interviews, and can be said that students who have been learning the STEM approach have academic achievement problem solving skills creative skills, communication and cooperation skills, and a better attitude towards learning. Therefore, teachers should be encouraged to bring the concept of STEM education will be

applied in the integrated teaching and learning management in Science learning subjects and subjects related to STEM further.

VI. BODY OF KNOWLEDGE

The researcher presented a new body of knowledge from a model of teaching and learning management based on the STEM concept for teachers of Phrapariyattidhamma School General Education Department as shown in Figure 1.

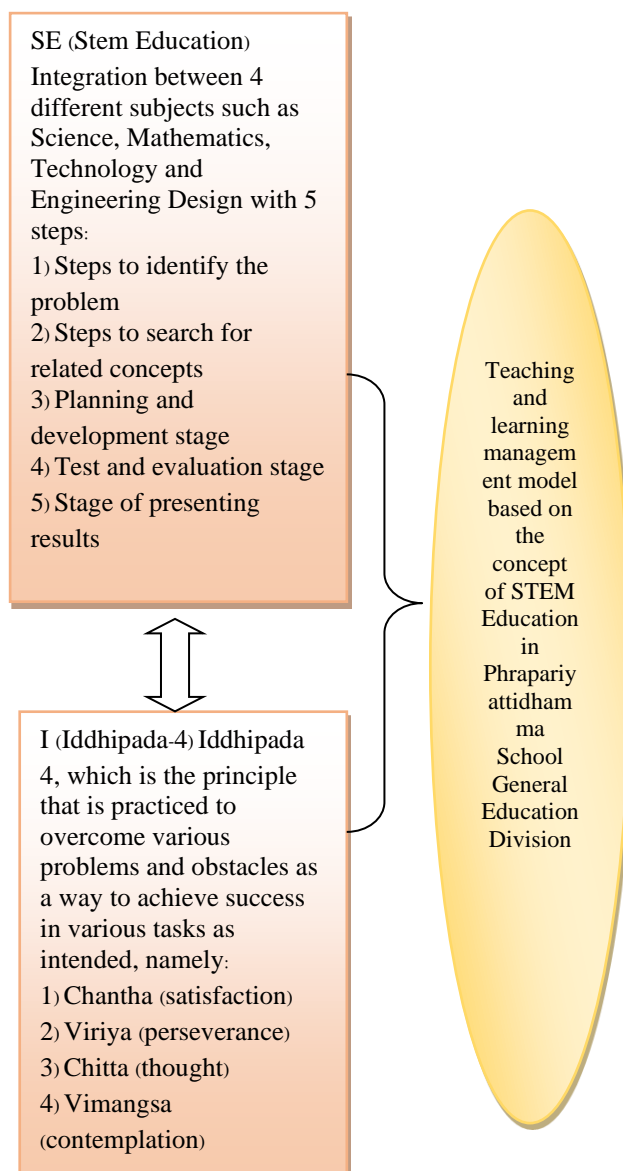


Figure 1 Knowledge gained from the research “SIP Model” Source: Phra Mahatharatip Worawichyo (Worasayan), 2021.

VII. Recommendations

A. Recommendations for Policy

1. The relevant agencies should promote the process of teaching and learning that emphasizes that learners present and discuss solutions to problems and share knowledge in the classroom.
2. Relevant agencies should encourage students to search for knowledge from Google to find solutions and techniques to solve problems that arise by creating innovations and knowledge in various fields.
3. Relevant agencies should encourage students to make plans for student innovation and present them to teachers.
4. Relevant agencies should encourage students to create questionnaires about their own innovation in various forms and came out to present student innovation with reference to student innovation assessment scores.
5. Relevant agencies should promote the development of personnel to have a correct understanding of STEM education in a learning management approach, the role of personnel involved in an appropriate manner.
6. Relevant agencies should organize exchanges of learning experiences, knowledge, ideas, and resources among people, groups of people, organizations and sources of knowledge that are continually participating in the learning process resulting in the dissemination of new knowledge which creates a network of learning management according to STEM education.
7. Relevant agencies should provide teachers and personnel to train monks and novices to have skills in interdisciplinary activities and creative theory of learning in tandem with the Buddhaddhamma, Iddhipada 4.

B. Recommendations for Further Research

1. Should study the process of developing teaching and learning management according to the concept of STEM for Phrapariyattidhamma School teachers. Department of General Education.
2. Should study activities to promote teaching and learning in accordance with the concept of

STEM for teachers of Phrapariyattidhamma School, Department of General Education

3. Should study the development of teaching and learning management according to the STEM concept for teachers of Phrapariyattidhamma School, Department of General Education

CONCLUSION

Development of Teaching Management Model based on the STEM Education in Phrapariyattidhamma School General Education Division was conducted and the results of the study were showed that teaching management based on the STEM Education in Phrapariyattidhamma School General Education Division consisted of 4 subjects which were Science (S), Technology (T), Engineer (E), and Mathematics (M). Teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division was developed students who used the STEM education concept based on the problem-based learning management showed that after studying, it was significantly higher than before at .05 level. The students' skills and process after learning management and teaching based on STEM based-education using problem learning was at high level. The students' opinions towards learning management according to the STEM education using problem-based learning was at high level. Teaching management model based on the STEM Education in Phrapariyattidhamma School General Education Division was proposed for teaching and learning management with effectively from the study, schools or educational organizations should apply this model into the school context in order to develop student's learning related to STEM Education.

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