A MODEL OF STEM EDUCATION LEARNING MANAGEMENT COMPETENCIES VIA OPEN EDUCATIONAL RESOURCES FOR TEACHER UNDER OFFICE OF THE BASIC EDUCATION COMMISSION

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ABSTRACT

The objectives of the research study were to 1) design a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission and 2) assess the suitability of a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission. The samples included learning management, STEM learning management and evaluation experts of 8 people. The research tools composed of the model's suitability assessment form using 5-point Likert scale. The research results were to 1) a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission that can be divided into three main parts (1) open educational resources which were the resources for developing the teacher STEM education competencies, (2) the development of teacher learning management competencies in order to enable teachers to collaboratively design and create a STEM learning management plan, and (3)the results of the development of teachers learning management competencies and the teachers' opinions on the model of learning management competencies would be the feedback or suggestions for developing the teacher learning management competencies. 2) assessment the suitability of a model revealed that (1) the open educational resources in the competency section learning management, engineering design, measurement and evaluation were appropriate at the highest level, followed by content knowledge of STEM education. Knowledge of learning management according to the STEM approach 21st century skills and collaborative learning activities which is appropriate at a high level (2) the development of competence in learning management in the part of the study of knowledge in the knowledge repository together to design a learning management plan jointly assess the learning management plan. The first assessment of teachers' learning management competency was the most appropriate, followed by the creation of a learning management plan. Teachers organize learning according to plans and teaching notes, discussions, expanding knowledge with fellow teachers. And the second assessment of teachers' learning management competency, which was appropriate at a high level; (3) in terms of the teachers' opinions on the model for improving the learning management competency of teachers with the STEM approach through open educational resources was the most appropriate, followed by the learning management competency effect. And (4) the overall picture of the implementation of the STEM education competency development model through open education resources for teachers under the Basic Education Commission was at a high level. The most the experts also provided additional comments and suggestions: an overview of interesting work. It is beneficial to the development of teaching and learning. However, it should be considered that the implementation through the open system is how to achieve real results. Teachers are truly involved in the exchange of learning.

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1. INTRODUCTION

National Education Act (Thailand) B.E. 2542 Amendment (No. 3) B.E. 2553 emphasized the importance of teacher development. Faculty and educational personnel stated that "There is a principle to promote professional standards of teachers, faculty members and educational personnel. and the development of teachers and faculty and educational personnel on an ongoing basis." and has established the principle of action that "Let the Ministry promote a system and the production process to develop teachers, faculty members and educational personnel to have quality and standards suitable for high-professional and to increase the potential of the education system keep up with changes in information The vast amount of knowledge in the present and future era, teachers who play a role in learning management. classroom management including student management which must have comprehensive knowledge and be up-to-date with various changes around him, therefore should be developed in all aspects of competence, especially competence in learning management This is one of the functional competencies that the Office of the Basic Education Commission has set in order to know the knowledge. Ability to manage learning as well as measuring and evaluating learning management

There are many approaches to effective learning management. STEM education (Science: S, Technology: T, Engineering: E, Mathematic: M) is a learning management approach that integrates science, technology, engineering. and mathematics together Emphasis is on applying knowledge to solve real-life problems and future careers. Moomaw (2012) said that STEM education is highly relevant to today's children. Because today's children live in a world of rapidly changing technology. And related to the 4 sciences of STEM makes it easier for children to understand things around them. If children learn these things in a fun way, learning, experimenting, touching through materials, thinking, and solving creative problems from learning through experiences from a young age. Will make children like to learn, want to experiment, enjoy thinking This instills in children a love to learn math and science from an early age, making them feel fearless to learn these subjects when learning becomes more difficult.

To drive STEM education to cover all schools across the country, it may require methods to allow information and knowledge related to STEM education to be quickly passed to teachers in schools. That is information technology that can be used to help manage learning. Many schools that have already organized STEM education. There will be various resources used to manage learning. Each school has those resources stored within the school's own repository, making it difficult to exchange knowledge. or published for others to be able to share One system that will be able to solve such problems. Is an open education resource system (Open Education Resource: OER), which is a source of information, knowledge, media, documents used in teaching and learning management that teachers Teachers and educational personnel are involved in creating freely exchanged and utilized There is no limit under the given license.

Therefore, the researcher has designed a STEM-style learning management model. Resources related to STEM education are stored and managed within an open education system for teachers and interested educators. Participate in the use of the system by studying, researching, creating various forms of STEM education, creating media for learning

management, measuring and evaluating learning management. including exchanging experiences together.

2. RESEARCH OBJECTIVES

The objectives of the research study were to 1) design a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission and 2) assess the suitability of a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission.

3. RELATED LITERATURE

3.1. Principles of teaching and learning design and development. It is an analysis of teaching and learning appropriate teaching methods and teaching evaluation for learners to gain knowledge that will be applied to real situations or consistent with everyday life (Wiggins, G., & McTighe, J., 2011; Namon Jeerangsuwan, 2013)

3.2. Competency in learning management is the behavior of the teacher arising from the application of knowledge, skills and attitudes in various subject areas to help design and formulate an integrated, consistent, and connected learning management plan engaging learners to participate in appropriate learning management and to help them manage their learning effectively (Suban Iamkrit, 2005; Office of the Basic Education Commission, Ministry of Education, 2010; Educational Systems Research Institute Foundation, 2015)

3.3. STEM education learning management model. It is a learning management approach that integrates science, technology, engineering and math emphasis is placed on applying knowledge to solve real life problems. including the development of new processes or products that benefit life and occupation (Moomaw, 2012; National Conference of State Legislatures, 2013; the institute for the promotion of teaching science and technology, 2014).

3.4. Open Educational Resources. It is a system that collects information, knowledge, media, and documents used in STEM education learning management for teachers, instructors and educational personnel to manage their own learning. Including being a participant in the creation freely exchangeable. There are no limitations under licenses (UNESCO, 2002 cited in Butcher, 2014; Geser, 2014; McCarty, 2011).

4. RESEARCH METHODOLOGY

4.1. Design a model for developing teachers' learning management competency with a STEM learning management approach through open educational resources based on the conceptual framework. by analysis and synthesize the principles of teaching and learning design and development by means of front-end analysis, which are (1) Context analysis, which consists of needs analysis and environment analysis. (2) Teacher analysis and (3) Learning task analysis.

4.2. Create a model's suitability assessment form (draft 1), which is divided into 2 parts: Part 1) details of the model and Part 2) the model's suitability assessment form.

4.3. The experts consider the suitability assessment form. by learning management, STEM learning management and evaluation experts of 8 people.

4.4. Experts assess the suitability of the model by using the model's suitability assessment form by using 5-point Likert scale.

4.5. Analysis, summary, amendment of the model as assessed by experts

5. RESULTS

5.1. The results of a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission by figure 1.
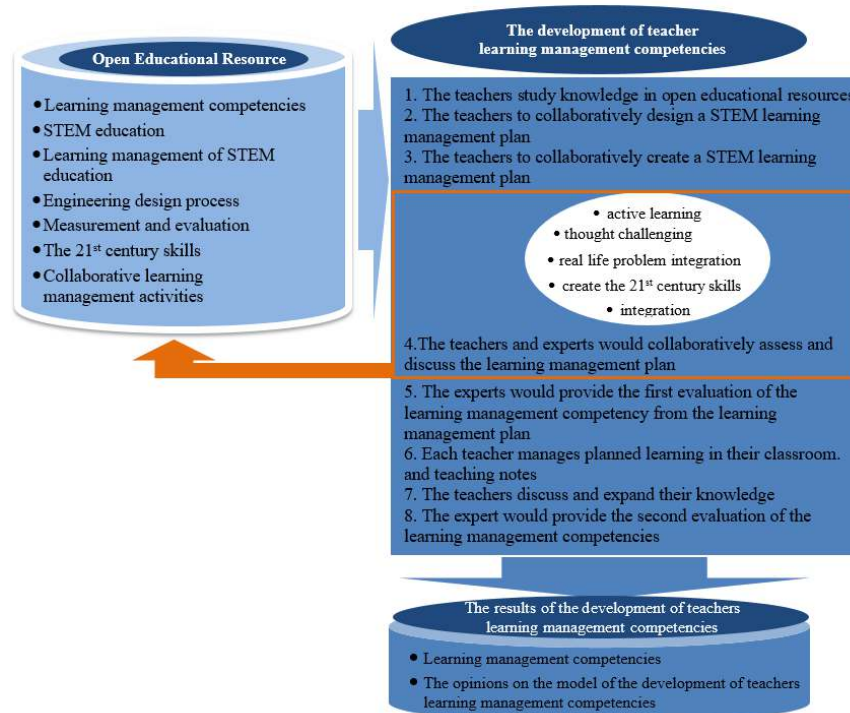

Figure 1: A Model of STEM Education Learning Management Competencies Via Open Educational Resources for Teacher Under Office of the Basic Education Commission.

From a figure 1 represent to a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission consisted of 3 main parts: (1) open education resources (2) competency development. and (3) the results of the development of learning management competency as follows:

1. Open educational resources. It is a basic resource for learning management and a space for collaborative learning of teachers who access the knowledge library which is divided into competence in learning management knowledge of STEM education, Guidelines for STEM learning management engineering design process It consists of 6 steps: (1) Identifying the problem (Problem Identification) (2) collecting information and ideas related to the problem (Related Information Search) (3) Designing a solution (Solution Design) (4) Planning and implementing Solving problems (Planning and Development), (5) testing, evaluating and improving the solution to the problem or work (Testing, Evaluation and Design Improvement), and (6) proposing a solution to the problem. The result of a solution or workpiece (Presentation) measurement and evaluation 21st century skills and collaborative learning activities

2. Development of learning management competencies It consists of the following steps: (1) Teachers study knowledge in open educational resources. about competence in learning management STEM knowledge Learning management according to the STEM approach engineering design process measurement and evaluation and 21st century skills within 2 months (2) Teachers jointly design learning management. Teachers jointly design a learning management plan. By dividing teachers into groups of 3-4 people to jointly consider the course details and knowledge about STEM learning management. Then have each teacher in the group design their own learning management plan according to the course details. Then have each group take the designed learning plan together to consider and improve, modify, and design it into a single learning plan. within 2 weeks (3) Teachers jointly create a learning management plan. by jointly creating a learning management plan as designed It covers the main characteristics of learners in learning according to the STEM approach, which is to allow students to express opinions and understandings consistent with the content of the four disciplines or other subjects. Challenge students' thinking (Challenge) Learning management that emphasizes integration. (Integration) connecting a variety of knowledge Linking content in all 4 disciplines or other subjects with daily life and occupation and focus on developing important skills in the 21st century (Skill for 21st Century) within 2 weeks. (4) Jointly assess the learning management plan by all teachers in the group and experts together to assess the learning management plan created then continue to improve discuss the knowledge of the learning management plan co-designed by the teachers. To summarize the knowledge gained from writing a learning management plan according to the STEM Education guidelines. Then expand the knowledge gained to apply in daily life. or to develop other learning management plans and to lead to other knowledge helpful which may be written as various suggestions of the learning management plan and then disseminate the learning management plan on the knowledge base within 1 week. (5) Conducting the 1st assessment of the teacher's learning management competency after the teacher has already designed and formulated a learning management plan. to assess the ability to formulate a learning management plan which is the competence in learning management of teachers. (6) Each teacher organizes learning activities according to the learning management plan they have created. By having each teacher manage learning with students in their own classroom according to a jointly created learning management plan. and recording after every teaching to show the progress in knowledge, skills and attitudes of students and teachers. From the learning management according to the plan created according to the time period in the learning management plan. (7) Each teacher jointly discusses, asks questions and expands knowledge through the system. to summarize the knowledge gained from writing a learning management plan and from learning management according to the plans created. (8) The second assessment of the teacher's learning management competency after the development of the teacher's learning management competency. by design prepare a learning management plan and carry out learning successfully to assess the teacher's learning management competency in terms of knowledge, skills, and attitudes.

3. The results of the development of teachers' learning management competencies consisted of: (1) Teachers' learning management competency after developing the learning management competency according to the model of teacher learning management competency development with the STEM learning management approach. and (2) the results of a study of teachers' opinions on the model of teacher competency development with a STEM approach through open education resources.

5.2. The result of assessment the suitability of a model of STEM education learning management competencies via open educational resources for teacher under office of the basic education commission revealed that (1) the open educational resources in the competency section learning management, engineering design, measurement and evaluation were appropriate at the highest level, followed by content knowledge of STEM education. Knowledge of learning management according to the STEM approach 21st century skills and collaborative learning activities which is appropriate at a high level (2) the development of competence in learning management in the part of the study of knowledge in the knowledge repository together to design a learning management plan jointly assess the learning management plan. The first assessment of teachers' learning management competency was the most appropriate, followed by the creation of a learning management plan. Teachers organize learning according to plans and teaching notes, discussions, expanding knowledge with fellow teachers. And the second assessment of teachers' learning management competency, which was appropriate at a high level; (3) in terms of the teachers' opinions on the model for improving the learning management competency of teachers with the STEM approach through open educational resources was the most appropriate, followed by the learning management competency effect. And (4) the overall picture of the implementation of the STEM education competency development model through open education resources for teachers under the Basic Education Commission was at a high level. The most the experts also provided additional comments and suggestions: an overview of interesting work. It is beneficial to the development of teaching and learning. However, it should be considered that the implementation through the open system is how to achieve real results. Teachers are truly involved in the exchange of learning.

6. DISCUSSION

The researcher has studied documents and research related to learning management competency. and has designed the development of learning management competencies it consists of the following steps: (1) study knowledge in open educational resources; about competence in learning management STEM knowledge Learning management according to the STEM approach engineering design process measurement and evaluation and skills in the 21st century (2) jointly design learning management where teachers jointly design a learning management plan to jointly consider the details of the course, various knowledge about STEM learning management. Then have each teacher design their own learning plan according to the course details. Then, have each person in the group bring together the designed learning plan to consider and improve, modify, and design it into a single learning plan. (3) Teachers work together to create a learning plan. By jointly creating a learning management plan as designed it covers the main characteristics of learners in learning according to the STEM approach, which is to allow students to express opinions and understandings consistent with the content of the four disciplines or other subjects. Challenge students' thinking learning management that emphasizes integration. Connecting a variety of knowledge linking content in all 4 disciplines or other subjects with daily life and occupation and focus on developing important skills in the 21st century (4) jointly assess the learning management plan. By all teachers in the group and experts together to assess the learning management plan created then continue to improve discuss the knowledge of the learning management plan co-designed by the teachers. To summarize the knowledge gained from writing a learning management plan according to the STEM Education Guidelines. Then expand the knowledge gained to apply in daily life. or to develop other learning management plans and to lead to other knowledge helpful which may be written as various suggestions of the learning management plan Then the learning management plan was published on the knowledge base. (5) Conducted assessment of the teacher's learning management competency No. 1 after the teacher had already designed and developed a learning management plan. to assess the ability to formulate a learning management

plan which is the capacity of the teacher's learning management (6) Each teacher organizes the learning activities according to the learning management plan created. By having each teacher manage learning with students in their own classroom according to a jointly created learning management plan. and recording after every teaching to show the progress in knowledge, skills and attitudes of students and teachers. From the learning management according to the plan that was created (7), each teacher jointly discusses, asks questions and expands knowledge through the system. to summarize the knowledge gained from writing a learning management plan and from the learning management according to the plan that was created (8), the second assessment of the teacher's learning management competency after the development of the teacher's learning management competency. by design prepare a learning management plan and completed learning management to assess teachers' learning management competency in terms of knowledge, skills, and attitudes, the model for developing STEM education competency through open education resources for teachers under the Basic Education Commission is stated.

ACKNOWLEDGMENTS

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