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MODEL OF SUPERVISION TO SUPPORT THEMANAGEMENT OF STEM LEARNING FOR PRIMARY SCHOOL TEACHERS

(Research article)

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Abstract

Studying the components and indications of a supervision style in order to enhance learning management in accordance with the STEM education approach for elementary school teachers working under the Office of the Basic Education Commission was the objective of this research. The sample was divided into two different groups. 1) They were professionals who checked various research instruments, and there were five of them 2) Seven subject matter experts who will verify the many constituents and indications of the supervision style resulting from the use of rigorous screening against the predetermined criteria for qualifying. The document synthesis record form, the interview form, and the evaluation form are the instruments that are utilized. The concepts of frequency, mean, and standard deviation were utilized in the statistical analysis. According to the findings of the research that was conducted on the components and indicators of the supervision model, the components of the supervision model included a total of 20 indications and four individual components. The mean and standard deviation of the degree of applicability of the supervisory components to enhance learning management are presented below. The basic education commission's office has issued a guideline for the teaching of STEM subjects in primary schools, which may be found in overview and indications. When taken as a whole, it was the solution that was the most appropriate when thinking about each component. is the one that works best with each and every component.

Keywords: STEM education, supervision, teacher development

1. Introduction

It is crucial to invest in the development of human resources in order to produce a population that is of sufficient quality, possesses the cognitive abilities necessary for learning, is able to effectively apply acquired knowledge to real-world problems, and is inventive enough to generate new ideas. Due to the fact that the present scenario in the globe is always shifting. The fourth industrial revolution is making its way into the world economy. Throughout the entirety of the manufacturing process, it is dependent upon the availability of electric power, developments in information and communication technology, as well as advances in scientific research and manufacturing technology (Chai, 2019; Starkey, 2020).

As a direct consequence of this, people's purchasing and use patterns of various goods and services have shifted. Therefore, businesses that produce products and services have a responsibility to adapt to the development that is based on the knowledge of science, technology, and innovation. The relevance of education in scientific fields, technological fields, and engineering fields is recognized and valued in a great number of nations all over the

world. education in science, technology, engineering, and mathematics, sometimes known as STEM education, is important in educating the workforce to have the knowledge and skills necessary to advance the economy and society of a country (Onsee & Nuangchalerm, 2019; Nuangchalerm et al., 2020a; Suebsing & Nuangchalerm, 2021).

Creating long-term riches for Thailand in the 21st century by revamping the economic structure of the nation in a way that is driven by innovation and the production of value-added goods and services. There are three essential qualities, which are as follows: 1) a shift from the production of "commodities" to the production of innovative products; 2) a shift from a country that is driven by industry to a country that is driven by technology, creativity, and innovation; and 3) a shift from concentrating on the manufacturing sector to concentrating more on the service sector. In this sense, the modifications made by these countries have brought forth complementing technological developments. The fundamental focus of driving is on inventiveness, creativity, scientific discovery, technological advancement, and research and development. At the moment, Thailand is dealing with a number of significant challenges. one of these challenges is climbing out of the "middle income trap".

Moreover, Thailand is transitioning towards an ageing society at the same time. increasing the national income per person will result in a reduction in the proportion of the population that is of working age, which will have a negative impact on economic growth. This will occur as a result of breaking out of the middle-income trap. The level of education and expertise held by the country's labor force has to be improved. When looking at the overall quality of education in Thailand, it was discovered that the country has an issue with the quality of education provided in the areas of science and mathematics. According to the findings of the most recent PISA test, which was conducted in 2018, it was discovered that Thailand had an average score that was lower than the average score of nations that belong to the OECD group (Organization for Economic Co-operation and Development). Students in Thailand scored an average of 419 out of a possible 489 points in maths, and 426 out of 489 points in science (OECD mean 489 points). It demonstrates that Thailand has to move more quickly to increase the growth of its knowledge and capacity to think critically. Its applications include Science Technology and Mathematics (Institute for the Promotion of Teaching Science and Technology (IPST), 2021).

The requirements of nations that are entering the Thailand 4.0 age and that desire to break free from the shackles of middle-income status by developing their own internal resources while simultaneously establishing connections with the international world. By achieving the goals outlined in the National Education Plan 2017-2036 on the provision of education, Thailand will be able to break out of the middle-income country trap. And bring about a decrease in the level of inequality that exists throughout the nation by establishing the objective of learners, which is an initiative that seeks to equip all students with the qualities and abilities necessary for learning in the 21st century. At the most fundamental level of education, the objective is to ensure that students get instruction in accordance with a curriculum designed to foster the development of students with a greater range of traits and capabilities appropriate for the 21st century. The twenty-first that follows the national plan that has been outlined and is consistent with it. An integrated learning management system that takes a STEM education approach is one of the ideas that are utilized within education management (Cetin, 2020). Students need to be encouraged to develop abilities in critical thinking and creative innovation that makes use of information in scientific, mathematical, technological, and engineering design processes in the context of learning activities.

Integrated learning management based on the STEM Education approach not only helps students who are in the education system acquire STEM skills, but also enhances the

technological or innovation capabilities of working people as well (Nuangchalerm, 2018; Listaina et al., 2019; Nuangchalerm et al., 2020b). Educational reform that is based on the idea of STEM education is the solution that will help the country evolve into one that is stable, prosperous, and sustainable. The term "teacher" refers to the one who plays the most significant role in the process of the development of education and learning (Karakaya et al., 2020). The significance of educators cannot be overstated; they remain the single most crucial element in the learning environment. Who are the significant people when it comes to the standard of education? This is due to the fact that the quality of teachers determines the quality of students who learn. This is due to the fact that the quality of teachers determines the quality of students who learn. As a result, it is essential to train educators in order to elevate the standard of the educational system. and to ensure that educational administration is in line with how people study in the 21st century (Secretariat of the Council of Education, 2016).

It is important to obtain direction or oversight from a certain knowledgeable person in order for learning activities to progress. This can take the form of either guidance or supervision. in order for the issue to be effectively addressed and resolved In order for the education of a country to conform to the educational standards established at the national level, an educational surveillance system is required. Because teaching is a complicated activity, there is a need for monitoring in order to accommodate teachers with varying levels of skill. Even though a teacher has had a lot of training, it is still important for them to have educational supervision since it is a duty that is necessary to their progress. However, educators should always be striving to develop themselves while they are working in real-world settings. And educational monitoring is vital as well since it assists instructors in the process of activity organization. And in order to keep up with the rapidly developing society, it is essential to bring the educator into the current era.

One of the responsibilities of educational management is educational supervision, which involves a cooperative effort on the part of both the person doing the supervising and the person being supervised. Both the mix of supervisors from outside the school and those already working inside the institution. and the collaboration of educators inside the educational institutions themselves, with the shared goal of improving both the quality of students and the quality of educational administration. The internal supervision process includes a number of steps, one of which is the monitoring of activities designed to increase teacher learning. Because the process of internal supervision is an activity or a technique for instructors within the school to work with one another in aiding, promoting, and providing support for one another. It is a strategy that contributes to the development of positive connections between colleagues and administrators. The growth of instructors' learning management, which in turn impacts the development of learners' learning quality, is what constitutes supervision. Supervision is done with the goal of achieving the objectives that have been defined.

This research sets a question to response what are the components and indications of a supervision style in order to enhance learning management in accordance with the STEM education approach for elementary school teachers working under the Office of the Basic Education Commission?

2. Methodology

2.1. Research Design

This research employed a survey method to investigate empirical data by asking educators in basic education level for promoting learning management in accordance with the criteria for STEM education in primary schools by the Office of the Basic Education Commission.

2.2. Participants

At this point, the sample group was divided into two distinct groups:

1) Five individuals with extensive knowledge in the field of inspecting tools study, qualified according to the predetermined criteria.

2) Experts to verify the make-up and the indications that were obtained from the specific selection, with a total of seven people qualified according to the criteria that were provided.

2.3. Data Collection Tools

The instruments that are used to gather data are as follows: (1) a document synthesis form; (2) an interview form; and (3) an assessment form. The procedure for carrying out the research consists of analyzing the various components and indicators. Supervision for the purpose of promoting learning management in accordance with the criteria for STEM education developed for teachers working in primary schools by the Office of the Basic Education Commission Documents, concepts, principles, and theories pertaining to educational supervision are subjected to synthesis by researchers. The formation of a community of educators committed to lifelong learning. The promotion of learning management in accordance with the STEM education method, including pattern development research and development, and associated research.

2.4. Data Analysis

Details gleaned via an analysis of the combined contents of various documents. The data went through statistical analysis, which focused on the frequency. data with scores derived from an evaluation and an investigation. The frequency, mean, and standard deviation of data are the three main concepts in statistics.

3. Results and Discussion

In order to promote learning management in accordance with the STEM education approach for elementary school teachers working under the auspices of the Office of the Basic Education Commission, the results of the study that synthesized documents, principles, concepts, and theories related to educational supervision were analyzed. The formation of a learning community for educators, the promotion of learning management in accordance with the STEM education method, research and development on pattern formation, and research that is relevant to this topic discovered that

1. Components and indicators of supervision to promote learning management According to the STEM Education Guidelines for Primary Education teachers under the Office of the Basic Education Commission.

Knowledge, comprehension, and encouragement are included in the first stage of relationship development, which is denoted by the letter "D" in the acronym "Relationship Development". Providing an assistance and direction in order to build connections, trust, and acceptance, which ultimately leads to collaboration in the growth of learning management. There are total of five indications, and they are as follows: 1) genuineness Integrity, integrity, self-sacrifice, charity, and perseverance 2) Cultivating positive sentiments for one's fellow man 3) Having an appreciation for individual uniqueness 4) Communication that is transparent and effective 5) Acquiring a sense of self-assurance and trust.

Corporate culture development planning: D: Planning that focuses on collaborating with one another and making the job even more effective, number 5 indications: 1) Sharing comparable long-term objectives, tactics, and perspectives 2) collaboration 3) encouraging and

providing support for various manifestations 4) effective and clear communication 5. Creating an atmosphere that is amenable to support and encouragement. D: Supervision is the third component of the operational development plan. interactions with members of the administrative staff of schools. There has been collaboration between the academic head teacher, science teacher, and mathematics and technology teacher.

There are three further steps: 1) A meeting for the purpose of preparation prior to the supervision 2) Pay attention in class and take notes on all of the material gathered in accordance with the learning management system. 3) Learning via introspection and collaboration Providing guidance and aid to educators in regard to a total of five indications, with the following as the first: 1) generating motivation to take place at work 2) The examination of data 3) The observance of protocols and the establishment of standards 4) The process of measuring and analyzing performance 5) The gathering of data and the enhancement of it.

Assessment for Development (also known as Development for Assessment: D): The utilization of proper assessment forms and techniques for the purpose of researching the state of success, issues, or barriers in operation. The following five indications are provided to serve as information that may be utilized to enhance and develop supervision practices: 1) Having a crystal clear understanding of the objectives of measuring and assessment. 2) Measurement of behavior in its whole, taking into accounts real-world skills and qualities 3) The use of a wide variety of techniques and instruments for the purposes of measurement and assessment 4) The application of reliable evaluation methods with regard to self-assurance and authority 5) Evaluation, analysis, interpretation, and application of the findings of the evaluation in the development process

2. The results of the assessment of the suitability of the components and indicators of the supervision model for learning management According to the STEM education guidelines for primary education teachers under the Office of the Basic Education Commission, the mean and standard deviation in the overview as in Table 1.

Table 1. *STEM Education guidelines for primary education teachers*

Main component	Fitness level		
	$\overline{X}$	SD	Interpret
Component 1 Relationship Development (Relationship Development : D)	4.54	0.21	Highest
Component 2: Corporate Culture (Development Planning : D)	4.64	0.15	Highest
Component 3: Operational Development (Operational Development : D)	4.68	0.51	Highest
Component 4: Assessment for Development (Development for Assessment : D)	4.59	0.26	Highest
Overview of all components	4.6	0.24	Highest

The way the game is played and how the programming model is used to provide learning-based management are both detailed in Table 1. Basic education standards should serve as the basis for establishing recommendations for STEM education for teachers. in a quantity befitting the maximum degree that is possible given the circumstances and the background. It must have the greatest memory capacity in the annals of history.

The results of the study of components and indicators of supervision to promote learning management according to the STEM education approach for elementary school teachers under the Office of the Basic Education Commission found that there are 4 components: Component

1 Relationship Development: D) : Providing knowledge, understanding, encouraging Giving help and advice to create relationships, trust, acceptance, leading to cooperation in learning management development Component 2 Corporate Culture Development Planning :D: planning, goal setting working together and improving the work even better Component 3 Operational Development : D : Supervision operations with school administrators Academic Head Teacher science teacher Mathematics and Technology have cooperated Facilitate, support, promote and participate in supervision each time.

Research and analysis of various educational supervision-related texts, concepts, principles, and theories are required. The formation of a community of educators committed to lifelong learning Study of current conditions, problems, and needs from a sample group of schools that have best practices, and synthesis of those findings into components and indicators. The components and indications were validated by knowledgeable specialists through an examination of how well they fit together. The supervision model is reconstructed with the help of friends' contributions. Consistency was maintained throughout the process of synthesizing the material found in each component of the supervision model (Haar et al., 2016; Strerrett et al., 2020).

Following up on and evaluating the integration of knowledge in STEM education in educational institutions, it was discovered that integrated learning management in accordance with the concept of STEM education did not reach the goal as expected (Retnowati & Subanti, 2020). This was discovered as a result of the follow-up and evaluation of the integration of knowledge in STEM education in educational institutions. The most significant barriers are some educators that do not support STEM education. There is a dearth of information and comprehension among teachers about the STEM integrated curriculum (Mpofu, 2019). Traditional learning activities that place an emphasis on memorizing are still utilized in the majority of learning management, assessment, and evaluation processes.

The structure of the curriculum does not lend itself well to effective administration of teaching and learning. Absence of ongoing supervision, monitoring, and assessment. Consequently, STEM learning activities that are in line with the learning management of the 21st century are unable to be as effective as was anticipated in this regard. Because of this, STEM education, which is essential to the growth of both the labor force and the economy at the national level, cannot be implemented properly (Tekerek & Karakaya, 2018; Kerdthaworn & Chaichomchuen, 2021). If Thailand is serious about improving the standard of education available to pupils, the preparation of teachers to have knowledge and comprehension of STEM education is one technique that may be put into practice. to be able to teach pupils skills that are needed in the STEM fields.

The executives do not give oversight the attention it deserves. The educators are resistant to change and have a negative attitude toward the administration's oversight. It was discovered that there was a lack of evaluation and the application of supervision outcomes, which was deemed to be one of the difficulties with the supervision process. in addition to a lack of support This is in accordance with the findings of the Office of the Basic Education Commission (2021), which found that the majority of schools continued to organize learning activities that placed an emphasis on memorization, despite being unable to meet the requirements of human potential development in line with the development direction of the country. This finding is in line with what has been stated here. This is because there is a difficulty with educational supervision, which results in their still being a significant amount of issues.

For instance, there are not enough supervisors available. Insufficient numbers of qualified and capable supervisors' skills and experience insufficient levels of coordination There is no

connection whatsoever between educational monitoring and internal supervision, and there is little funding for classroom supervision. The amount of work that Supervisor needs to undertake for his studies is so great that he is unable to provide continuous supervision. hence leading to a variety of issues Affect monitoring so that instructors have help in creating the essential learning activities to develop students with the necessary abilities and traits of the 21st century (Yamkasikorn, 2021).

Therefore, supervision to promote learning management in accordance with the STEM education approach is necessary supervision to prepare teachers to improve the quality of learning management in line with learning management in the 21st century in order to Answers to the needs of the country that is moving into the Thailand 4.0 era, which is in line with the conclusion about the importance and necessity of educational supervision, which contended that educational supervision is necessary to answer the needs of the country that is moving into the Thailand 4.0 The changes that have taken place in society require an adjustment to be made in the educational system as well (Khonjaroen & Srikoon, 2021). This is in line with the concept that was presented by Glickman et al. (2007), stated that the supervision process is important because it is a process that helps improve the teaching quality of teachers, which in turn affects the quality of students. This idea is supported by the fact that the aforementioned statement is consistent with the aforementioned statement.

Educational supervision is a process that helps enhance the teaching quality of instructors, which in turn influences the quality of students, this aspect of education is extremely important. as well as from the challenges that primary school instructors have when attempting to organize learning activities in accordance with the STEM education method. This is coupled with the requirement to promote the organization of learning activities in accordance with the STEM education approach for teachers in elementary schools. These activities need to be organized in line with the human potential development goals that are in line with the direction that the national development direction is heading.

References

Çetin, A. (2020). Examining project-based STEM training in a primary school. *International Online Journal of Education and Teaching*, *7*(3), 811-825.

Chai, C. S. (2019). Teacher professional development for science, technology, engineering and mathematics (STEM) education: A review from the perspectives of technological pedagogical content (TPACK). *The Asia-Pacific Education Researcher*, *28*(1), 5-13.

Glickman, C. D., Gordon, S. P., & Ross-Gordon, J. M. (2007*). Supervision of instruction: A developmental Approach.* Allyn and Bacon.

Haar, J. M., de Fluiter, A., & Brougham, D. (2016). Abusive supervision and turnover intentions: The mediating role of perceived organisational support. *Journal of Management & Organization*, *22*(2), 139-153.

Institute for the Promotion of Teaching Science and Technology (2021). *Assessment Results PISA 2018 Reading, Mathematics and science*. Bangkok: Institute for the Promotion of Teaching Science and Technology (IPST).

Karakaya, F., Akpinar, A., Alabas, Z. E., & Yilmaz, M. (2020). Determination of middle school students' views about STEM activities. *International Online Journal of Education and Teaching*, *7*(2), 537-551.

Kerdthaworn, P., & Chaichomchuen, S. (2021). A learning model of STEM education on cloud computing technology, to promote learning and innovation skills for students practicing teachers. In *Journal of Physics: Conference Series* (Vol. 1835, No. 1, p. 012073). IOP Publishing.

Khonjaroen, K. P., & Srikoon, S. (2021). The development of training course to promote learning activities skill based on the STEM Education concept for elementary school teachers. In *Journal of Physics: Conference Series* (Vol. 1835, No. 1, p. 012063). IOP Publishing.

Listiana, I., Abdurrahman, A., Suyatna, A., & Nuangchalerm, P. (2019). The effect of Newtonian dynamics STEM-integrated learning strategy to increase scientific literacy of senior high school students. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *8*(1), 43-52.

Mpofu, V. (2019). A theoretical framework for implementing STEM education. *Theorizing STEM Education in the 21st Century*, 109-123.

Nuangchalerm, P. (2018). Investigating views of STEM primary teachers on STEM education. *Chemistry: Bulgarian Journal of Science Education, 27*(2), 208-215.

Nuangchalerm, P., Prachagool, V., El Islami, R. A. Z., & Abdurrahman, A. (2020b). Contribution of integrated learning through STEM education in ASEAN countries. *Jurnal Pendidikan Progresif*, *10*(1), 11-21.

Nuangchalerm, P., Prachagool, V., Prommaboon, T., Juhji, J., Imroatun, I., & Khaeroni, K. (2020a). Views of primary Thai teachers toward STREAM education. *International Journal of Evaluation and Research in Education*, *9*(4), 987-992.

Office of the Basic Education Commission. (2021). *Basic Education Development Plan 2021 - 2022.* Agricultural Cooperative Assembly of Thailand Limited.

Office of the Education Council Secretariat.(2020). *Monitoring and evaluation of knowledge integration STEM education in educational institutions*. Bangkok: The Secretariat of the Education Council.

Office of the Secretariat of the Council of Education. (2016). *Research report. to prepare promotion policy proposals Management of STEM education in Thailand*. Prigwahn.

Office of the Secretariat of the Council of Education. (2017). *National Education Plan 2017 – 2036.* Prigwahn.

Onsee, P., & Nuangchalerm, P. (2019). Developing critical thinking of grade 10 students through inquiry-based STEM learning. *Jurnal Penelitian dan Pembelajaran IPA*, *5*(2), 132-141.

Retnowati, S., & Subanti, S. (2020). The STEM approach: The development of rectangular module to improve critical thinking skill. *International Online Journal of Education and Teaching*, *7*(1), 2-15.

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, *50*(1), 37-56.

Sterrett, B., Rhodes, G., Kubasko, D., Reid-Griffin, A., Robinson, K. K., Hooker, S. D., & Ryder, A. J. (2020). Shaping the supervision narrative: Innovating teaching and leading to improve STEM instruction. *Journal of Educational Supervision*, *3*(3), 59.

Suebsing, S., & Nuangchalerm, P. (2021). Understanding and satisfaction towards stem education of primary school teachers through professional development program. *Jurnal Pendidikan IPA Indonesia*, *10*(2), 171-177.

Tekerek, B., & Karakaya, F. (2018). STEM education awareness of pre-service science teachers. *International Online Journal of Education and Teaching*, *5*(2), 348-359.

Yamkasikorn, M. (2021). STEM education and innovation for teacher development: New challenges toward Thai education quality. *Asia Research Network Journal of Education*, *1*(1), 32-42.