LEARNING MANAGEMENT BASED ON STEM EDUCATION CONCEPTS TO PROMOTE PROBLEM-SOLVING SKILLS OF STUDENTS IN CHONGQING, CHINA

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ABSTRACT
The aims of this study were twofold: 1) to examine the implementation of learning management that is grounded in Stem education principles in order to enhance students' problem-solving abilities, and 2) to assess the effectiveness of learning management based on Stem education principles in promoting students' problem-solving skills in Chongqing, China. This study employed a quantitative research methodology. The sample consisted of 273 elementary school pupils that were selected using Krejcie & Morgan's Table. The study instrument utilized a learning management assessment form grounded in Stem education principles, with the aim of enhancing the problem-solving abilities of students in Chongqing, China. The statistical measures employed for data analysis were percentage, frequency, mean, and standard deviation. The research findings indicated that students generally held positive opinions regarding the use of STEM education to cultivate problem-solving skills, with an average score of 3.28. Furthermore, the comparative analysis showed no significant variation in these opinions when considering factors such as gender, age, and educational level. The suitability evaluation determined that the implementation of a learning management component based on Stem education principles in Chongqing, China had a high level of appropriateness and feasibility in promoting students' problem-solving skills.
Keywords: Learning Management, STEM Education Principles, Problem-Solving Abilities

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INTRODUCTION

Currently, the world is undergoing rapid transformations in several domains; it has also seen quick changes. Various aspects such as the economy, society, politics, technology, job, and daily life are undergoing tremendous transformations. The introduction of technology has facilitated advancements in both business and daily life. This indicates that the progress of science and the requisite knowledge has advanced swiftly and consistently. Organizations require someone with creative abilities. Possess the capacity for critical thinking and adept problem-solving abilities. Problem-solving abilities are essential for success in the 21st century, particularly in the context of Ford. Human existence is inherently impartial due to the constant challenges they encounter on a daily basis. Acquire the knowledge and ability to effectively utilize your cognitive faculties or a specialized expertise that is dedicated to enhancing intellectual capabilities. It is a talent that may also cultivate attitudes, cognitive approaches, principles, knowledge, and comprehension of social circumstances. This enables them to effectively address the challenges encountered in the given circumstance.

Hence, it is important to foster problem-solving abilities in students of all academic levels through the instruction of management. Acquiring this foundational information is essential for all students to effectively address difficulties. And possess the capability to utilize acquired knowledge to resolve everyday challenges. Implementing this will enhance your prospects of employment. Furthermore, it has the capacity to foster comprehension and cultivate productivity and vitality in the modern day.

Tanchitanon and Junoisuwan (2013) However, the current investigation into teaching and learning management has revealed that the majority of educational institutions prioritize traditional lecturing as a teaching method, with a strong emphasis on memory of exam-related knowledge. Students are not taught to cultivate creativity and acquire novel ideas. The application of acquired information to real-life situations leads to a deficiency in the development of intellectual skills and a lack of creativity among pupils. Incapable of resolving issues and without the proficiency to employ the requisite principles for articulating commonplace occurrences.

STEM Education is an instructional technique that focuses on teaching and learning for students. Capable of integrating information from several academic fields, such as Science (S), Technology (T), Engineering (E), and Mathematics (M), by harnessing the power of natural phenomena. The teaching techniques of each area synergistically facilitate the application of information across other domains for problem-solving, research, and innovation. In today's interconnected world, where learning management is crucial, teachers in many fields collaborate due to the necessity of acquiring a comprehensive understanding of several parts of work that are not employed in isolation. Furthermore, STEM education fosters the cultivation of crucial proficiencies in an interconnected world, including aptitudes necessary for the modern day that have evolved beyond mere knowledge-based competencies. These proficiencies encompass academic expertise, high-level talents, and creative ability. Harbor the notion of generating novel advancements.

Hence, the researcher is intrigued by investigating the pupils' comprehension of STEM education. Opinions on learning management in accordance with the STEM Education idea aim to enhance students' problem-solving abilities and acquire information that will aid in the development of their knowledge and comprehension of STEM education. Enhance the teacher's capacity to create learning experiences aligned with STEM education for optimal effectiveness.

LITERATURE REVIEWS

In The researcher successfully condensed it into four key points:
1) The objective is to provide students with the ability to cultivate problem-solving abilities by effectively utilizing the concept of cause and effect. Furthermore, it may be implemented in everyday activities.
2) This activity aims to enhance students' ability to engage in multifaceted thinking.
3) To facilitate collaborative work among students and foster knowledge and experience sharing for problem-solving purposes.
4) To foster pupils' enthusiasm for learning.
Procedures for acquiring management knowledge to enhance problem-solving abilities The Secretariat of Education (2007A: 4-5) outlines the following procedures for managing learning in problem-solving processes:
1) Stage of problem identification the problems presented in the course might originate from several sources, including visual stimuli, demonstrations, and narrative. I viewed films, presentations, riddles, interactive activities, news updates, and captivating daily occurrences. Generating authentic scenarios for role-playing, encompassing both genuine and honest events.
2) Stage of assumption Observation leads to the formation of assumptions. Data collection refers to the process of gathering and recording information or data from various sources. By employing facts and experiences, one may deduce the solution to the problem in a logical manner.
3) The data collection step involves gathering information through means such as reading, observing, interviewing, searching, or conducting tests. The information is meticulously documented. To do a thorough analysis of the data in order to address the situation at hand.
Data analysis involves presenting information derived from research or experimentation to facilitate student engagement in discussions, questioning, answering, and expressing opinions with teachers. This collaborative process aims to provide guidance and advice, ultimately leading to the formulation of conclusions in subsequent steps.
4) Summary and assessment: The concluding phase of the problem-solving learning process consolidates the knowledge gathered from many sources into a definitive learning conclusion. Subsequently, the teachers and students collaboratively assessed the outcomes. They are employing various instructional approaches and utilizing the assessment outcomes to enhance students' development.
The reference is from Munkham's work published in 2007, specifically on pages 32 to 34. The proposed approach suggests three key phases in problem-solving learning management:
1) Initial phase of readiness
1.1) Educators analyze learning management plans. Elaborate information and objective
1.2) Instructors organize activities systematically.
2) Acquisition phase
2.1) The problem determination stage involves the instructor highlighting the importance of pupils being able to visually perceive and comprehend the problem, as well as accurately assessing its extent. Teachers can employ many strategies, such as storytelling and constructing simulations, to enhance their teaching methods.
2.2) Hypothesis stage: The process of formulating a tentative response to the problem. By use expertise and past encounters to anticipate the potential consequences of the situation. Or how to effectively address the problem that requires several assumptions to be made.
2.3) Stages in formulating the problem the purpose of this stage is to formulate a strategy for resolving the issue. They utilize the data obtained from the difficulties examined in step 1, as well as the pertinent information and expertise pertaining to the situation. Furthermore, it is employed to strategize the issue-solving process in the event that the problem necessitates experimental verification. This stage entails the process of formulating a strategy for a study,

which involves the creation of hypotheses. Establish a procedure for experimentation or validation. It may incorporate instructions for assessing solutions.
2.4) The data collecting step involves students acquiring knowledge from several sources, including doing literature searches, examining documents, and interviewing experts. Alternatively, one might consult an expert or conduct an experiment to get the acquired data. To test the hypothesis in the following stage, the data might be utilized by employing record-keeping or other suitable ways.
2.5) Conducting data analysis and hypothesis testing. The acquired data is utilized to assess and evaluate the established hypothesis.
2.6) Conclusion: Learners assess the issue-solving approach or choose the most efficient strategy to tackle the challenge. The nature of the conclusion pertains to the beliefs of any hypothesis, which may be stated as principles that serve as an answer or solution to a specific situation, together with the practical application of information.
3) Evaluation stage Teachers and learners collaboratively evaluate the learning outcomes of the learners using diverse approaches and utilize the assessment findings to enhance the learners' progress.
The 6-step problem-solving teaching technique proposed by Sinthanon et al. (2002, pp.206) includes:
Step 1: Establish an issue. When creating a problem, the instructor examines the lesson that will be presented and thereafter prompts the student to generate a problem or question that requires a solution. Alternatively, it may enable learners to present issues or uncertainties. Students may encounter difficulties or uncertainties that may be addressed through many approaches:
1) Employing interrogative statements that prompt the identification of issues.
2) Narrating or constructing a problematic scenario
3) Prompt pupils to generate inquiries or challenges.
4) Perform or execute studies to induce issues.
Second step a hypothesis is a rational and systematic approach to examining a problem and determining the solution. Contemplate dividing the significant difficulty into smaller, less significant matters. Subsequently, engage in a methodical thought process by utilizing acquired knowledge, comprehension, facts, and past experiences that have been examined to generate solutions and approximate the answers.
Step 3 involves formulating a strategy to address the problem or devising a systematic approach to derive solutions based on the underlying causes of the problem. This process entails analyzing the source of the problem and use logical reasoning to develop a solution that aligns with the identified cause. This will necessitate the generation of a diverse range of options or solutions. Subsequently, employ rational reasoning to deliberate over the selection of a viable option. The optimal approach to prepare equipment Tools ready for usage.
Step 4 proceed to gather the necessary information. When formulating or strategizing a solution, let the pupils to execute the strategy. Subsequently, document the acquired data in order to show it, ensuring the veracity of the material. Arrange data and display it in a comprehensible manner
Step 5 provides a concise overview of the findings. This is the phase in which the information is being evaluated. Analyze the causal link or correlation between the independent and dependent variables in order to derive a conclusion based on the hypothesis. Consequently, the findings are condensed into general concepts.
Step 6: Inspection and Evaluation After the overall conclusions have been made, the credibility of the results is reassessed.
Based on the analysis of the learning management process in a problem-solving method, it can be deduced that there are six distinct processes involved in issue solving:

1) Stage of identifying the problem 2) Stage of formulating hypotheses 3) Stage of developing a plan 4) Stage of gathering data 5) Step of analyzing the data and 6) Summary and assessment.

RESEARCH METHODOLOGY

The study sample comprised secondary school students in Chongqing, China, with a total of 75 schools and 122,200 students. The source of this information is the Ministry of Education, specifically from the year 2022.The sample was 273 primary school students selected by Krejcie & Morgan's Table. The research instrument was an assessment form of learning management based on Stem education concepts to promote the problem-solving skills of students in Chongqing, China. Statistics used for data analysis were percentage, frequency, mean, and standard deviation.

RESEARCH RESULTS

Mean analysis ($\overline{X}$), standard deviation (S.D), level value and rank of opinions about learning management according to STEM Education concept to promote problem solving skills. of a sample of students in higher education

Table 1 Level value and rank of opinions about learning management according to STEM Education concept to promote problem solving skills of a sample of students in higher education

Description	$\overline{X}$	S.D.	level value	rating
1) Implementing an educational management system that is rooted in the principles of STEM Education can serve as a means to enhance problem-solving abilities. Proficiency in this talent is crucial for students in the 21st century.	4.55	0.52	Strongly agree	1
2) Learning management models based on STEM Education can employ diverse learning management techniques. It encompasses more than just problem-based or project-based learning management.	3.28	0.68	agree	6
3) If it comes to implementing STEM Education, instructors have the task of only promoting student learning.	3.49	0.63	agree	5
4) The learning materials utilized in the context of STEM Education should be directly connected to practical or professional scenarios. It may be integrated into STEM Education curriculum without identifying the specific grade level.	3.51	0.65	agree	4
5) Learning knowledge and skills education based on Science, Technology, Engineering, and Mathematics (STEM) principles. Education should prioritize the cultivation of 21st-century process skills, with a particular focus on problem-solving abilities, instead of prioritizing science and math subject matter.	3.53		agree	3
6) The learning management strategy centered around STEM Education necessitates the incorporation of science, mathematics, technology, and engineering design processes exclusively.	3.48		agree	7
7) STEM-based learning management Education should facilitate chances for learners to engage in the exchange of ideas with their peers. Consistently attending class	3.54		agree	2
together	3.53	0.44	agree	

According to the data in Table 1, the group of higher education students expressed their ideas regarding learning management based on the concept of STEM Education, which aims to enhance problem-solving skills. On average, the group agreed with this concept at a level of 3.53, when evaluating each item individually. The data can be arranged in descending order based on the average, starting from the highest value to the lowest value.

The utilization of STEM Education as a foundation for learning management can serve as a valuable framework for fostering problem-solving abilities, which are essential competencies for learners in the 21st century (mean score = 3.65, indicating high agreement).

The learning management system, based on the principles of STEM Education, should facilitate regular and meaningful exchange of ideas among learners inside the group and throughout class sessions (mean=3.54, agreement).

Third in rank, item number five. The focus of learning management, based on the principles of STEM Education, should be on fostering students' development of process skills, particularly problem-solving abilities, in the context of the 21st century. Instead of prioritizing the content of science and math (mean=3.53, agreement),

DISCUSSION & CONCLUSION

Through the process of analyzing data to summarize, the findings of the research are as follows.

1) Examination of participants' personal data the data illustrates the distribution of the sample group, which consists mostly of female university students. Out of the total sample size of 249 individuals, 59.3 percent are under 20 years old. Additionally, 36.9 percent of the sample group are undergraduate students, totaling 155 individuals.

2) The analysis yielded data for the percentage of students who answered correctly and their degree of knowledge and awareness of STEM education within the sampled student population at the college or university level The study revealed that the pupils' collective knowledge and comprehension of STEM education was at a commendable level. The accurate response is 57.72%.

3) Five point one point three the analysis of the frequency and percentage of students who correctly answered questions about STEM education at the higher education level revealed that the number of students with a strong grasp of STEM education was... The levels of knowledge and comprehension of STEM education were categorized as very excellent, good, and moderate, with no significant differences observed in the numbers. The percentages were 29.8%, 28.6%, and 25.9%, respectively. The group with the lowest representation was the one with a limited comprehension of STEM education. Comprised 15.7 percent

Analysis outcome:

4) The study examined the percentage of students who correctly answered questions related to STEM education, and categorized them based on their sex, age, and level of education. The results showed that there were no significant differences in the knowledge and comprehension of STEM education among students with varied sex, age, and level of education.

5) The average analysis findings ($\overline{X}$), standard deviation (S.D), and the level of opinions on learning management in relation to the idea of STEM Education for enhancing problem-solving skills are as follows: The study conducted on a group of higher education students revealed that their attitudes towards learning management, specifically in the context of STEM Education to enhance problem-solving skills, were generally favorable (mean = 3.43).

6) The study conducted a comparative analysis of opinions on learning management based on the idea of STEM Education, with the aim of promoting problem-solving abilities. The analysis categorized the data according to sex factors and used One-Way ANOVA for analysis. The results revealed differences in opinions among the sample of students of various sexes. Their perspectives on learning management, which is rooted on the principles of STEM Education to enhance problem-solving abilities, were same.

7) Six point one point seven The findings of a comparative study of viewpoints on learning management, specifically in relation to the notion of STEM Education and its impact on problem-solving abilities, were classified based on age factors. The analysis utilized One-Way ANOVA and revealed that the samples of students from different age groups yielded distinct outcomes. They held similar views about the utilization of STEM Education as a means to enhance problem-solving abilities in learning management.
8) The study conducted a comparative analysis of viewpoints on learning management, specifically focusing on the notion of STEM Education and its impact on promoting problem-solving abilities. The analysis categorized the data based on educational level factors and utilized One-Way ANOVA for statistical analysis. Examine various their perspectives on learning management, which is rooted on the principles of STEM Education to enhance problem-solving abilities, were unanimous.
Suitability study results and potential for the Learning Management component Experts have determined that using STEM education concepts to enhance problem-solving skills among students in Chongqing, China is both suitable and achievable at a significant level.

REFERENCES

Astin, A. W. (1971). *The college environment*. American Council on Education.
Chalakbang, W. (2016). The Spirit of Teachers: Important Characteristics of Professional Teachers. *Journal of Humanities and Social Sciences Nakhon Phanom University*, 123-128.
Channai, O. (2010). *Factors Influencing English Learning Achievement of grade 6 primary school*. 18.
GJ., P. (1992). *Analyzing the curriculum*.
Good, C. V. (1973). *Dictionary of Education. Good, Carter V. (1973). Dictionary of Education*. New York: McGraw-Hill Book.
Harold, S. (1964). *A higher education*. The council for national Academic Award and British.

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