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Creative Development of 4th Graders by Using a Set of Learning Management Activities Based on the STEAM Concept

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Abstract

This research aimed to develop the creativity of 4th-grade students by using a set of learning activities based on the STEAM concept. The target group in this research is 4th grade students in elementary school in Thailand, during the second semester of the academic year 2023- 2024. There were 13 respondents in this research. The tools used in this research were a set of learning activities based on the STEAM concept, Academic Career Grade 4 Student Performance Assessment Form, and Student Interview Form. The research methodology was classroom action research. Data were analyzed using mean, standard deviation, and percentage, which were researched in two operating cycles. The results showed that in Operation Cycle 1, 9 students passed the assessment criteria of 70 percent out of a total of 13 students, representing 69.24 percent of the total students. In Operation Cycle 2, 13 students passed the assessment criteria of 70 percent, representing 100 percent of all students.

Keywords: Creativity, STEAM Concept Learning, Learning Activity

INTRODUCTION

Thailand still faces development challenges in many dimensions including economic dimensions where the economic structure is not yet fully driven by innovation. There are important development goals to develop people in all aspects and at all ages. To be a good, skillful, and competent person, you need to have the right mindset and skills needed in the 21st century (Office of The National Economic and Social Development Council, 2018). In the educational curriculum, emphasis is placed on enhancing the thinking capacity of learners, starting from the primary level, with emphasis on the teachers designing learning arrangements that promote the ability to think and solve problems by the learners. The designing of learning management for learners aims to use the scientific knowledge of learners while developing and practicing essential skills and engineering design processes to solve real-life problems (Chulavatnatol, 2013). Career groups are subject groups that help develop learners to have knowledge, understanding, and the basic skills necessary to live and be adaptable to changes. It can also bring knowledge about livelihood and careers that when applied to work, can make it creative. It also focuses on developing learners to have knowledge, abilities, and job skills (Hilton & Pellegrino, 2013).

It is considered an important skill that allows learners to learn from hands-on practices, and develop job skills resulting in gaining basic occupational skills (Akbulut, 2018). Rapid changes in the social context leave learners knowledgeable but lacking the capacity to use their

knowledge in real-life situations. The inability to put knowledge to good use in real-life situations is because it is learned by primary necessity. Therefore, there is knowledge and understanding at the superficial level resulting in a lack of self-awareness, not knowing their potential and aptitude. They don't often understand and see the value of their studies and don't apply their knowledge and skills to find their relevance in their daily lives (Sanguanrat & Bharangkul, 2021). Most educational extension schools have a teaching style that emphasizes lectures rather than hands-on approaches and do not receive the necessary skills training such as creative problem-solving skills, innovative skills, etc. From the analysis of learning outcomes in occupational learning strands, it was found that the standard aspects concerning students were that the students must be developed in acquiring self-knowledge and developing skills and work processes. As for the standards regarding the teachers, it must be continuously developed in the use of teaching materials and educational innovations which affect students causing them not to develop to their full potential. Teaching and learning did not achieve the goals as set and are still in an unsatisfactory condition. These developments, if properly observed, will enable the students to achieve academic achievement in the Careers and Technology Learning strands. From the experience of managing the learning of teachers, it was found that in the practical part, in terms of skills and processes, learners lack the techniques and methods to create work. The work produced by the students is similar or imitative. There is no novelty, no difference in ideas and styles. The students were unable to explain what they wanted to convey, nor was it possible to create the work in a timely manner.

STEAM Education is an issue that many countries pay attention to with the goal of education management to develop human resources to have knowledge and skills (Chomjumjang, 2022**)** It was developed from STEM education by Yakman **(**2008) **(**Olapiriyakul,S. 2019**).** This is an integrated learning arrangement of many subjects with learning activities instead of teaching separately from only 4 sciences (STEM Education) namely Science, Technology, Engineering, and Mathematics with the addition of one science, Art, to STEAM Education, to allow learners to convey or apply important ideas with creativity and imagination. Learners can also communicate their thoughts in the style of drawing. This makes a piece the perfect piece of work and beauty (Unkaew, S. NCP**)** Creativity is the ability of the brain to think in a complex way. It consists of originality, agile thinking, flexible thinking, and detailed thinking (Guilford, 1967**).** It takes an effort to make a dream or imagine possible dreams to produce a work (Panmani, 1994**).** It helps to raise the level of ability and builds patience and determination, helping to produce good work for the benefit of work and career (Worawattanachai, 2022**).** The media which is a set of learning activities helps learners to learn,

including playing a role or actively participating in learning, intellectually, physically, socially, and emotionally (Ansari & 2020). Therefore, it is appropriate to use in a student-centered learning activities. Activity kits can help solve problems and develop learners effectively. This gives teachers the confidence to provide learning activities to learners (Chaengploy & Jadesalug, 2016). Nilwan (2021) has developed the creativity of Grade 3 students who are learning according to the STEM approach. The results showed that in Cycle 1, four students passed the 70% threshold for creativity, representing 66.67. In the second cycle, two students passed the 70% creativity threshold, representing 100% of the total number of students, and Rahmawati, (2017), research looked at the development of skills development in chemistry classrooms in the 21 century. Opportunities and Challenges of STEAM Integration to Improve Chemistry Students' Skills in Secondary School The results show that students begin to challenge their creativity and creativity within the existing learning environment. Integrating STEAM into chemistry learning can improve students' skills in the 21st century. Therefore, a set of learning activities is the right tool to help students be creative. Based on the above reasons, the researcher is interested in developing the creativity of 4th-grade students by using learning management based on the concept of STEAM and encouraging learners to develop higher creative thinking skills in academic and professional careers.

METHOD

Target Group

The target group used in this research was Grade 4 students at an elementary school in Thailand, enrolled during the second semester of the academic year 2023- 2024. There were 13 respondents in this study.

Variables studied

The research variables include: The independent variable is a set of learning activities based on the STEAM concept and the dependent variable is creativity.

Duration of research

To conduct research on the creative development of 4th-grade students using a series of learning management activities based on the STEAM concept, there is a research period in the second semester of the academic year 2023- 2024. The contents used in the research were a. occupational learning group, topic 1, and b. livelihood and family, standard D 1.1. The skills that the students are expected to acquire after studying these contents are the following: understanding of the work, being creative, having work process skills, management skills, problem-solving skills, collaboration skills, knowledge-seeking skills, having morality and work habits, having a consciousness of energy, resources, and environment for livelihoods and

families. The learning activities in the contents are the following: Unit 5 on banana leaf crafts has the following contents:

1) Learning Activity Set 1: Creating decorative items from banana leaves. It takes 4 hours to manage learning with 2 plans.
2) Learning Activity Set 2: Banana leaves to use in crafts. It takes 4 hours to manage learning with 2 plans.
3) The third set of learning activities starts with banana leaves. It takes 4 hours to manage learning with 2 plans.

Research tools

1) A set of learning management activities based on the concept of STEAM education. There are 3 sets of activities: Learning Activity Set 1 on Creating Decorative Items from Banana Leaves, Learning Activity Set 2 on Banana Leaves to Use in Crafting, and Learning Activity Set 3 on Start Getting Creative With Banana Leaves. The researcher created it by studying the curriculum and documents related to the Basic Education Core Curriculum, Mathematics Learning Strands, Content Analysis Principles of Creating a Set of Learning Activities, and a career course book. Then, the researcher created a set of learning activities that consists of a section of the teacher's manual. It consisted of a learning management plan, student performance assessment, and student activity series consists of knowledge sheets and learning activity sheets. The researcher presented it to the thesis advisor for revision as instructed, and proposed it to the research and evaluation experts of STEAM Teaching and Curriculum and Instruction. 3 persons reviewed and gave feedback regarding this research. It has an overall expert opinion score of 4.52, which is the most appropriate level, and the original version of the STEAM Education Learning Management Activity Kit is published and then applied to the experimental group.
2) Semi-structured student interview form. It looks like an open-ended question log. The researcher created it by studying the document that pertains to concept and theory relevant research, then define the scope of the interview. The researcher then created a 10-question interview for the students. The questions were revised to be accurate and appropriate and presented them to the same set of experts, where the experts considered the consistency of the questions with the issues measured (IOC). Another item cannot be applied because the IOC value is lower than 0.6. The researcher then presented it to the thesis advisor again and selected the most suitable one. The complete student interview form will be published for further data collection.

Data Collection

This research is a classroom action research based on the ideas of Kemmis & McTaggart (1988) as can be seen in Figure 1. (PAOR) which has the following steps:

Step 1: Plan is the stage of exploring the problems that will be used in teaching and learning and determining the desired issues.

Step 2: Act is the implementation of the plan. The plan must be adaptable in any situation.

Step 3: Observe is the stage of collecting information obtained from work. It is recorded as a report obtained by careful observation. The observer must report the observation of the implementation process and the results of the observation of the situation.

Step 4: Reflection causes the actions recorded from observations and data collection to be analyzed and interpreted, which will lead to improvement to use in the next action plan.

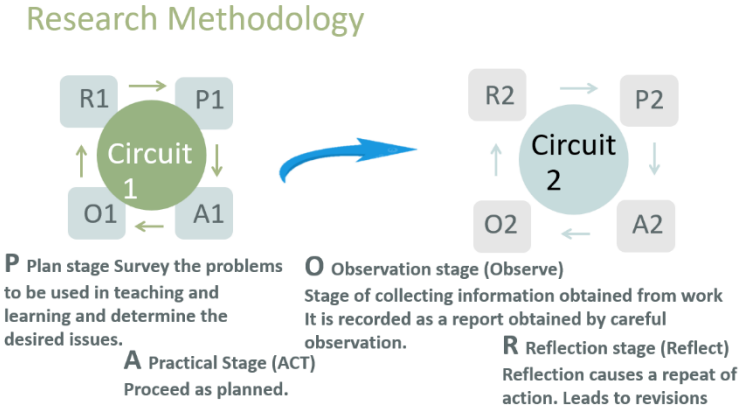

Figure 1. Research Methodology (Kemmis, S., & McTaggart, R. 1988)

Figure 1 points out the action cycle in the research on the creative development of 4th-grade students using a set of learning management activities based on the steam concept. Action Cycle 1, Step 1, Planning is the collection of problem data of 4th-grade students. Theory, core curriculum, academy curriculum, books, and research related to creative development, and then create a set of learning activities 1. The topic of creating decorative items from banana leaves consists of 2 parts: Part 1 is a set of learning activities for students. Preface, student statements, knowledge sheets, activity sheets, and self-assessments, and Part 2 is a teacher's manual. Preface Statement for Instructors Learning plans, student portfolio creativity assessments, student interviews, and student behavior observation It takes 4 hours to complete the learning process. Then find out the appropriateness of a set of learning activities from 3 experts, who suggested that the time spent on the activity should be adjusted appropriately, since in the third stage, creating the work, students may not be able to practice or create the work in insufficient time. The teaching stage is interesting. Students are encouraged to be interested. Grade 4 students Stage 2 Practical stage Clarify the use of a set of learning activities. Introduce the

process to students and then proceed with the teaching according to the learning management plan on creating decorative items from banana leaves. Step 3: Observation stage during learning We collected data from tools used to collect data, namely creativity assessments from student performance, student interviews, and student behavior observations. After completing Round 1, the researcher analyzes and synthesizes knowledge. Stage 4: The reflection stage showed the scores of 13 students. In the first learning activity series, banana leaf decorations were below the threshold of 70 percent, which is 30.76 percent of the total students. Therefore, the target group that needs to develop creativity is 4 students in this class. This hinders the creation of works. The researcher sought a solution to the problem by having students search for different components of the banana tree. Learn by integrating science subjects. The instructor asks students to write a clear time plan and follow it strictly, has students take into account the value of time, and has students practice cutting. Sewing Paste Outside of school hours. Action Cycle

Phase 1: Planning The results of the assessment of creative abilities are based on student performance assessments and student interviews. Create a second set of learning activities based on the Steam concept. Academic Career Grade 4. The story "Banana Leaves to be Used in Crafting" consists of 2 parts: Part 1 is a set of learning activities for students. Preface, student statements, knowledge sheets, activity sheets, and self-assessments, and Part 2 is a teacher's manual. Preface Statement for Instructors Learning plans, student portfolio creativity assessments, student interviews, and student behavior observation. It took 4 hours to organize the learning activities and then find out the appropriateness of the learning activity set from 3 experts who gave feedback that the created learning activity set was suitable for use. This enables students to learn integrally. The 4 teaching steps Stages are appropriate for learning management and may help students to be creative. Step 2: Implementation Implement a learning management plan in a series of learning activities based on the steam concept. Occupational Academic Course Grade 4 on banana leaves to be used in crafts for 4 hours Step 3 Observation stage during learning management The researcher collected data from the tools used to collect the data, namely: Creativity assessment based on student performance, student interview form, and student behavior observation form At the end of the second learning cycle, the researcher uses the data to analyze the data. Step 4: Reflection stage It was found that 13 students had a score of creativity assessment based on student performance. In the second learning activity series, banana leaves should be used in crafts. This is 100% of all students, so none of the students who do not meet the criteria end up collecting data in the research.

RESULTS AND DISCUSSION

Data analysis in this research, The researcher divided the data analysis into 3 types as follows:

1. Qualitative analysis. The researcher analyzed the line of answers from student interviews after learning using a series of STEAM concept-based learning activities. Each activity series is completed using content analysis.
2. Quantitative analysis. The researcher analyzed the data from the practice of learners' activities based on learning management in the creative development of 4th grade students using a learning management model based on the STEAM concept. Students must meet 70 percent of the criteria to be considered qualified by using statistical analysis.
3. Analysis of instruments used in research

The researcher analyzed the tools used in the research namely, a set of learning activities based on the STEAM concept, the scores from experts used to analyze the quality of the learning activity set, and the student interviews that were conducted using expert scores to analyze the consistency between the questions and the issues to be measured (IOC).

Data analysis results

This research is conducted to develop the creativity of 4th graders using a series of learning management activities based on the STEAM concept. After learning in the second cycle, 13 students passed 70 percent, representing 100 percent of the students in the target group. The following are the results when dividing into considerations in each operating circuit.

Operation Cycle 1: Manage learning with Learning Activity Set 1 based on the STEAM concept. In the fourth-grade vocational course, it was found that the target students had an average score of 23.5 out of 32 in the student performance assessment, with 9 students who met the 70% criteria and 4 students who did not meet the 70% requirement.

Operation Cycle 2: Manage learning with the second set of learning activities based on the STEAM concept. In the fourth- grade of vocational education, the target group of students had an average score of 26.7 out of 32 in the student performance assessment, and 13 students passed the 70 percent threshold. The student scores from student performance assessments in Cycles 1 and 2 as can be seen in Figure 2.

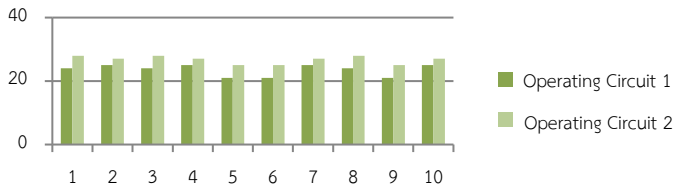

Figure 2. Student scores from student performance assessments in Cycles 1 and 2

CONCLUSION

Action Cycle 1 From Organizing Learning Activities Using Learning Activity Set 1. According to the STEAM concept, in the fourth- grade of vocational education, the average creativity score of the target students was 23.5 or 73.43 percent. Nine students passed the creativity assessment criteria of 70% or 69.24%, and 4 students did not pass the creativity assessment criteria of 70 percent. This is because students have studied a series of learning activities and were enthusiastic about the idea of using a set of learning activities. Students come up with innovative ideas by searching for information with a variety of learning resources. Students were able to come up with creative ideas in line with Guilford (1967) that said, creativity is the ability of the brain to think in complex ways, thinking that creates new things and can be applied to their advantage. Creativity is a multifaceted mindset and together they plan their work, make it work on time, followed the supposed plan, and conclude the results of the collaboration. Assignments are submitted on time and students learn a variety of subjects. Science allows students to learn the different parts of the banana tree and know which parts they can use in their works. Technology and Engineering subjects are from which the design of the student's work. Art is the creation of the work to be more complete, and Mathematics is the prediction of the size of the work. In line with (Olapiriyakul, 2019). It is a learning management approach that focuses on integrating learning in science, technology, engineering, mathematics and arts subjects by encouraging creativity to find new methods or processes to solve problems and apply them to what is learned (Kang, 2019).). He studied the development of a series of art teaching based on the concept of STEAM education to promote the creative process for Grade 5 students. It was found that the students were more inspired to create the pieces and they enjoyed learning art based on the concept of STEAM education and also in Thanyaret's research. According to Perignat & Katz-Buonincontro (2019) STEAM education was organized to promote creativity and attitude towards science on nutrients of 6th grade students. This is followed by creativity generation and evaluation and improvement of ideas, respectively. In line with Hyunshik, (2022) research, the development of mathematical creativity was studied to study steam learning in conjunction with Korean traditional art under the roof. Hanok is The results showed that 4D frames can help develop creativity and critical thinking in students in the context of steam conceptual education. The findings of this research have the potential to expand the scope of STEAM studies to include content for creative education.

We concluded that the reason why 70% of the target students did not meet the assessment criteria in Cycle 1 was because the students lacked application in their work. This is in line with Sanguanrat & Bharangkul (2021). That said, learners have knowledge but cannot use their

knowledge. The inability to put knowledge to good use in real- life situations is due to the fact that it was learned by primary necessity. Therefore, there is knowledge and understanding at the superficial level only and a lack of self-awareness, not knowing their potential and aptitude. They don't see the value of their studies and its relevance in their lives. Also, students do not understand the process of using activity sets. Teachers solve problems with detailed explanations and guidance and students lack motivation to design creatively. The instructor has therefore reinforced it with a commentary allowance. In line with (Prasertsang, 2023). That suggests reinforcement by giving compliments to students. This makes students more enthusiastic towards learning activities better when students are reinforced, thus increasing their enthusiasm. And in line with (Rahmawati, 2017). Research, study of skill development in chemistry classrooms in the 21st century. Opportunities and Challenges of STEAM Integration to Improve Chemistry Students' Skills in Secondary School The results showed that students developed critical thinking and creative problem-solving skills as well as collaborative skills. Students begin to challenge their creativity and creativity within the existing learning environment. Integrating STEAM into chemistry learning can improve students' skills in the 21st century.

Cycle 2 After the researcher improved the learning activities, it was found that the score from the student performance assessments showed that the creativity score of the target group students averaged 26.7 or 83.43 percent. This is a result of students having a better understanding of the process. Students are prepared to search for information for planning and design. Students do their research on the subject of banana leaves and can now conclude a better understanding. They are increasingly enthusiastic and have an ideas that can build on the work from analyzing and synthesizing data. This includes observing and collecting available materials and planning and designing in writing (Mirhosseini & Mirhosseini 2020). That said, it is an integrated learning management that allows one to connect knowledge and skills learned from Science, Technology, Engineering, and Mathematics with real-life situations by using engineering processes as a stage of solving problems or satisfying needs. To be easily used, students work together to create pieces from planned divisions of duties and can follow the steps they have planned. The feasibility of the work is taken into account. In line with (Petcharak, 2005). That said, creative learning is a learning principle that emphasizes the learner to create new knowledge (Constructionism Theory) by taking the learner as the creator of knowledge himself. It also states that learners build knowledge on their own by allowing learners to engage in self-learning activities. In addition to supporting the said principle, the principles of experiential and environmental learning, emphasize the importance of

collaborative learning. Principles that use technology as a tool and knowing how to seek answers from various sources of knowledge on your own results in ingrained behavior when learners learn how to learn (Sawangrat, 2023) Which develops the creativity of 3rd-grade students who are learning according to the STEM approach, the results showed that in Operation Cycle 1, four students passed the 70% threshold for creativity, representing 66.67%, and in Cycle 2, two students passed the 70% threshold, accounting for 100% of the total number of students.

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