Original Research Article

DEVELOPING A COURSE MODEL OF YOUTH INNOVATORS UNDER THE PRINCIPLE OF STEAM 4 INNOVATOR TO PROMOTE STABILITY IN THAILAND'S SOUTHERN BORDER AREAS

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Abstract

This research aims to study the primary knowledge and skills required to be innovators, develop a course model for youth innovators and assess student satisfaction with the course. The research utilizes participatory action research as a methodology. The conduction process is divided into four stages as follows: 1) studying and analyzing information to improve the course, 2) developing the course draft and having experts assess its quality, 3) trying out the course, and 4) evaluating and adjusting the course. 20 samples were taken from 20 high school students who are representatives from a private Islamic school that teaches both religious and general education together in the Thailand's southern border areas. The research results reveal as follows: skills evaluation result is suitable at a good level in each item, the idea selection and decision-making skills are suitable at a very good level, business development planning skills are suitable at a very good level, communication and information representation skills are suitable at a very good level, and analyzing and data collection skills are suitable at a good level. Whereas the evaluation results on satisfaction evaluation of the course users found that they are suitable at the most level. While the evaluation results in each item on contents are suitable at a much level, and the application aspect is suitable at a much level.
Keywords: STEAM 4 INNOVATOR, Youths, Thailand's Southern Border, Stability

Introduction

The Developing Children and Youth Council of Thailand (CYCT) mostly operates in accordance with the law. However, some roles are less efficient than others, particularly in resource mobilization and cooperation with public and private sector networks, including private development organizations. Qualitative study results indicate that the CYCT, along with related individuals, has guidelines aimed at developing the potential knowledge, skills, and tools necessary to nurture children's physical, emotional, social, and intellectual development. The objective is to cultivate efficient leaders among children and youths (Komonmarn et al., 2016). The major institution of society and youth development reveals that developing youths is akin to building a foundation for the future expansion of the majority of people in society. Developing youths are considered valuable personal resources for society and should begin at an early age. Furthermore, they should be enhanced to think critically, possess self-adjustment skills, develop positive attitudes, and acquire the ability to access knowledge and adapt to the changing currents in society that will impact their future livelihood (Udom et al., 2016). Additionally, childhood and youth are the ages of learning. This is evident in the 'National Child and Youth Development Plan,' which is a national policy. Therefore, we often witness numerous activities and projects organized by both the government and private sectors to support and provide opportunities for children to be nurtured, cultivated, and empowered to become strong individuals. Consequently, communication for the development of communities and societies involving children and youth is considered a crucial goal (Jitwanichkul, 2017). If knowledge and skills in creative thinking are nurtured in youth to become innovators, it will empower the youth in the three southern border provinces to develop creativity in pursuing positive endeavors and generating innovative ideas for successful careers. This process is crucial for enhancing the country's human resources by fostering quality and potential for innovation. Upon completion of the research, the model can be implemented to benefit at least 1,000 individuals, resulting in the youth becoming responsible citizens who contribute to the stability, prosperity, and sustainability of the nation. Furthermore, when young people possess positive attitudes and ideas towards their nation, it can aid in addressing issues of unrest in the three southern border provinces.

The purpose of this research is to study basic information to develop a course for improving model youth innovators , create the course, implement it to develop model youth innovators , evaluate the results, and adjust the course to impact the development of model youth innovators in the southern border areas under the principle of STEAM 4 INNOVATOR.

Literature Review

Phengnoi & Boonsom (2021) indicated that the learning activities planned according to the STEAM Education concept were efficient and met the criteria. Additionally, the results of the students using the learning activities based on the STEAM Education concept after learning were higher than before learning with statistical significance at the .05 level. Moreover, the ability to solve problems of the students and create scientific contributions after learning through the STEAM Education concept has reached a high level. Additionally, student satisfaction with learning activities based on the STEAM Education concept has reached its peak. Mayasari et al. (2016) revealed that scientific skills are masterpieces derived from learning management integrated with science, technology, engineering, and mathematics. These skills can enhance students' creative ideas and enable them to apply their knowledge and skills to solve daily problems. Orapiriyakul (2019) studied learning management by integrating science, technology, engineering, art, and mathematics altogether, emphasizing that learners generate knowledge and apply it to develop original problem-solving skills and create novel things for life. The major factors of learning management are divided into three parts: presenting the situation, creative design, and fostering appreciation through learning and

making contributions in various ways. This includes expanding knowledge through innovation to develop responses to the changing 21st century environment. Kruatong & Leesuksam (2020) discovered that the student's skills in the engineering design process had higher scores after learning than before learning, with statistical significance at .05. The learning achievement results in STEAM education were higher than the mean before learning, with statistical significance at .05. Additionally, students' satisfaction with the learning management in STEAM education was at a high level. Lesseig et al. (2016) indicated that the design of learning activities in accordance with STEAM education should systematically incorporate instructional steps that enhance students' ability to develop problem-solving skills effectively. For art skills, Saksriwan & Po Ngern (2020) revealed that the students' learning achievement for the art subject according to STEAM concept together with using learning sources from the students' locality in terms of the activities around the fence of Phra Pathom Chedi was at a good level. Furthermore, the activities from local materials invented into basketry are at the very good level, and the activities of arts from inspiration in the locality are at a very good level, including the satisfaction of the learners toward the art activities are at the much level. Meanwhile, Kwon (2004) found that based-STEAM education is a connection of individuals' creativity, which leads to the development of creativity among junior students. Moreover, it affects students to have good attitudes toward learning. This can be observed from the activities conducted and the analysis of learning results. According to Sriboon & Pongen (2019), students demonstrated high levels of mathematics skills and processes after engaging in learning management through STEAM education using problem-based learning. Additionally, the students expressed a high level of satisfaction towards the learning management approach through STEAM education utilizing problem-based learning. In Laboy-Rush's (2015) study, she revealed that integrating learning management with STEAM education enhances students' ability to complete projects, enabling them to transfer knowledge and skills to real-life problem-solving scenarios when faced with new issues, thus improving their insight.

It can be concluded that using STEAM-based education focuses on fostering individuals' creativity. In today's world, there is a growing emphasis on STEAM-based education, which aims to cultivate creativity among young students and positively impact their attitudes towards learning. This can be observed through the various activities' students engage in. The analysis of learning outcomes for Steam 4 Innovator involves a development plan aimed at nurturing innovation potential among Thai youths aspiring to become innovators "The crucial guidelines used by the National Legislative Assembly of Thailand emphasize the development of innovative entrepreneurs within the youth network group. The integration of business potential and entrepreneurship with the principles of STEAM aims to empower young individuals to apply their knowledge and skills in science and technology, fostering completely innovative business ventures.

Research Methodology

Population and Sample

The sample group is twenty informants who are the high-school students in the private Islamic school that teaches both religious and general education together in the southern border areas. The instrument used for this experiment includes the course of model youth innovators under the principle of STEAM 4 INNOVATOR to promote stability in the southern border areas and to enhance the creativity of high school students in the private Islamic school teaching religious and general education together in the southern border areas.

Data Collection and Data Analysis

Part 1: the study of information to develop the course; it involves studying and analyzing the theoretic concepts on the research related to creativity development, researching course

development through documents, textbooks, journals, and the internet, and examining the characteristics of youth in southern border areas. Please check the grammar.

Part 2: the development of the course draft; it is created in line with concepts and characteristics required to be considered innovators according to the STEAM 4 INNOVATOR concept.

Part 3: trying using the course; it is the stage of bringing the course draft from Stage 2 to try out using with the sample group to test the efficiency of the course.

Part 4: evaluation and improvement of the course; it is about bringing the results from the test compared with the set criteria and bringing such results to improve and adjust the course to gain the appropriate and complete course ready to apply to create the efficient innovators further.

The instruments used for collecting data include the evaluation form of learning skills and the evaluation form of satisfaction, which were investigated and assessed by three experts to find the Index of Item Objective Congruence (IOC). The evaluation results of the Index of IOC indicate that its value was between 0.60 and 1.00, and the results of coherence on the satisfaction evaluation form reveal that the IOC was between 0.67 and 1.00. Data analysis is carried out by using Mean and Standard Deviation.

Research Result

The result of course development consists of 3 learning units.

Unit 1: creating the realization of values and significance of the STEAM EDUCATION (3 hours). The structure of Learning Unit 1 includes science skills, technology skills, engineering skills, art skills, and math skills.

Unit 2 comprises innovation concepts and innovation type (5 hours). The structure of Learning Unit 2 includes the meaning of innovation, characteristics of innovation, and type of innovation.

Unit 3: developing abilities to create innovation on STEAM 4 INNOVATOR (22 hours). The structure of Learning Unit 2 comprises the principle of knowing something inside out, idea creativity, business planning, and production and distribution.

Guidelines for conducting the learning activities:

1) The objectives of the course: the course of the model youth innovators under the principle of STEAM 4 INNOVATOR for high-school students by enhancing creativity through developing the characteristics according to the skills of creating innovation on STEAM 4 INNOVATOR which consists of knowing something inside-out, idea creativity, business development plan, and production and distribution of products.

2) Learning contents are proposed in the form of organizing activities to enhance creativity in line with the principles and purposes of the course.

3) Learning activity:

3.1) Learning management mainly emphasizes learner-centered approaches. Learners are encouraged to engage in self-directed learning through authentic experiences, practice conceptual processes to enhance creative thinking and create learning environments that foster freedom of thought, learning, and work. This approach aims to promote motivation, especially internal motivation, which includes curiosity, self-confidence, and assertiveness. By cultivating these qualities, learners can realize the value of creativity and build self-esteem.

3.2) Learning activities guidelines include questioning and answering to solve problems from articles appropriate to the ages of learners, using the technique of questioning according to the instructional pattern.

4) Learning materials used for organizing the learning activities should be varied and suitable according to the course objectives and be in line with the contents of activities determined in the learning activities, which include a worksheet, knowledge sheet, diagram, etc.

5) Learning measurement and evaluation use various methods, including behavior observation during instructional activities, checking work based on worksheets, and evaluating learning achievement in alignment with the course objectives using creative ideas in the measurement form.

When considering each aspect, the Skills evaluation results show as follows:

The skills evaluation results in each aspect: the data analysis and data collection are appropriate at a good level ($\bar{x}$ = 3.75, S.D. = 0.78). When considering each item, 'the learners have skills of data analysis' has the highest mean at a very good level ($\bar{x}$ = 4.50, S.D. = 0.58). Secondly is 'the learners have the skills of data collection' at a good level ($\bar{x}$ = 3.75, S.D. = 0.66) , and the lowest Mean is from 'the learners have the skills of questioning for the interview at a moderate level ($\bar{x}$ = 3.00, S.D. = 0.81) Furthermore, 'the ideas selection and decision-making' as a whole is appropriate at a very good level ($\bar{x}$ = 4.75, S.D. = 0.48) When considering each item, 'the learners have the skills of brainstorming within the team' at the highest level. Secondly 'the learners have the skills of grouping ideas as a set of data for decision', and 'the learners have the skills of selecting suitable ideas. The Mean is as follows: ($\bar{x}$ = 4.75, S.D. = 0.48), ($\bar{x}$ = 4.75, S.D. = 0.49), and ($\bar{x}$ = 4.75, S.D. = 0.46), respectively. For conducting the business development plan as a whole is appropriate at a very good level ($\bar{x}$ = 4.55, S.D. = 0.50) When considering each item, 'the learners have the skills of determining products, services, and values which will deliver the target group or customers', and 'the learners have the skills of indicating the target group clearly' at a very good level ($\bar{x}$ = 4.75, S.D. = 0.45), and ($\bar{x}$ = 4.75, S.D. = 0.48), respectively And the lowest Mean is 'the learners have the skills of indicating channels of incomes and indicating expenses as the cost' at a good level ($\bar{x}$ = 4.25, S.D. = 0.51). And the skills of communication and proposing information as a whole are appropriate at a very good level ($\bar{x}$ = 4.50, S.D. = 0.58). When considering each item, the learners have the skills of communication comprehensively at a very good level ($\bar{x}$ = 5.00, S.D. = 0.73), and the lowest Mean is 'the learners have the skills of negotiation appropriate at a good level ($\bar{x}$ = 4.00, S.D. = 0.72) ($\bar{x}$ = 4.00, S.D. = 0.72).

The evaluation result of satisfaction toward the course users, when considering each item, it appears as follows:

The evaluation results of satisfaction in each item on 'the contents of instructional management' are appropriate at the most level ($\bar{x}$ = 4.57, S.D. = 0.59). When considering each item, 'the knowledge transfer of the guest lecturer' is clear. Secondly is 'the answering of the questions in the training', 'the linking of contents in the training', 'the completeness of contents in the training', 'the ability to elaborate the contents', and 'the use of time as determined' according to the Mean are as follows: ($\bar{x}$ = 4.75, S.D. = 0.53), ($\bar{x}$ = 4.70, S.D. = 0.59), ($\bar{x}$ = 4.60, S.D. = 0.56), ($\bar{x}$ = 4.60, S.D. = 0.55), ($\bar{x}$ = 4.50, S.D. = 0.56) and ($\bar{x}$ = 4.30, S.D. = 0.65), respectively. The evaluation results of satisfaction in terms of the application are appropriate at the most level ($\bar{x}$ = 4.00, S.D. = 0.69). When considering each item, 'it can apply the knowledge to the operation' is at the most level ($\bar{x}$ = 4.75, S.D. = 0.52). Secondly is 'It is confident and can apply the knowledge' is at the most level ($\bar{x}$ = 4.00, S.D. = 0.66). The lowest Mean is 'it can bring knowledge to publicize/transfer' at the much level ($\bar{x}$ = 3.60, S.D. = 0.81).
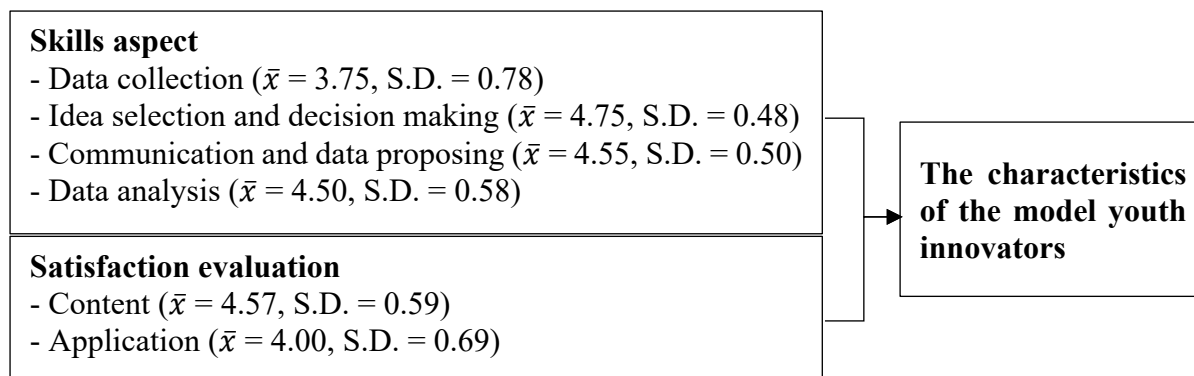
Skills aspect
- Data collection ($\bar{x}$ = 3.75, S.D. = 0.78)
- Idea selection and decision making ($\bar{x}$ = 4.75, S.D. = 0.48)
- Communication and data proposing ($\bar{x}$ = 4.55, S.D. = 0.50)
- Data analysis ($\bar{x}$ = 4.50, S.D. = 0.58)

Satisfaction evaluation
- Content ($\bar{x}$ = 4.57, S.D. = 0.59)
- Application ($\bar{x}$ = 4.00, S.D. = 0.69)

The characteristics of the model youth innovators

Figure 1 Conclusion of research result

Conclusion and Discussion

According to the skills the researcher used by observing the operation following what is determined in the worksheet as an overall image, the components of the project are appropriate at a good level. It is because the operation of this project starts from developing the project proposal in terms of the skills of data analysis and data collection, skills of ideas selection and decision-making, skills of conducting a business development plan, and the skills of communication and data proposal as follows:

1) The skills of data analysis and data collection are viewed as the components of the project on the skills of data analysis and data collection are appropriate at a good level. It is because there was a preparation of the learners on the skills of questioning for interview, skills of data collection, and skills of data analysis in operation for the youths as a target group very well. It is in line with Kwon (2004) who studied and found that STEAM-based learning is linked to persons' creativity. STEAM study is from STEM which is caused by the combination of science, engineering technology, mathematics, and liberal arts. The liberal arts study generates concrete learning. Also, it is a motivation to develop the students' personalities which leads to developing creativity within primary level students. Furthermore, it affects the students to have good attitudes toward learning, which can be observed by their activities and analysis of their learning results.

2) In terms of the skills of idea selection and decision-making as a whole, the components of the project are considered to be at a very good level. This is because the project's development focuses on involving everyone in the process of thinking and decision-making, aiming towards self-development and authentic operation. The team prepared for brainstorming, grouping ideas as a set for decision-making, and selecting appropriate ideas. This approach aligns with Jampong & Prammanee's (2017) findings, which suggest that the skills cultivated in STEAM Education through creating masterpieces involve integrated learning across various subjects through instructional activities. Kim et al. (2014) indicated that students who had the opportunity to learn science subjects through STEAM Education's scientific lessons showed more creative ideas and interest in science compared to the control group who learned in a general manner.

3) The skills of organizing the business development plan as a whole identify that the components of the project on the skills of organizing the business development plan are appropriate at a very good level. It is because of the conducting of the project in various business plans, which include the determination of products, services, and values which would deliver the target group or customers, a clear indication of the target group, identification of incomes channel and costing expenses, including the resources required and parties' network, as well as conducting the model innovation. In line with Riquelme (2000), the control group, who were open-minded, able to produce creative contributions even though they did not receive techniques for enhancing creativity to create marketing strategies. Additionally, they expressed

that creative ideas could be supported and increased even among the group that was closed-minded and lacked initiative. This group consisted of individuals who expressed unconventional ideas that were beneficial to themselves.

4) Skills of communication and information proposal as a whole, the project components on the skills of communication and information proposal, it is because developing according to the project of story-telling determination for marketing communication, conducting media for presentation, understanding communication, and negotiation emphasize the youths to take part in thinking and authentic practice. The participation organized for the sample group includes mutual thinking, planning, and conducting. It is concordant with Thongsamsri & Chantuk's (2016) work, which revealed that most of the samples viewed the factors of communication the most. Hence, it can be concluded that success depends on good communication in terms of perceiving information and news in up-to-date situations and having ability to communicate or publicize information and news, especially using modern technology and information technology to help work and project development for achieving the utmost efficiency.

The learners feel satisfied with the contents and application reached the most level, causing them to apply all knowledge for operating and transferring such knowledge to others well. It is concordant with Pongwiritton et al. (2019), revealed the overall highest level of satisfaction. They offered basic knowledge of business management related to the information system to bring such knowledge as a tool to solve problems in time. Moreover, it should have a follow-up and evaluation system and bring various information to develop the information system to meet the criteria of the users' needs to bring such information to conclude and adjust, which enhances the business to be stable in the future. Moreover, Laboy-Rush (2015) indicated that allowing students to manage their own learning through projects affected their ability to transfer knowledge and skills, leading to improved problem-solving abilities in real-life situations, including the application to new problems.

Policy Recommendations

1) It should organize the learning by STEAM 4 INNOVATOR with other variables apart from creativity and innovation, such as problem-solving, critical thinking, etc.

2) It should create games in other forms to join with the learning by STEAM 4 INNOVATOR, such as online games or other games that help practice various skills of youths.

3) It should organize the study that compares the evaluation results of the model youth innovators under the principle of STEAM 4 INNOVATOR to enhance stability in the southern border areas between the youths in southern border areas and the youths in other regions in order to adjust the patterns to be more efficient.

Recommendation for Further Research

1) It should organize various kinds of knowledge such as language, information technology, and other sides the students feel interested in to let them investigate their interests and aptitudes. It enhances the learners' potential for future careers.

2) It should provide the research focusing on the use of Thai language or communication skills for higher quality towards the youths in the southern border areas.

References

Jampong, M., & Prammanee, N. (2017). The Development of Work Creation through STEAM Education Approach on Energy. *Eau Heritage Journal Social Science and Humanities, 7*(3), 81-92.

Jitwanichkul, S. (2017). Communication process for the development of children and youth in the community. *Journal of Journalism, Thammasat University, 10*(2), 7-9.

Kim, D., Ko, D., Han, M., & Hong, S. (2014). The Effects of Science Lessons Applying STEAM Education Program on the Creativity and Interest Levels of Elementary Students. *Journal of the Korean Association for Science Education, 34*(1), 43-54.

Komonmarn, C., Kampangkeaw, N., & Ungleng, S. (2016). The Evaluation of Children and Youth Council Development. *Journal of Social Work, 24*(1), 105-134.

Kruatong, S., & Leesuksam, N. (2020). The Study of Engineering Design Process Skill Using STEM Education on Electricity of Grade 9 Students. *Journal of Education and Human Development Sciences, 4*(1), 78-91.

Kwon, E. (2004). *A new constructivist learning theory for Web-based design learning with its implementation and interpretation for design education.* Doctor of Philosophy Thesis, Ohio State University.

Laboy-Rush, D. (2015). *Integrated STEM Education through Project-Based Learning.* Retrieved from https://studentsatthecenterhub.org/resource/integrated-stem-education-through-project-based-learning/.

Lesseig, K., Nelson, T., Slavit, D., & Seidel, R. (2016). Supporting Middle School Teachers' Implementation of STEM Design Challenges. *School Science and Mathematics, 116*(4), 177-188.

Mayasari, T., Kadarohman, A., Rusdiana, D., & Kaniawati, I. (2016). Exploration of student's creativity by integrating STEM knowledge into creative products. *AIP Conference Proceedings, 1708*(1), 080005.

Orapiriyakul, S. (2019). STEAM EDUCATION: Innovative Education Integrated into Learning Management. *Journal of Research and Curriculum Development, 9*(1), 1-16.

Phengnoi, D., & Boonsom, N. (2021). Development of Scientific Work Creation and Creative Problem-solving Abilities for Fifth Grade Students by STEAM Education-based Learning Activities Management. *Silpakorn Educational Research Journal, 13*(1), 238-257.

Pongwiritton, R., Chaiwattanaporn, S., Pakvipas, P., & Kantawongwan, B. (2019). Development of the Information System for Business Plan Writing to Propose for the Loan from Financial Institution to Enhance the Capability of Small and Medium Enterprises in Thailand. *Panyapiwat Journal, 11*(2), 1-16.

Riquelme, H. (2000). How to Develop More Creative Strategic Plans: Results from an Empirical Study. *Creativity and Innovation Management, 9*(1), 14-20.

Saksriwan, D., & Po Ngern, W. (2020). The Development of Art Activities based on STEAM with the Local Learning Resources to Promote the Creative Works of Third Grade Students. *Silpakorn Educational Research Journal, 12*(2), 53-70.

Sriboon, S., & Pongen, W. (2019). The Learning Outcomes of STEAM Education based on Problem Based Learning to Developing Mathematical Skills and Process for Seventh Grade Students. *Journal of Education Studies, 47*(1), 526-543.

Thongsamsri, P., & Chantuk, T. (2016). A Confirmatory Factor Analysis of the Factors that Affect the Success of the Innovation Business Plan Grant Program. *Veridian E-Journal, Silpakorn University, 9*(2), 1564-1580.

Udom, C., Sachdev, H., Phaiboonrattananon, N., & Butchiwan, P. (2016). Social Key Institutions and the Linkage of Youth Development. *Phranakhon Rajabhat Research Journal (Humanities and Social Sciences), 11*(2), 227-237.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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