The Best Practices in STEAM Education: Using Local Wisdom to Improve Innovators' Competence

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Abstract
It is a challenge for elementary school teachers to design learning activities that blend local wisdom about Thai handicrafts with STEAM education management. Proactive learning management and local wisdom card games are used to help learners develop innovator competencies through the engineering design process. To inspire curiosity and innovation among learners. Take systematic and scientific action and develop innovator competencies in conjunction with local wisdom to develop a learning community for the transfer of knowledge, social processes, and local culture by means of local philosophers. The best practices were studied by 1) local philosophers and 2) teachers from all four regions of Thailand. There were interview forms and questionnaires used for the study. The content analysis of the data revealed that the best practices in STEAM knowledge management using local wisdom to develop innovator competency comprised eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

Keywords: The Best Practice, STEAM Education, Local Wisdom

Introduction

The researcher places a heavy emphasis on how children and adolescents learn. The objective of cultivating student innovation competencies is to promote creativity and attract more academically curious students. It focuses on six characteristics of innovators: a focus on the future, social networking, creativity, project management, content knowledge and practical skills, and personality. A few examples are Wasan Suttawat and Pitak Siriwong (2015), Dyer et al. (2011), Couros (2014), Eriksson (2013), Hackney (2016), and Maeda (2013). The Engineering Theory of Innovation, upon which this study is based, posits that an essential aspect of innovation depends on innovators' analytic reasoning skills (Freeman & Socte, 2013). In engineering, learners must also continuously employ their skills, particularly through the use of the Engineering Design Process (EDP) as a tool for critical thinking and methodical practice, in order to acquire new knowledge. It comprises each of the six aforementioned innovation competencies. This study also references the Social Network Theory of Innovation, which was derived from the Engineering Innovation Theory, in order to establish a connection between learning and the development of innovative competencies. The establishment of a network for the transmission of information via traditional healers, local sages, indigenous groups, etc. (McMarsh, 2000).

Various learning activities, such as the study of the integrated STEAM Education curriculum, are implemented to help students improve their abilities. It is a learning management system that encourages students to solve problems and adapt to 21st-century changes. STEM education is the foundation of STEAM education. STEAM education makes a compelling argument for fostering creativity by extending STEM education by incorporating art disciplines to improve the efficacy of the right brain. And cultivate student satisfaction in accordance with the function of both hemispheres of the brain and, consequently, the growth of reasoning. According to Kim & Park (2012), p. 693-698, creativity and thinking go hand-in-hand with the development of cognitive abilities (Hellige, 1990). Utilizing liberal arts increases students' math and science learning achievements. In addition, learning is lasting due to practical application and tangible innovation.

According to Ostler (2012) and Supak Olapiriyakul (2019), the advancement of technology has caused education to take the form of STEAM education. And the requirement to enhance students' knowledge and abilities so that they have more applicable knowledge and abilities Therefore, the researcher focused on the development of learning activities. In other words, the Engineering Design Process (EDP) plays a significant role in STEAM-based education. It is the process of designing educational activities that encourage students to think synthetically. Students' problem-solving skills should be honed through creative thought, especially for situations that arise in everyday life. The engineering design process is an indispensable instrument for fostering systemic thought. Extend the students' knowledge and perspectives by encouraging the growth of creative and analytic thought, which will enable them to solve a variety of problems exhaustively and accurately using original ideas that will lead to the development of new technologies. And enhance the performance and aptitude of students in accordance with the characteristics that students of the 21st century should possess (Suthida Karimi, 2017: 24). Six phases comprise the engineering design procedure: Identification of the problem; Researching Related Data 3) Solution Creation 4) Construction and Planning Evaluation, testing, and design enhancement; and presentation. The engineering design method can be adapted to the requirements of the learner. or approaches to problem-solving and developing innovations that meet customer needs (Ozkan & Umdu Topsaka, 2021; Sutida Karimi, 2017, pp. 23–34).

It is a fascinating concept to use indigenous knowledge as a learning instrument. Because the modern generation is found to be interested in the social realm and to neglect it. As a corpus of information or a means of assisting locals with problem-solving, local knowledge is not given much weight. As a result of ongoing transmission from ancestors Residents of the area are the owners of the intellectual property. For locals to coexist in harmony, they must learn and transmit a way of life through rituals, cultures, and traditions through the social production process. Saneh Jamrik (1998) and the National Education Commission's Office (1998) Through STEAM education, students have the opportunity to study by applying local knowledge to learning administration and skill development. Develop your innovative and critical thinking skills. The local significance is valued by the students. Bahri et al. (2017) found that cultivating coffee trees in East Java necessitates a combination of STEAM education and indigenous knowledge. Indonesia can enhance academic performance. Similar to the research conducted by Oktoriyadi (2020), which combines STEAM education with regional knowledge from Indonesia, such as zoning, architecture, customs, and folk melodies. Additionally, instruct students in the cognitive, affective, and psychomotor domains.

Based on the study of related research cited above, Thus, the researcher recognizes the significance of preparing students to be innovators in all six areas by coordinating a learning management process using steam education and local knowledge. This study seeks to develop students in basic education. Focusing on the upper elementary level in the Bangkok region, including institutions under the university Office of the Private Education Commission Bangkok Education Office and Bangkok Primary Educational Service Area Office, can impart local knowledge. Incorporating village academics from the four regions into the design of the learning management unit In order for students to be able to innovate through learning in accordance with the STEAM education approach and engineering design process. Students learn independently. Encourage the self-learning of students. Therefore, the research team is interested in establishing a set of learning management activities using STEAM studies and indigenous knowledge to promote innovators' competence. For Senior Students in Elementary School.

Literature Review

STEAM education

STEAM education is a learning management system that encourages students to solve problems and adapt to 21st-century changes. Incorporating arts subjects (Arts: A) in addition to STEM education, which concentrates on developing left brain skills in numbers, calculation, reasoning, and science. Consequently, STEAM education excels at stimulating creativity and increasing the satisfaction of the students. This reflects the function of the two brains that alternately collaborate. Therefore, the development of both reasoning and creativity is necessary for the growth of cognitive abilities (Hellige, 1990; Kim & Park, 2012). In addition, Ostler (2012) and Supak Olapiriyakul (2019) discussed the significance of steam studies, which Ostler (2012) and Supak Olapiriyakul (2019) outlined. As a result of technological advancements, learning in the form of steam education has occurred. And the necessity to improve students' practical abilities and knowledge.

Local wisdom

The Royal Institute Dictionary (1999, p. 619) and Angkul Somkanay (1999, p. 264) define the term "local wisdom" as the knowledge, ability, and experience of villagers acquired through a lifetime of living and learning. Connecting with one another in all fields Not divided into disciplines Combine and interconnect them all. by transmitting knowledge acquired through the development process in accordance with the times. This is consistent with Samart Chantrasoon's (2000, p. 12) assertion that villagers can conceive of anything based on their potential. And it can be used to solve local problems in a contemporary manner. considered to be intelligent It is all the villager's knowledge."

Engineering Design Process; EDP

Because it encourages students to think synthetically, the Engineering Design Process (EDP) is an integral component of both STEM and STEAM education. Along with creative thinking in order to develop individualized problem-solving skills, particularly in commonplace problem situations.

Suthida Karimi (2017, p. 23–27; Keane & Keane, 2016; Khine, 2019; Ozkan & Umdu Topsaka, 2021) described the six-step engineering design procedure. Adaptable to learners' or problem-solving methods' ways of thinking and capable of innovating in response to requirements.

Suthida Karimi's (2017, p. 24) six-step engineering design procedure Step 1: Problem Identification Step 2: Search for Related Information Step 3: Step 4: Planning and Construction Steps 5 Testing, Design Improvement, and 6 Presentation.

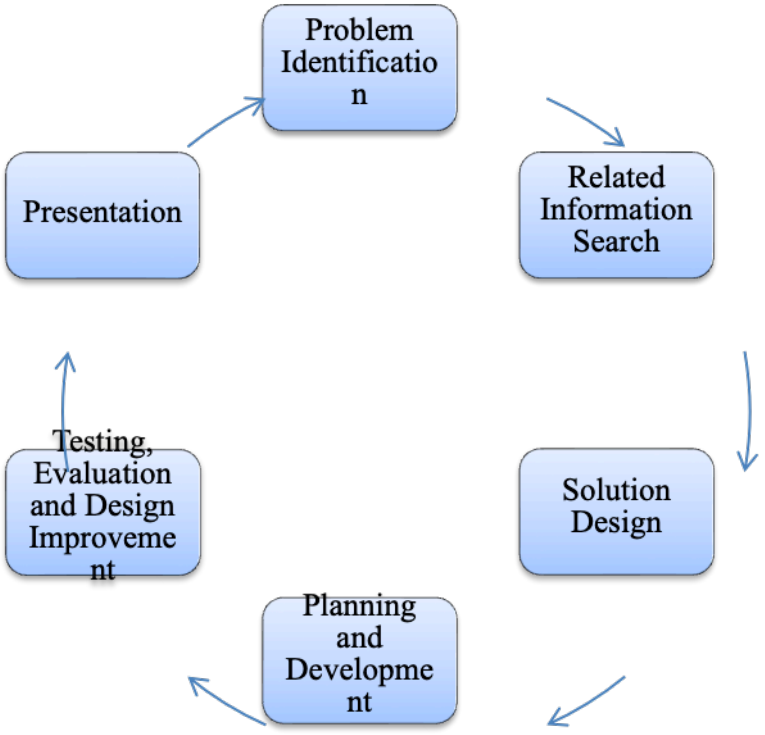

Figure 1: Suthida Karimi's (2017, p. 24) six-step engineering design procedure is depicted in this diagram

Conceptual Framework

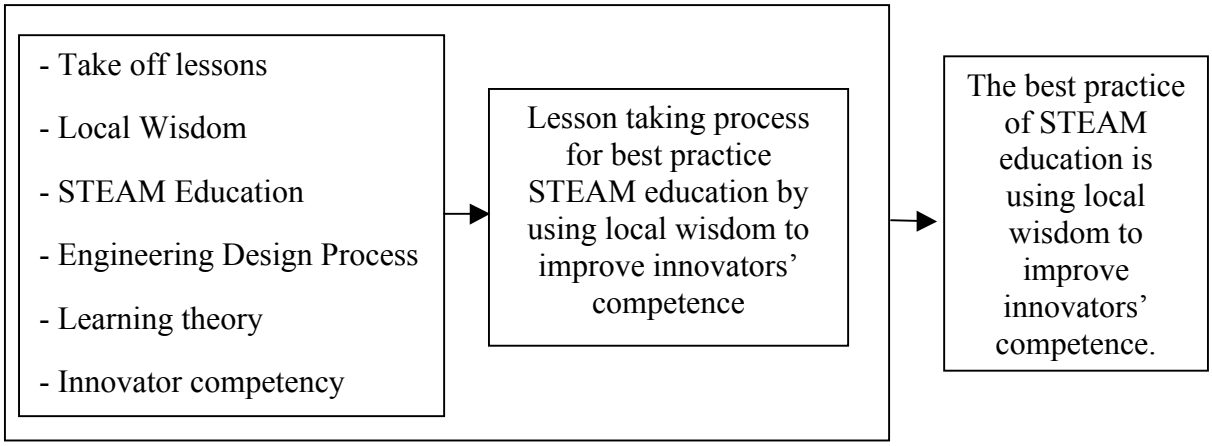

Figure 2: Conceptual Framework

Thailand is a small country. Asia is a tourism destination. On the basis of knowledge, culture, and custom, Thailand can be divided into four major regions. Thailand possesses diverse regional cultures. Every region has a unique identity. Thailand can be divided into four distinct regions, each with its own characteristics. Additionally, the handicrafts are intriguing. Crafts created for the purpose of preserving local traditions and culture.

The Bangkok's and other metropolitan areas' pupils continue to lack knowledge of crafts. Students continue to be unaware of local knowledge. Additionally, there are problems with learning management due to students' lack of creative thinking. Science's technological and procedural proficiency Consequently, this is where the research began.

Figure 3: Diagram showing examples of local wisdom

The initiative investigated in this study In order to develop learning management principles that encourage student innovation, fundamental information has been analyzed. Using information from four geographic regions: 1. elders knowledgeable about local wisdom; and 2. educators involved in the supervision of the learning process for STEAM education Faculty of Education administrators, educators, and instructors, as well as supervisors and graduate students.

Examine the perspectives of those who contribute to local knowledge. Examining the perspectives of local wisdom practitioners and educational personnel involved in learning management in educational institutions It is the application of study results, document analysis, and document synthesis as guidelines for examining opinions. By developing an interview form and a survey to collect opinions on local wisdom. In order to obtain in-depth knowledge, specificity is required. Four regions comprised the research areas: the northern, central, northeastern, and southern regions.

Each region contained the provinces of Khon Kaen, Chiang Mai, Suphan Buri, and Surat Thani. Bangkok was acquired by deliberate selection. 45 individuals were interviewed (people involved with local wisdom and educational personnel engaged in learning management in educational institutions via local wisdom). 100 individuals (those involved with local wisdom and educational personnel involved in learning management in educational institutions through local wisdom) responded to the survey.

Methodology

Procedure

1. Examine concepts, theories, and fundamentals
2. Examine the science subject group's content, subject matter, learning standards, indicators, learning outcomes, and fundamental learning subject matter. The Fundamental Education Core Curriculum
3. Examine the method of learning management with STEAM; examine using indigenous knowledge to promote innovator competency
4. Examine the perspectives of those involved in local wisdom
5. Lesson transcription procedure Visit the area and examine preliminary data gathered through in-depth interviews
6. Based on information gathered from in-depth interviews with village sages and pedagogical personnel in four regions of Thailand, five areas were identified
7. Include information gathered through interviews and questionnaires

Interview questionnaire and form

1. Examine concepts, theories, and relevant research
2. A questionnaire and interview form were created for the research project consultant to review the content's accuracy and completeness
3. Adjust the language of the acquired queries to be more succinct and clear before applying them in accordance with the suggestions of the experts
4. Modify interview forms and questionnaires based on the suggestions of experts. The modified questionnaire was then utilized to acquire actual data
5. Data Acquisition
6. Data analysis

Procedure

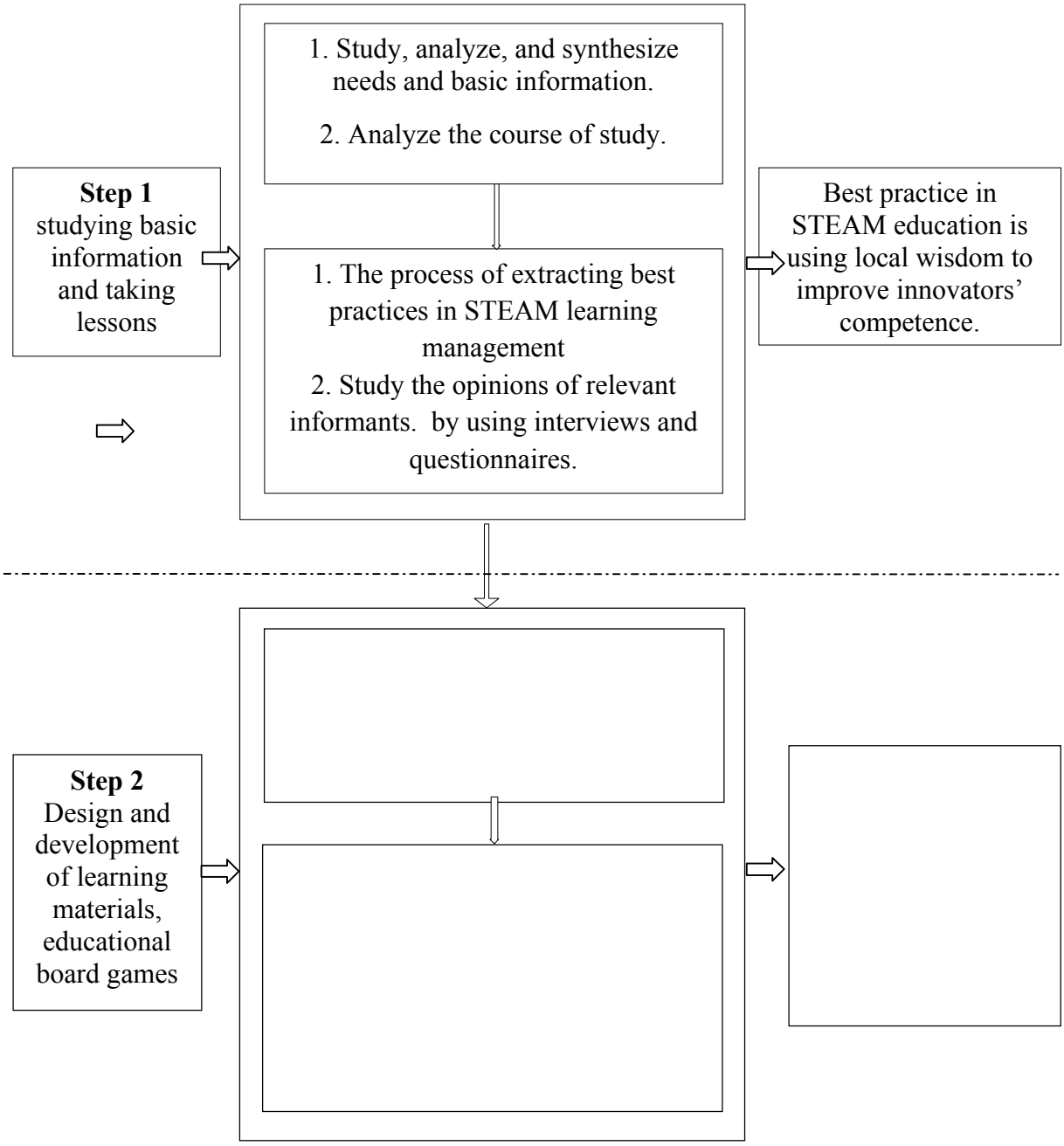

Figure 4: Procedure

Discussion

The best practices in STEAM education knowledge management utilizing local wisdom to cultivate innovator competency consisted of eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

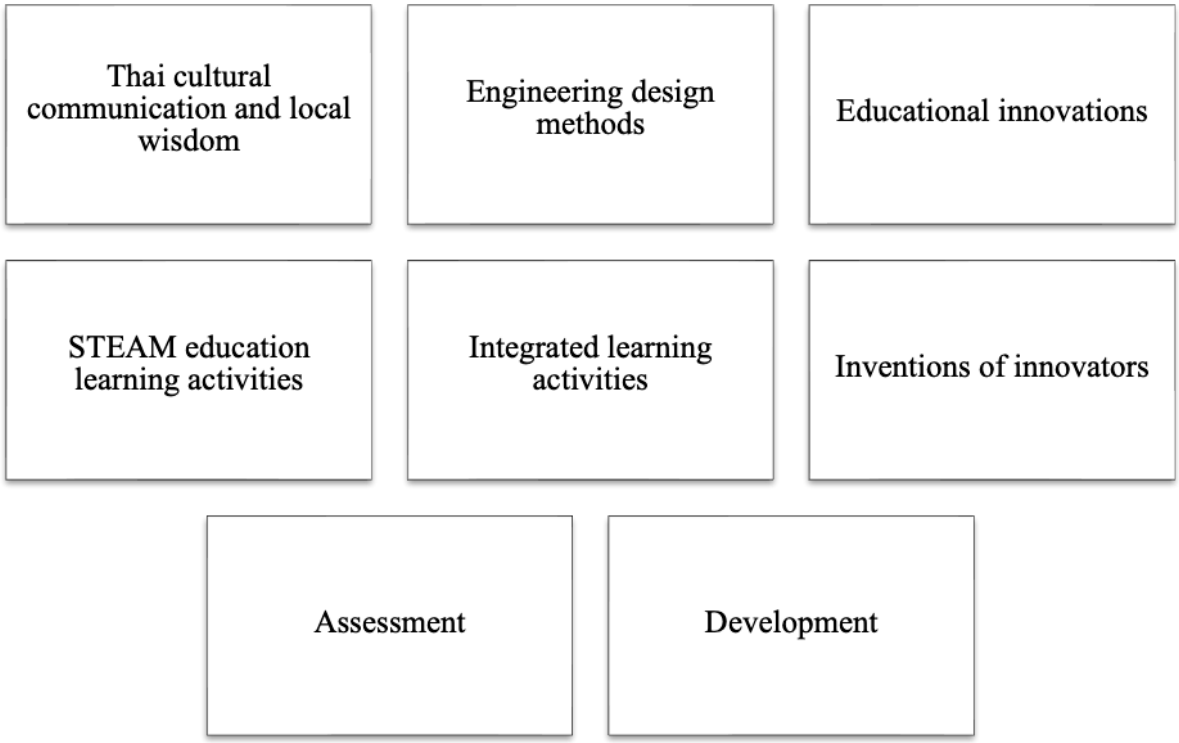

Figure 5: The best practices in STEAM education: using local wisdom to improve Innovators' competence.

Conclusion

Local philosophers and instructors from each of Thailand's four regions examined the best practices. The research utilized interview forms and questionnaires. The content analysis of the data revealed that the best practices in STEAM education knowledge management utilizing local wisdom to cultivate innovator competency consisted of eight components. 1) Thai cultural communication and local wisdom; 2) engineering design methods. 3) Educational innovations 4) STEAM education learning activities; 5) integrated learning activities 6) Inventions of innovators 7) assessment, and 8) development.

It is a challenge for elementary school instructors to design learning activities that combine STEAM education management with local knowledge about Thai handicrafts. Through the engineering design process, proactive learning management and local wisdom card games are used to help learners develop innovative competencies. To inspire learners' inquiry and creativity.

Create a learning community for the transmission of knowledge, social processes, and local culture by means of local philosophers by taking systematic and scientific action and developing innovator competencies in conjunction with local wisdom.

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