Development of Local Wisdom-Based Science Learning Innovation to Promote Creative Problem-solving Skill: Case Study Chessboard Game of Mueang Kung Pottery, Chiang Mai

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Abstract

The research aimed to 1) study science knowledge in local wisdom of Mueang Kung pottery, Chiang Mai province, 2) develop local wisdom-based science learning innovation to promote creative problem-solving skills, and 3) study satisfaction levels of students to local wisdom-based science learning innovation to promote creative problem-solving skills. The research was action research. The sample in the research consisted of: 1) one village scholar of Mueang Kung village, Hang Dong district, Chiang Mai province; 2) experts of local wisdom learning management accounting for 3 people; and 3) third-year students of Chemistry Departments and fourth-year students of Faculty of Education, Chiang Mai Rajabhat University for the academic year of 2020 accounting for 15 people. Purposive sampling was used. The study results revealed that:

1) From the study on scientific knowledge in local wisdom of Mueang Kung pottery, Chiang Mai province, it was found that in the process of producing Baan Mueang Kung pottery of Chiang Mai province, scientific knowledge has been used to be integrated to develop quality pottery. The knowledge found in the community can be used to design local wisdom-based science learning innovation to promote creative problem-solving skills.

2) From developing local wisdom-based science learning innovation to promote creative problem-solving skills, it was found that the learning innovation developed in the form of Splendor Board Game with components, namely (1) cards in various forms, (2) the board for playing the Board Game and (3) rules of playing and there were results of assessing efficiency of the innovation (E1/E2) at the level: 80.22/81.56. This is deemed to have efficiency in implementation for learning.

3) Regarding satisfaction levels of students to local wisdom-based science learning innovation, it was found that the students had satisfaction levels at the highest level.

Keywords: local wisdom-based science learning innovation, creative problem-solving skills, pottery, Chessboard Game, education sandbox

1. Introduction

From the concept of the fourth goal for sustainable development (SDGs) in confirming equitable and thorough education, and promoting lifelong learning for everyone, being successful covers quality education. This emphasizes the already proven belief that education is one of the driving forces efficient for sustainable development. Moreover, the objective is to arrange occupational training with proper prices equally and get rid of sexual inequality and differences to succeed in accessing the universal principle for higher education with qualities and developing learning skills entering the local community of one's own. The environment must be relied on as an important lesson in integrating learning in the science of other fields. One of the approaches to the operation is building and upgrading

educational equipment and instruments sensitive to children, the disabled with impairments, and genders, and there should be a learning environment that is safe, violence-free, inclusive, and effective for everyone. The objective is to guarantee that every student will receive the knowledge and skills required for sustainable development. This also includes education for sustainable development, having a sustainable way of life through cultural diversities, and cultural participation towards sustainable development (United Nations, 2015). In terms of building opportunities and equality according to the 20-year national strategy from B.E 2561 to 2580, there are important development goals placing importance on pulling power of sectors, namely private sectors, civil society, and local communities to mutually drive by supporting public unification in thinking and taking actions together for the public (Office of the National Economics and Social Development Council, 2018). Therefore, educational management must focus on integrating area-based identity in the community to be a base for learning management whereby there are various learning dimensions such as community history, community geography, ethnic culture, history of Buddhist art, ecoculture, etc. (Mangkhang, et al., 2022).

Education is an important instrument in society all over the world used to develop citizens to build strength in the community. In developed countries, all people in the society are developed with quality education at first, and then other aspects are focused on to be developed further. Due to this important reason, every sector starts to be aware of placing importance more. According to the promulgation of the Education Sandbox Act B.E. 2562 coming into effect on 30 April 2019, basic educational management must be developed because this is an important foundation for developing the Thai people to have qualities, longing for knowledge, creative ideas, and communication abilities, to be able to live and work with other people with differences. The development should also make their knowledge keeping up with the world and skills in making a living according to the aptitudes of each learner. Moreover, the state, local administration organizations, the private sector, and the civil society sector are to jointly develop qualities and efficiency and reduce differences in basic educational management truly, Therefore, the education sandbox has been determined whereby this area is an area for reforming administration and educational management to support educational innovation building which is the pilot project in decentralization and gives freedom to educational agencies and basic schools to bring about quality and efficiency development and difference reduction. This also includes the extension of schooling management innovation and good practices to be used in other schools (Education Sandbox Act B.E. 2562). One approach of the education sandbox is to use local wisdom which is valuable cultural heritage in managing learning to upgrade knowledge values. This strengthens citizens from the cultural foundation in the district.

Therefore, local wisdom is deemed to be the knowledge that people in the community have discovered by relying on experiences and adaptation to conduct life and the local environment of their own. Local wisdom will always be developed. Local wisdom is important in terms of being a heritage that ancestors have accumulated, created, and passed on continuously from the past to the present time. It is the thing that descendants should be proud of and they should adopt to be used in everyday life. This is because local wisdom, besides being the foundation in conducting life, helps humans adapt themselves in time to changes occurring in society. On top of that, local wisdom can be used to develop the country in every aspect as well. Therefore, local wisdom is a valuable thing and is very important if knowledge from local wisdom is integrated with the science of schools and the community can be built to be strong. Wisdom is a human resource, a knowledge resource existing in the district, and a source that is an individual identity or a common universal characteristic of several districts. each local wisdom originates from knowledge seeking to overcome natural and social obstacles necessary for living. Therefore, wisdom involves production and villagers such as performing rituals of the community or the tradition of gathering to help one another do an important job that one person alone cannot accomplish (Veerapong Saeng-Chooto, 2001; Chaiwat Sutthirat, 2010; Thidarat Plangpairee et al., 2022)

The National Education B.E. 2562 determines the goals and guidelines of schools in arranging the learning process focusing on developing students in terms of skills of thinking, management, situation-facing, and developing people to be quality citizens while Thai society currently is in crisis. This crisis results from a weakness of thinking, making people in society lack proof of the fact and interpret situations inaccurately from the facts. They also lack judgment in solving problems. Good curriculum should focus on making students develop thinking skills mainly. The present time is the age in which the world progresses rapidly due to the trend of social changes occurring in the 21st century. Skills of the 21st century are skills important in living and working in the social and economic system. These skills are 3R x 7C learning whereby 3R are reading (being able to read), W(Rating) (being able to write), and (A) Mathematics (being able to do some calculations). 7C are skills of critical thinking and problem solving, skills of creativity and innovation, skills of cross-cultural understanding, skills of Collaboration, Teamwork and Leadership, skills Communication, Information, and Media Literacy, skills of Computing and ICT Literacy, Career and Learning

Skills (the Institute for the promotion of teaching science and technology, ministry of Education, 2017). Skills of problem-solving are very important at the current age with a variety of data and information.Therefore, people must know how to think critically, sort out and rank data, and collect and process occurring situations systematically to bring about clarity, correctness, and reasonability for making decisions in solving complex problems efficiently. People should have creativity in managing problem conditions occurring in everyday life and in society.

Skills of creative problem solving are the ability in using reasons efficiently, to think systematically, to assess decision-making, and solve problems. Critical thinking refers to various reasons-based thinking suitable for situations. There is systematic thinking, analyzing, and assessing evidence and opinions with various viewpoints. There is also synthesis, interpretation, and summary preparation to reflect thoughts with judgment by using experiences and the learning process. Problem-solving refers to solving unfamiliar problems or new problems by using already-known knowledge, skills, methods, and experiences or searching for new knowledge, and methods to solve problems. Moreover, this also includes questioning to understand different and various viewpoints to obtain better methods of problem-solving. This is the way to develop thoughts to have reasons and prudence. It is a matter of practicing thinking with judgment to lead to decision-making in selecting to receive and use the data suitably as well as to analyze and assess data. Therefore, several educators view that critical thinking skills and problem-solving skills can help students grow in terms of thoughts and they can criticize what they see, what they read, or what they hear to live in the age of information. This is also one of the basic skills which are required in the 21st century (the Institute for Promotion of Teaching Science and Technology, Ministry of Education). Based on the mentioned reasons, bringing about practices or practical thinking development to students is, therefore, very important. Applying the process of solving problems creatively in schooling activities in various forms which are suitable with the span of age, knowledge, and capabilities and the level of students are promoted and supported to develop capabilities of solving problems creatively, skills of teamwork, self-appreciation and building good attitudes in solving problems creatively. This is to happen with students at the beginning and it is a matter of preparation to study the use of the process of solving problems creatively in organizing activities to develop students. Skills of teamwork and self-appreciation receive activity organization to develop students by using the process of solving problems creatively because it is the process that helps students to be able to solve problems and manage to change situations creatively. It consists of steps easy to lead to goals and achieve objectives that have been set (Treffinger, Isaksen & Dorval, 2010).

The method of developing the skills of creative problems solving of students can be done in many ways. Several researchers have given suggestions for developing the skill of critical thinking and the skill of problem-solving by using methods such as the method of searching, the method of integration with normal teaching, the method of six thinking hats, etc. In a lot of research works, the presentation of using games is focused on developing the skill of critical thinking because games can create good opportunities in practicing the skill of reflective thinking (reflection) and critical thinking. Moreover, games help make students have a good time. Through games, they can also help students understand the difficult or complex subject matter more easily. Games help students learn empirically by themselves. This makes learning meaningful and durable. It was found that game-based schooling has more advantages than lecture teaching and training. For example, students participate more, students become enthusiastic to learn and feedback can be given to learners immediately. Students can connect the lesson or games with the real-life context more easily etc. (Puangpit Siriphrom, 2008; Teerapong Kaeninn, 2014; Tissana Khaemanee, 2015).

The Splendor Board Game has an important role in developing the artificial intelligence (AI) technique. Various challenges are important thing in driving innovation and understanding the modern technique. Presenting the board game which uses cards and several players partly noticed the fact that the parameters can be determined. These parameters can change rules, objectives, and items in the game easily. The framework can be explained in all features. Challenges in playing games are building a foundation and analysis of skills and the process of thinking systematically. There are main roles in experiments by emphasizing that the mentioned parameters can be greatly influential in showing results. The norm representative has additional participation in the algorithm of statistical planning in advance, regulation of the general AI index, standard criteria, game playing, and increasing parameter efficiency for many dimensions (Diego Perez-Liebana et al., 2019). Splendor Board Game is a game with game components in developing the skill of solving problems creatively because students must understand situations or problems incurred in each round at first. This is a matter of problem-identifying development, and planning in problem-solving during one's playing of each round. There is an assessment in decision-making to choose the best choice of one's own. Therefore, this is the way to develop the skill of critical thinking and problem-solving. This game is not too difficult and complex and suitable for learners of every age.

Mueang Kung village is located at Moo 7, Nong Kwai sub-district, Hang Dong district, Chiang Mai province in the

south of Chiang Mai province, Thailand. The physical characteristic of the village is a long from north to south. The Mueang Kung village community originated from Pu city, Sart city currently in Shan state, Myanmar. The migration took place for relocation in the Hang dong district in Chiang Mai province at present. Villagers in the community make pottery with their own identity called "Nam Ton" and "Moo Nam Ngeow" (Nannapas Fak Thong, 2010). The local wisdom of producing pottery of the Ban Mueang Kung community is an important identity having been carried on for a long time and is one of the valuable cultural heritages of Chiang Mai province.

Therefore, the research team has studied the development of local wisdom-based science learning innovation to promote creative problem-solving skills by selecting the local wisdom of Ban Mueang Kung pottery of Chiang Mai province. This is because Ban Mueang Kung pottery has outstanding designs and identity. Moreover, the Mueang Kung village is also well known for making Nam Ton which is durable and there is a pottery polishing technique, which cannot be done in other villages. This has to have relied on expertise. Ban Mueang Kung also has scientific knowledge not promulgated to the public. Therefore, the researcher has become interested in studying and promulgating the mentioned knowledge and then implementing it to develop local wisdom-based science learning innovation to promote creative problem-solving so that interesting things and the development problem-solving skills can be brought about. This will also be guidelines for developing learning management in the education sandbox of Chiang Mai province further.

2. Methodology

2.1 Step 1 Research Form

This research is action research. The research was conducted by collecting and analyzing data obtained from document analysis, interview forms, achievement test forms, and satisfaction questionnaires. After that, the study results were presented in the form of descriptive analysis supporting data synthesis and description.

2.2 Step 2 Population and Samples in the Research

The population used in the research was the knowledgeable people regarding Ban Mueang Kung pottery local wisdom of Chiang Mai province.

The sample of the research:

(1) Village scholars of Mueang Kung village, Hang Dong district, Chiang Mai province (1 person) selected by using purposive sampling.

(2) Experts of local wisdom learning management (3 people) selected by using purposive sampling.

(3) Students of the Chemistry Department of Year 3 and Year 4, Faculty of Education, Chiang Mai Rajabhat University of the 2020 academic year (15 people) selected by using purposive sampling

2.3 Step 3 The Instruments Used in the Study

(1) Village scholar's Interview forms regarding Ban Mueang Kung local wisdom of Chiang Mai province

(2) Achievement tests of learning about scientific knowledge in the Mueang Kung pottery local wisdom of Chiang Mai province (before and after learning)

(3) Questionnaires regarding satisfaction levels of students to local wisdom-based science learning innovation to promote creative problem-solving skills

2.4 Step 4 Data Collection

(1) Documentary study was conducted by collecting data regarding science knowledge in the Mueang Kung pottery local wisdom of Chiang Mai province from documents, books, journals, and other secondary data sources appearing in the database. The reason for doing this was to collect basic data regarding scientific knowledge in the Mueang Kung pottery local wisdom of Chiang Mai province. Then, the obtained data were used to support the analysis of education issues further.

(2) Design and development referred to designing and developing local wisdom-based science learning innovation to promote creative problem-solving skills by designing and developing chessboard game learning media on Ban Mueang Kung pottery of Chiang Mai province. After that, lecturing was conducted on general knowledge regarding Ban Mueang Kung pottery and science knowledge in the Ban Mueang Kung pottery local wisdom. This was done based on the knowledge insert on general knowledge regarding Ban Mueang Kung pottery and the knowledge insert on scientific knowledge in the Ban Mueang Kung pottery local wisdom of Chiang Mai province, and the chessboard

game was also used in conducting learning activities together with students. Then, the achievement test of learning was used before and after learning. After that, the obtained results were analyzed statistically to find the efficiency of the learning media by using the formula E1/E2 based on the percentage criteria of 80/80.

(3) Satisfaction assessment was to study the satisfaction levels of students with local wisdom-based science learning innovation to promote creative problem-solving skills. Then, the results were obtained from the satisfaction questionnaire to find the mean and standard deviation.

2.5 Data Analysis

(1) For qualitative data, the research team analyzed the data according to the educational goal by using the content analysis method, and they were obtained from document analysis and interviews to summarize issues according to data groups and to analyze relationships of the data.

(2) For quantitative data, the research team analyzed the data obtained from the assessment form by using the statistical package which was able to analyze the data suitably. Descriptive statistics-based analysis was used whereby results of statistical data analysis were shown as mean and standard deviation.

3. Results

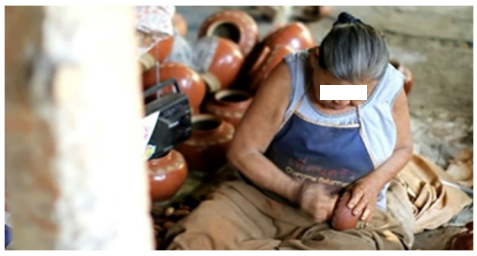
Regarding the research at this time, the research team classified the data obtained from the research and presented research results according to the objectives determined whereby study results can be summarized as follows:

3.1 Regarding the Study on Scientific Knowledge in the Mueang Kung Pottery Local Wisdom of Chiang Mai Province

From observation and interviewing the knowledgeable people about Mueang Kung pottery, the research team can divide analysis issues into 5 issues as follows:

Table 1. Issue of Studying Science Knowledge in the Mueang Kung Pottery Local Wisdom of Chiang Mai Province

Issue of interviewing from community scholars	Picture supporting the interview
1) Identity of Mueang Kung pottery The local wisdom in making Mueang Kung pottery is the local wisdom of Ban Mueang Kung villagers, Hang Dong district, Chiang Mai province with features different from somewhere else divided into 6 characteristics as follows: 1. Soil fermentation and soil preparation 2. Water pot sculpting 3. Drying pots 4. Carving pot pattern 5. Polishing with river rock 6. Burning	 Pots which have been already carved  Unique techniques and patterns.

Issue of interviewing from community scholars	Picture supporting the interview
	
	Polishing the pots
2) Mueang Kung pottery handicraft village Ban Mueang Kung, Nong Khwai, Hang Dong district, Chiang Mai province is a village where there is pottery-making almost in every household. It can be said that this is a village of Thai wisdom. The villagers there have the main occupation which is pottery-making. If you walk along concrete streets in the village, you will find many kinds of clay pots of many sizes such as vases, flowerpots, and others dried in rows in the middle of the courtyard. Moreover, you will find elders in the space under Thai houses to help one another decorate clay water pots energetically.	
	Sculpting pots with clay
	
	
	Burning clay pottery
3) Local wisdom transferring "Mueang Kung pottery" Regarding local wisdom transferring in making Mueang Kung pottery, there are 2 types, namely. 1) Transferring wisdom from the direct lineage of ancestors such as transferring from fathers and mothers who already have this occupation passes on knowledge and experiences to descendants through practices. 2) Transferring from studying local wisdom such as coming for trial for a short period of interested students to know the methods roughly	
	Identity preservation of making pottery from generation to generation.

Issue of interviewing from community scholars	Picture supporting the interview

Students come to study Mueang Kung pottery-making

4) Tools for making Mueang Kung pottery.

The pottery of Ban Mueang Kung, Nong Khwai sub-district has been produced in containers, namely water pots, and ewers mostly. The mentioned pottery containers have a particular form of their own known and called locally as "Moo New" and "Nam Ton Ngeow". The Mueang Kung pottery product is deemed to be folk art originating from local craftsmanship skills and produced for everyday use or to respond to traditional and cultural activities. The product form of traditional pottery produced for the mentioned purpose consists of Nam ton and water pots which are containers for putting drinking water in, types of pots used in cooking. Tools are divided into 2 groups as follows: 1) Tools for sculpting pottery and 2) tools for polishing pottery

Tools for sculpting pottery

5) Methods of making pottery.

For making Ban Mueang Kung pottery, there are main steps divided into 6 characteristics as follows:

1. Soil fermentation and soil

For soil fermentation, bring the soil obtained from digging to be dried and then bring it to be crushed finely. Separate rock waste, and sand waste completely. After that, mix it with water and ferment the mixture in a bowl for about 1-2 days and then it can be used for sculpting.

Soil fermentation and soil preparation

2. Sculpting water pot

Firstly, a lump of clay is kneaded until it becomes softer. Place it on the spinning disc and press it in the middle to make a wide hole keep forming the bottom upward and keep moving one following the other gradually. Slice off the unwanted part to obtain a beautiful shape.

3. Drying pots

Dry the pot which has been already sculptured in the shade or in the open air or where there is sunlight.

Sculpting water pots

4. Carving pot pattern

Use a plastic lid of a drinking-water bottle to press it on the line at the neck of the pot to create serration. For the second line, create patterns by using the method of pattern pressing in a form of a heart triangle. Mortise the serration

Issue of interviewing from community scholars	Picture supporting the interview
part to make the heart triangle appear outstanding. After that, polish it with river rock to make it shiny. 5. Polishing with river rock Take the water pot already going through the drying process and the carving process to be prepared for polishing. Mix the finely crushed laterite with Zola oil. Rub this mixture with the pot. 6. Burning Put the water pot in the clay pot to prevent it from breaking. Put it in the kiln. Pile up the woodpile at the 4 sides to distribute the temperature equally for the 4 sides. Provide the floor with ashes. Cover this with scraps of straw.	 Drying the pots.  Carving the pot pattern.  Polishing with river rock  Burning clay pottery

Source: Chaicharoen, et al. (2023)

3.2 Regarding Developing Local Wisdom-Based Science Learning Innovation to Promote Creative Problem-Solving Skills

It was found that the developed learning innovation is in the form of the Splendor board game with the following components:

3.2.1 Cards with the picture of pottery

1) Type 1 card: Type of Nam Ton

2) Type 2 card: Type of water pot

3) Type 3 card: Type of applied pottery

3.2.2 Raw material cards

3.2.3 Silver medal, gold medal

3.2.4 Raw material coins

3.2.5 Extra mark cards

3.2.6 Talent cards

From using the chessboard game in conducting learning activities together with students and then using the learning achievement test before and after learning of students and analyzing the obtained results statistically to find the efficiency of learning media by using E1/E2 based on the percentage criteria 80/80, the results revealed that regarding the developed learning innovation, the result of assessing the efficiency of the innovation (E1/E2) was at the level of 80.22/81.56. This is deemed to have the efficiency to be implemented in learning.

3.3 The Result Revealed by the Satisfaction Level of Students to Local Wisdom-Based Science Learning Innovation

Table 3. Satisfactions Levels of Students to Local Wisdom-Based Science Learning Innovation (n=15)

Items of assessment	Mean	SD	Interpretation
1. The game is interesting.	4.73	0.59	Highest
2. The game stimulates faster thinking.	4.53	0.74	Highest
3. The game helps students review the lesson.	4.67	0.62	Highest
4. The game helps practice critical thinking and problem-solving.	4.87	0.35	Highest
5. The game is consistent with the subject matter.	4.93	0.26	Highest
6. The game helps in remembering the content better.	4.60	0.74	Highest
7. The game is modern.	4.93	0.26	Highest
8. The game makes easier understanding of the content.	4.53	0.83	Highest
9. Playing the game competitively with friends stimulates the effort in doing the test.	4.93	0.26	Highest
10. The game helps develop skills of thinking and problem-solving.	4.93	0.26	Highest
Overall	4.77	0.49	Highest

Source: Chaicharoen, et al. (2023)

From Table 3, it was found that the satisfaction level of students with local wisdom-based science learning innovation was at the highest (Mean=4.77, SD=0.49). When individual items were taken into consideration, it was found that students were satisfied with local wisdom-based science learning innovation which helps develop skills of thinking and problem-solving. This is in line with the content to be prepared for learning and teaching. Moreover, the mentioned innovation is also modern and enjoyable, making students have a good time and become alert to learning more.

4. Discussion

4.1 Studying Science Knowledge in the Mueang Kung Pottery Local Wisdom of Chiang Mai Province

It Was Found that the Process of Making Mueeang Kung Pottery of Chiang Mai Province has integrated science knowledge to develop quality pottery. The knowledge found in the community can be used to design local wisdom-based science knowledge to promote skills of creative problem-solving. This is in the same direction as the work of Chaichapo (2019) stating that regarding utilizing learning sources and local wisdom in education, education currently places importance on learning sources and local wisdom more because this is a source of knowledge near us. This is also in line with our way of life and benefits us in adapting knowledge to be used with ourselves, our families, and the community of transferring local wisdom. Moreover, this is also in line with the Office of National Culture Commission (1990) stating that wisdom is a matter of continuous succession without interruption from the

past to the present time. It is natural for villagers to connect to history continuously. It is the characteristic of internal relationships by villagers themselves. Therefore, wisdom is deemed to be an important social thought in terms of being both abstracts which is the philosophy for guidelines in conducting life, and concrete which is specific matters such as making a living, art, music, handicraft, and other things having to exist in the society for a long time. There is always wisdom in society. For making Mueang Kung pottery, there are 2 types of transferring wisdom: 1) Transferring wisdom from the direct lineage of ancestors such as transferring from fathers and mothers who already have this occupation passes on knowledge and experiences to descendants through practices: 2) Transferring from studying local wisdom such as coming for trial for a short period of interested students to know the methods roughly. The Ban Mueang Kung pottery which has been produced is containers, namely water pots, and ewers mostly. The mentioned pottery containers have a particular form of their own known and called locally as "Moo New" and "Nam Ton Ngeow". The Mueang Kung pottery product is deemed to be folk art originating from local craftsmanship skills and produced for everyday use or to respond to traditional and cultural activities.

4.2 Regarding Developing Local Wisdom-Based Science Learning Innovation to Promote Creative Problem-Solving Skills

it was found that the developed learning innovation is in the form of the Splendor Board Game with the following components: (1) Cards of forms; (2) Board for playing the board game and (3) Rules for playing. The results of assessing the efficiency of the innovation (E1/E2) were at the level of 80.22/81.56. This is deemed to have the efficiency to be implemented in learning and consistent with the work of Khammani (2016) stating that the board game is a schooling media in which students are interested. It is the teaching method that helps students have high participation in learning. Students enjoy it and it brings about learning from playing. The advantage of the board game is the fact that there are challenges, giving students opportunities to do some trials and errors and empowering students to make decisions in playing. The board game content reaches common human needs. It has responded and challenging characteristics making students compete to win. It brings joy, persuading students to follow. Moreover, Intasara (2019) also mentions that the educational board game is a board game that promotes and develops intelligence. The educational board game should have simple rules which children can follow to play it alone or in a group. The educational board game helps students learn to notice, and think to find reasons and makes them come up with concepts about color, shape, quantity, type, and relationships by themselves. The researcher believes that organizing educational board games is an approach that can promote and develop art abilities for students. This is developing learning innovation that upgrades learning abilities and self-development of students, The process of educational management must promote students to be able to develop learning skills naturally with full potential, and know about art, culture, Thai wisdom, and wisdom application. They should be able to live in society happily through local wisdom-based learning. This is related to the concept of Chuaratanaphong (1996) proposing that there are several local resources, especially for local wisdom or folk wisdom in the Thai countryside and they are valuable and indicate having been developed for a long time. The model curriculum or the core curriculum cannot utilize the mentioned local resources, but the local curriculum can integrate local resources and folk wisdom to be used in learning and teaching for the aspect of occupation, handicraft, agriculture, music, performance, literature, custom, and tradition. As a result, students learn about their local areas. They love and feel tied to their districts and can use local resources in having an occupation.

4.3 Regarding the Satisfaction Level of Students with Local Wisdom-Based Science Learning Innovation, It Was Found That Students Had Satisfaction at the Highest Level

From distilling the lesson learned together with students, students reflected on learning results that playing the game can make students come up with skills in critical thinking and skills of problem-solving. This is because the student must plan for playing. They must think based on supportive reasons by trying not to follow other students. After that, the best method is chosen to be used in playing to be the winner in playing. During the game playing, students will find problems in playing differently in each student. Therefore, students must solve problems during playing. This helps students come up with the process of problem-solving and leads to solution-seeking through learning whereby this is in line with Mangkhang (2022). He states that learning management in the context of wisdom and community culture is something around students that must know about. In the process of arranging activities that villagers participate in, villagers are the ones who transfer knowledge. They are proud and happy for what they have done in terms of being able to build benefits for the community. They are glad that there are wisdom successors. Moreover, training students to know and be able to perform a task related to wisdom or to understand community culture makes the community accept the abilities of students. This is beneficial in living in the community understandably in culture and they become cultural successors further. The result of studying the satisfaction levels of students revealed that developing local wisdom-based science learning innovation to promote creative problem-solving skills is the

learning method that builds participation in the learning of students. Moreover, it brings about joy and helps upgrade learning students so that they can develop skills and judgment. There is happiness in the classroom in this century of changes further.

5. Suggestions

5.1 Suggestions for Implementing Research Results

5.1.1 Teachers or educational personnel can arrange learning activities by applying or integrating local wisdom to match with the environment or the context to promote students to love and be proud of their local wisdom by using the process from this research.

5.1.2 Teachers or educational personnel can take the learning activity which integrates local wisdom to arrange for activities supplementing the curriculum or to develop for local curriculum.

5.1.3 Arranging learning activities integrating local wisdom must take into consideration the previous knowledge of the student in terms of content and local knowledge because each student knows each subject matter unequally.

5.1.4 Dividing children's groups should at least consist of at least 3 children for the best part of playing this game because if there are fewer than 3 people, playing will be too easy and thinking skills are used less than they should be.

5.1.5 Roles of teachers should be increased in designing the process. Playing the game to the end only should not be allowed. The session for summarizing the things for today's learning should be added to bring about learning exchanges among each other and to help students practice thinking. During playing, when each group is trying to solve problems, the teacher should interfere by helping with questioning so that students can contemplate. For example, questions should be in the form of why, what, and how to help students practice thinking, contemplating, and use judgment more in playing the game.

5.2 Suggestions for Doing the Next Research

5.2.1 Should study results of organizing learning activities in the class by measuring and assessing results to assess the scientific concept.

5.2.2 Should study knowledge of local wisdom and there should be the adjustment of using other local pearls of wisdom such as Karen woven fabrics, Wualai silverware.

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