

Developing Handmade Teaching Material Innovation on Thailand Maps to Enhance Geography Concepts of Students with Visual Impairments to Creating an Equitable Ecology in Education for Sustainable Development

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Abstract

The objectives of the research were to study and develop handmade teaching materials innovation on Thailand maps to enhance geography concepts of students with visual impairments and 2) to study Thai geography concepts of students with visual impairments. The research was action research whereby there were samples in the research, namely (1) 5 experts in developing teaching materials for students with visual impairments (2) 5 experts in social studies learning management, and (3) 10 students with visual impairments. Simple random sampling was used. From the research studies, it was found that: 1) Handmade teaching materials on Thailand maps to enhance geography concepts for students with visual impairments have been developed by using the content of Thailand maps of secondary education students to enhance handmade teaching materials on Thailand maps accounting for 15 charts based on the design of CADDIE model of Mangkhang (2017). Assessment results had completeness and appropriate qualities at a high level. This was used together with our plan of learning management on Thailand maps for 4 plans accounting for 10 hours. The assessment results of the learning management plan came out with having completeness, correctness, and qualities suitable at a high level; 2) Building the assessment form of geography concepts of students with visual impairments had completeness and qualities suitable at a high level and students had geography concepts at the highest level.

Keywords: handmade teaching materials, geography concepts, students with visual impairments, equity education, no child left behind

1. Introduction

Education 2030 Incheon Declaration and Framework for Action focuses on making the world manage education by taking into consideration providing inclusive education for everyone, developing equity education qualities, and lifelong education. The success results from efficient policies and planning together with the cooperation of every sector. Moreover, the mentioned Declaration demands the government of each country to place importance on budget allocation for educational sectors. The range between 4-6% of GDP or 15-20% of the national budget. In any case, this depends on the context of each country. Thailand has participated in the Incheon Declaration. The proposal that Thailand can conduct is to set up a committee to monitor and assess educational management. Doing this does not only make Thailand's data can be shared among member countries of UNESCO but also makes the country prepare the data on educational development more systematically, which will benefit the educational reform of the country. After the goal has been officially determined in September 2015, UNESCO will proceed to prepare the operational framework to support the educational operation so that the goal will be achieved in 2030 further (Spokesperson's office 2015; UNESCO, 2018).

From the concept of the fourth goal for sustainable development (SDGs) under education management for people with disabilities, there are concepts supporting equity throughout education, and promoting lifelong learning for everyone. The goal of success will cover quality education to reinforce the belief proving that education is one of the

driving forces efficient for sustainable development. One of the approaches to the operation is building and upgrading educational equipment and instruments sensitive to children, the disabled with impairments, and genders so that they will have a learning environment, which 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 in sustainable development (United Nation, 2015; Office of educational management plan for people with disabilities, Third Edition (2017-2021), 2017).

Regarding the convention on the rights of persons with disabilities (CRPD), it is the international human right law that promotes, protect and support the disabled to be protected in terms of basic human rights and freedom with full equity. It also promotes congenial respect for the dignity of the disabled. This convention is the first convention that covers issues regarding the human rights of the disabled in terms of not only citizens but also including economy, society, culture, and family life as well. Thailand became a member of the convention on the rights of persons with disabilities (CRPD) by ratifying it on 29 July 2008, becoming effective for Thailand to comply with regulations in the convention since 28 August 2008. The state must determine agencies responsible for focal points as a mechanism to coordinate with the government sector and to take care of the issues supporting operations in sectors. Moreover, Thailand has determined the Ministry of Human Development and Security be the focal point agency according to this convention. Moreover, the state must establish an internal structure to promote, protect and monitor compliance with this convention. For example, a committee performing duties related to the convention must be established with components coming from every sector. The state must promote the participation of the civil society, especially for the disabled, and organizations of the disabled to fully participate in monitoring the operation. The state must also prepare reports about measures in complying with obligations under the convention within 2 years after the convention becomes effective. After that, it must send subsequent reports at least every 4 years or upon request by the committee (Office of National Empowerment of Persons with Disabilities, 2009).

No Child Left Behind (NCLB) Act of 2001 the U.S. has made an effort in improving the academic achievement of students and reforming the educational program at the primary and secondary levels in the U.S. The main important goal of NCLB is the regulation stating that within a century, every student including the disabled, every child must have justified, equal and significant opportunities to receive high-quality education and achieve minimum abilities regarding challenging academic achievement standards of the state and academic assessment of the state. No Child Left Behind (NCLB) is a project of educational initiative with the most significance which has ever been promulgated in the past decades. The outstanding component of this initial project is the requirement that all students must have as follows: They must have qualified teachers and receive opportunities to attend high-quality schools. The NCLB law has prescribed the state to upgrade academic achievement for every student, including the disabled as well (Simpson, Lacava, & Graner, 2004). This is an initiative of the project which builds educational equalization to be concrete in many countries consecutively to the present time.

According to the National Education Act of B.E. 2542 (Amended version B.E. 2545), the goal of educational management is to develop the Thai people to be complete human beings in terms of body, mind, intellect, knowledge, and virtues in living. People have rights and equal opportunities in receiving basic education not less than 12 years which the state must provide thoroughly with qualities and without charging any fees. As a result, the Ministry of Education has determined the basic education core curriculum of B.E. 2551 by focusing on developing people to be complete, talented, and happy and learners have the potential to further their studies and have occupations. Therefore, the aim which is the learning standard has been determined to bring about 8 characteristics to learners and 12 basic values of the Thai people so that learners will be complete humans in terms of body and mind. The basic education curriculum determines the learning area of social studies, religions, and cultures to be the main area in which learners must receive education from Grade 1 to Grade 12. This is the instrument that will help learners have changed in 3 aspects, namely knowledge, skills, and attitudes. The aim of the learning area of social studies, religions, and cultures focuses on developing learners to be Thai citizens and world citizenship with omniscience and responsibilities to bring about important competencies and desirable characteristics of learners and to have the knowledge to respond and to become good citizens. Therefore, quality educational management must meet the demand of every group of learners in society for both normal learners and learners with other special needs such as people who have visual impairments, audible impairments, etc. (Mangkhang et al., 2017; Ministry of Education, 2008).

The education system in Thailand places importance on the disabled as human resources of the country and promotes and develops people with disabilities to be able to live in society as equally as normal people. The first step of Thailand in promoting the disabled to have rights was to put the People with Disabilities Rehabilitation Act B.E. 2534 into force. The Act determines the disabled to be protected, supported, developed, and rehabilitated through medical, educational,

social, and vocational training approach. The national plan for rehabilitating people with disabilities of B.E. 2540-2544 has been prepared. It is the national plan regarding people with disabilities to develop the disabled to have the capabilities of living in a society with good life qualities and to focus on rehabilitating the disabled in terms of medicine, education, occupation, and employment. Later on, the constitution of the Thai Kingdom B.E. 2540 has the main point which is allowing people with disabilities to be entitled to receive facilities which are public and other assistance from the state according to the legal provision. Moreover, the Ministry of Education is aware of the importance and rights of the disabled in receiving educational services so that all people with disabilities will receive development at their full potential. To increase educational opportunities and learning, people with disabilities are allowed to receive education thoroughly and equally, which is consistent with the government policy, including promoting the participation of every sector of society in educational management for the disabled. Therefore, the policy of educational reforms for the disabled in the second decade (2009-2018) has been determined to allow the disabled to receive education thoroughly and equally with qualities according to education standards of each type of disability in every system and educational form. This can be done by allowing every agency to participate in educational management, quality development of educational management for people with disabilities (Ministry of Education, 2008).

Due to poverty, Thai children accounting for 500,000 people get out of the system and another 200,000 children tend to lack educational opportunities with qualities. One of the groups is children with special needs for care and promotion. The important problem originates from the fact that the children's family bears very high costs of education compared to incomes 4 times higher than wealthy families. From these problems, allocating resources to reduce educational differences is therefore not enough. For example, students with different statuses however receive the same quantity of subsidies without considering different needs. On the contrary, assistance according to the principle of equality is given according to the information of necessity. The causes of differences are still due to differences in qualities or school standards, teachers' qualities or efficiency or economic or social statuses (Equitable Education Fund, 2019). Moreover, the problem of shortage of learning supporting resources is another important problem that pushes students in the group of people with disabilities out of the education system due to reaching learning resources meeting the special demand not thoroughly.

Special education is educational management for children with special needs without discrimination against castes, races, religions, and differences in terms of body, emotion, social, and intelligence. In other words, special education management is an indicator of educational rights and the equality of people in the nation. Special education management is the form of educational management for children with special needs. Special education management in countries including is rooted in the belief in rights, freedom, and equality in terms of humanity. Up until now, there has been an effort in legislation for the disabled in terms of law of promoting and developing life qualities of the disabled, educational management, and aspects for rights, freedom, and equality in the humanity of the disabled. Therefore, special education is different from education arranged for normal children because it is a matter of helping the disabled to have good life qualities. Moreover, educational assistance must be given properly because learning of students with visual impairments must rely on the remaining sense of perception (Arrayawinyou, 1999).

Educational management for students with visual impairments is schooling management according to relationships of factors which are components of aspects with roles in educational management, namely education in the school system with the cooperative learning form including the specialized form of learning in schools. Informal education for people with visual impairments consists of place management for managing education for students with visual impairments. Teaching curriculum management, management of personnel in charge of providing knowledge, and budget management for educational management for students with visual impairments. However, teachers performing teaching children with visual impairments must have knowledge and expertise in teaching children of each type as well as having patience and teaching psychology apart from being especially kind to those children. Educational management for students with visual impairments will help reinforce this group of children and the youth to be the main power in developing the country and driving equity and equal society for everyone in the society (Thongnoi, 2006).

Social Studies Pedagogy is the intellectual capital that mankind has invented to make education the social culture in instilling strong citizenship, protecting rights, building equality, giving opportunities to everyone to receive learning without bias, and supporting the civil society to participate in educational management. Results of the past curriculum of social studies have reflected that regarding qualities of educational management of social studies in schools, assessment results were at the level requiring improvement about thinking skills, skills of leadership, and being followers democratically. Moreover, the academic performance of important basic subjects still needs development when compared with the learning qualities of the youth in the regional countries. Education has not stepped over

desirable world citizenship due to the current competency inferiority of learners, resulting in no potential for world citizens in the future possibly (Mangkhang, 2016). The way people have limitations in conducting activities in everyday life and participating in social activities due to having visual impairments results in limitations in learning especially for the subject of geography which builds viewpoints through topography. The process of learning geography (geo literacy) is educational management that can help develop students to understand phenomena occurring on the earth related to location and to understand the natural system and changes originating from interactions between humans and the environment. The objective is to lead to developing abilities in thinking systematically and decision-making for building a sustainable environment for Thai citizens and world citizens. The process of learning geography contributes importantly to preparing students to be citizens in the 21st century whereby the process of learning geography will help students learn together through problems, changing viewpoints and attitudes, thinking together systematically leading to making decisions reasonably by taking into consideration contexts of the surrounding environment affecting every sector. Therefore, the process of learning geography is an important instrument of education to build citizenship in the issue of analyzing problems originating from exploiting natural resources and the environment unequally (Topan, 2021).

Schooling management of social studies teachers to learners with visual impairments in the subject of geography must focus on using sound, touching, practicing, and facing real situations. This makes learners able to learn the subject content like normal students. However, the geographical essence concerning Thailand maps is a difficult subject matter for learners with visual impairments because learners cannot learn from the real map. Moreover, the content has an abstract characteristic, resulting in making it difficult for learners to imagine. Therefore, the researcher views that there should be the production of learning and teaching materials that meets the demand of learners with visual impairments. In other words, Thailand maps materials suitable for learners with visual impairments should be produced and they can be used to support schooling regarding Thailand maps of geography substance for social studies truly.

2. Method

2.1 Objectives of the Research

1. To study and develop handmade teaching materials innovation on Thailand maps to enhance geography concepts of students with visual impairments
2. To study Thai geography concepts of students with visual impairments

2.2 Research Methodology

Step 1 Research methodology

The research at this time was action research (AR) conducted by collecting and analyzing data obtained from documentary analysis, making assessment of learning management plans, concept assessment forms. Research results were presented in the form of descriptive analysis to support data synthesis and narration.

Step 2 Population and samples in the research

The population used in the research consisted of experts in teaching materials developed for students with visual impairments and experts in social studies learning management

Samples in the research were

1. 5 experts in teaching materials developed for students with visual impairments based on purposive sampling
2. 5 experts in social studies learning management based on purposive sampling
3. 10 students with visual impairments based on simple random sampling

Step 3 Instruments used in the research

Instruments used in the research consisted of

1. Handmade teaching materials on Thailand maps accounting for 15 charts,
2. Plans of learning management in our Thailand for students with visual impairments,
3. Geography concepts assessment forms for students with visual impairments

Step 4 Data collection

1. Documentary study was conducted by collecting data from documents, books, and journals in terms of theories

and related concepts to take the obtained data to support the analysis of education issues.

2. Field study was classified into 2 periods as follows:

Period 1 Situational analysis refers to qualitative data collection conducted by synthesizing documents and related research works, interviewing experts in teaching materials developed for students with visual impairments

Period 2 Design and Development refers to quantitative data collection conducted by designing and developing handmade teaching materials on Thailand maps, learning management plans, and Thailand geography concepts assessment forms for students with visual impairments. Then, qualities were checked and the suitability of developed handmade teaching materials was to be found. After that, teaching materials were implemented experimentally together with learning management plans. Geography concepts for students with visual impairments were assessed through quality checking by experts in teaching materials developed for students with visual impairments and experts in social studies learning management. The instruments used consisted of assessment forms of handmade teaching materials qualities on Thailand maps, assessment of congruency of lesson plans with education objectives (Index of Item Objective congruence: IOC), and assessment of congruency of geography concepts assessment forms for students with visual impairments (Index of Item Objective congruence: IOC).

Step 5 Data analysis

1. Qualitative data: The research team analyzed data according to the educational goal by using the content analysis method obtained from documentary analysis and interviewing in order to summarize issues according to data groups and to analyze data relationships.

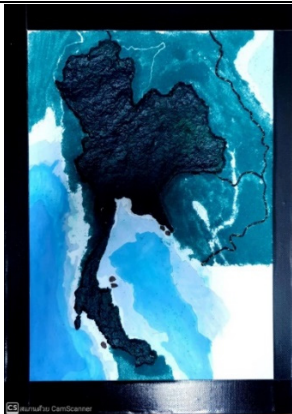
2. Quantitative data: The research team used the data from the assessment form to conduct data analysis with the statistical package which can analyze data appropriately. It was an analysis using descriptive statistics by showing results of statistical data analysis as mean and standard deviation.

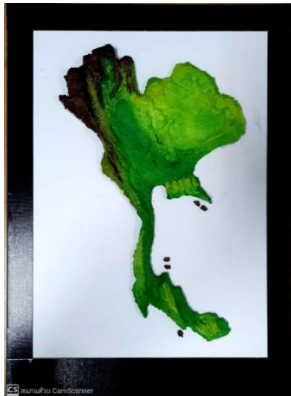
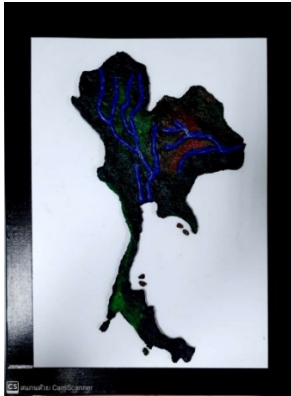


3. Results


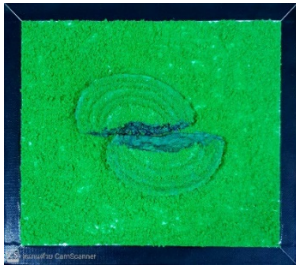



For the research at this time, the research team classified the data obtained from the research and presented research results according to the determined objectives. The study results can be summarized as follows:






1. Studying and developing handmade teaching materials on Thailand maps to develop Thailand geography concepts of students with visual impairments were conducted by studying the basic education core curriculum B.E. 2551, studying and searching textbooks related to learning of students with visual impairments, and interviewing experts of teaching materials developed for students with visual impairments in order to use as guidelines to enhance handmade teaching materials. Handmade teaching materials on Thailand maps have been developed for 15 charts as follows:

Table 1. Details of the Model Work of Handmade Teaching Materials Which Promote Geography Concepts

Picture No.	Model work of Handmade teaching materials	Geography concepts
1		Characteristics of shapes, location, and territory of Thailand

Picture No.	Model work of Handmade teaching materials	Geography concepts
2		Topography, areas, hypsography of Thailand
3		Characteristics of the flowing direction of main rivers in Thailand
4		Characteristics of classifying regions of Thailand
5		Characteristics of hills in Thailand

Picture No.	Model work of Handmade teaching materials	Geography concepts
6		Characteristics of being surrounded by mountains and basins in Thailand
7		Characteristics of terrace mountains in Thailand
8		Characteristics of caves in Thailand
9		Characteristics of cliff in Thailand
10		Characteristics of highland of Thailand

Picture No.	Model work of Handmade teaching materials	Geography concepts
11		Characteristics of river plains from mountains in Thailand
12		Characteristics of river plains in Thailand
13		Characteristics of ponds, lakes in Thailand
14		Characteristics of capes in Thailand
15		Characteristics of islands in Thailand

Source: Mangkhang, et al. (2022)

The research team built the assessment form of handmade teaching materials on Thailand maps and then had experts assess the built handmade teaching materials in terms of suitability and examine content validity, the language used by using the assessment form of rating scale according to Likert's method with 5 levels. Decision criteria were determined as follows (Boochom Srisaard. 2002):

suitable at the highest level	with the mean of 4.51 – 5.00 marks
suitable at a high level	with the mean of 3.51 – 4.50 marks
suitable at a moderate level	with the mean of 2.51 – 3.50 marks
suitable at a low level	with the mean of 1.51 – 2.50 marks
suitable at the lowest level	with the mean of 1.00 – 1.50 marks

The suitability assessment results of handmade teaching materials on Thailand maps to enhance geography concepts of students with visual impairments can be shown in the following Table:

Table 2. The Suitability Assessment Results of Handmade Teaching Materials on Thailand Maps to Enhance Geography Concepts of Students with Visual Impairments (n=5)

Item	List of assessment	\bar{x}	SD	Interpretation
1	Handmade teaching materials stimulate interest to seek knowledge concerning the subject matter to be studied.	4.60	0.55	The highest
2	Handmade teaching materials help students learn easily and have a long-term memory of the knowledge learnt.	4.20	0.45	High
3	Handmade teaching materials have correctness and correspond to the content.	5.00	0.00	The highest
4	Handmade teaching materials corresponds to the objective learning.	5.00	0.00	The highest
5	Handmade teaching materials are consistent with schooling activities.	4.20	0.45	High
6	Handmade teaching materials help students come up with correct conclusion.	3.80	0.45	High
7	Handmade teaching materials stimulate students come up with the concept process.	4.40	0.55	High
8	Handmade teaching materials are modern unique, different from normal learning.	3.60	0.55	High
9	Handmade teaching materials are convenient, easy to be used for organizing teaching and learning.	4.60	0.55	The highest
10	Handmade teaching materials are inexpensive. The production cost is low, worth for using in managing schooling.	5.00	0.00	The highest
11	Handmade teaching materials are durable and can be reused.	3.40	0.55	Medium
12	Handmade teaching materials are not against virtues and ethics which people should have and conform to.	5.00	0.00	The highest
13	Handmade teaching materials help enhance experiences to learners.	4.60	0.55	The highest
14	Handmade teaching materials are suitable to age and difficulties of the content.	4.00	0.00	High
15	Handmade teaching materials promote social interactions between teachers and students.	5.00	0.00	The highest
16	Handmade teaching materials are proper according to the principle of material production.	4.40	0.55	High
17	Handmade teaching materials can convey content which is abstract to become concrete.	4.40	0.55	High
18	Handmade teaching materials increase roles of learners in being actors.	4.20	0.84	High
19	Handmade teaching materials connect previous knowledge with new knowledge.	4.40	0.55	High
20	Handmade teaching materials can be applied in managing schooling appropriately.	4.40	0.89	High
	Overview	4.35	0.29	High

Source: Mangkhang, et al. (2022)

From Table 2, it shows that regarding results of overall assessing handmade teaching materials on Thailand maps to enhance geography concepts of students with visual impairment, the quality was suitable at a high level ($\bar{x}=4.35$, $SD=0.29$). When details were taken into consideration, it was found that handmade teaching materials on Thailand maps stimulated interest, were correct and consistent with the subject matter. This brought about seeking knowledge in the subject matter to be studied. It was convenient and easy to use them for teaching and learning and to enhance experiences to learners. Moreover, using them also helps promote social interactions between teachers and students.

The mentioned handmade teaching materials were used together with plans of learning management on our Thailand maps for student with visual impairments consisting of 4 lesson plans in the following Tables:

Table 3. Shows Details of Lesson Plans

Lesson plans	Topic	Number of hours
Lesson plan 1	Location and border of Thailand	2 hours
Lesson plan 2	Thai regions	2 hours
Lesson plan 3	Mountain ranges and important rivers of Thailand	2 hours
Lesson plan 4	Topography appearing on the surface of the earth crust in Thailand	4 hours

Source: Mangkhang, et al. (2022)

The research team studied the basic education core curriculum B.E. 2551 by preparing lesson plans from learning management guidelines, theories, principles, concepts, document and related research works. The research team also studied learning management guidelines according to the basic education core curriculum B.E. 2551 (Office of Academy and Basic Education standards, ministry of Education). After that, the research team proposed the built lesson plans to advisors and experts to check correctness and suitability by assessing congruence of lesson plans with the objectives of the study (Index of Item Objective congruence: IOC). Assessment results of suitability of lesson plans on our Thailand for students with visual impairments were obtained as in the following tables.

Table 4. Assessment Results of Suitability of Lesson Plans on Our Thailand for Students with Visual Impairments (n=5)

Item	List of assessment	\bar{x}	SD	Interpretation
1	Lesson plans are consistent and suitable with the curriculum.	5.00	0.00	The highest
2	Lesson plans are consistent and suitable with the subject nature.	4.20	0.45	High
3	Lesson plans are consistent and suitable with the age of learners.	5.00	0.00	The highest
4	Lesson plans are consistent and suitable with current conditions and problems.	4.20	0.45	High
5	Lesson plans suitable with the process of developing learners.	4.20	0.45	High
6	Lesson plans have suitable content.	3.80	0.45	High
7	Lesson plans promote enhancing geography concepts.	4.40	0.55	High
8	Lesson plans are flexible in teaching learners with visual impairments.	3.60	0.55	High
9	Lesson plans are suitable with interest of students with visual impairments.	4.60	0.55	The highest
10	Lesson plans are suitable with the learning form of learners with visual impairments.	4.60	0.55	The highest
	Overview	4.36	0.22	High

Source: Mangkhang, et al. (2022)

From Table 4, it shows that regarding the overall assessment result of lesson plans on our Thailand for students with visual impairments, the quality was suitable at a high level ($\bar{x}=4.36$, $SD=0.22$). When details were taken into consideration, it was found that lesson plans were consistent and suitable with the curriculum and lesson plans were consistent and suitable with the age of learners. Moreover, they were also suitable with the learning form of learners with visual impairments.

2. Results of the study on geography concepts of students with visual impairments revealed the level of geography concepts of students with visual impairments as in the following table:

Table 5. Results of Assessing the Level of Geography Concepts of Students with Visual Impairments (n=10)

Item	List of assessment	Geography concepts	\bar{x}	SD	Interpretation
1	Characteristics of shapes, location and territory of Thailand	Shapes	4.60	0.55	The highest
2	Topography, areas, hypsography of Thailand	Topography	4.20	0.45	High
3	Main rivers in Thailand	Main rivers	5.00	0.00	The highest
4	Regions of Thailand	Regions	5.00	0.00	The highest
5	Characteristics of hills in Thailand	Hills	4.20	0.45	High
6	Characteristics of being surrounded by mountains and basins in Thailand	Basin	3.80	0.45	High
7	Characteristics of terrace mountains in Thailand	Terrace mountains	4.40	0.55	High
8	Characteristics of caves in Thailand	Characteristics of caves	3.60	0.55	High
9	Characteristics of cliff in Thailand	Characteristics of cliff	4.60	0.55	The highest
10	Characteristics of highland of Thailand	Characteristics of highland	5.00	0.00	The highest
11	Characteristics of foothill plains in Thailand	Characteristics of foothill plains	3.40	0.55	Moderate
12	Characteristics of river plains in Thailand	Characteristics of river plains	5.00	0.00	The highest
13	Characteristics of ponds, lakes in Thailand	Characteristics of ponds, lakes	4.60	0.55	The highest
14	Characteristics of capes in Thailand	Capes	4.00	0.00	High
15	Characteristics of islands in Thailand	Islands	5.00	0.00	The highest
	Overview		4.43	0.26	High

Source: Mangkhang, et al. (2022)

From Table 5, it shows that regarding the result of assessing suitability of the assessment form on geography concepts of students with visual impairments in an overall picture, the quality was suitable at the high level ($\bar{x}=4.43$, $SD=0.26$). When details were taken into consideration, it was found that geography concepts of students with visual impairments had qualities suitable at the highest level in characteristics of shapes, main rivers, regions, characteristics of highland, characteristics of river plains, lakes and characteristics of islands.

4. Discussion

1. From studying and developing handmade teaching materials on Thailand maps to build geography concepts of students with visual impairments, research results revealed that regarding the overall assessment of handmade teaching materials on Thailand maps to enhance geography concepts of students with visual impairments, they had qualities that were suitable at a high level. Handmade teaching materials stimulate interest to bring about seeking knowledge in the subject to be studied. It is convenient to use them for teaching. They also help increase the experiences of learners. This is in line with the work of Pichakkana, Laowattanawong, Inguea & Sakulyuenwongsuk (2011) stating that developing learning devices of Thailand maps for students with visual impairments is to facilitate education outside class hours for students with visual impairments so that students have an opportunity to practice themselves. The methodology was based on a testing comparison of the level of teachers' opinions on learning Thailand maps and other devices, and learning was promoted to students at the highest level. Moreover, handmade teaching materials help promote creative ideas to learners, increase the learning skills of learners quickly, are suitable with the level of learners, enhance knowledge and understanding in learning Thailand maps of learners, learning basic data of Thailand, learning data of provinces in Thailand, learning provinces in Thailand. The mentioned handmade teaching materials have been used together with lesson plans in Thailand for students with visual impairments accounting for 4 learning management plans. Generally, their qualities are suitable at a high level. Lesson plans are consistent and suitable for the curriculum and the age of learners. This is in line with Sunthonroj (2001) stating that the learning management plan is the plan of organizing learning activities, managing learning, using materials to manage to learn, measuring and assessing results to correspond to content and objectives determined in the curriculum. In other words, lesson plans have been prepared from teachers' manuals or learning guidelines of the Department of Curriculum and Instruction Development (2000). This helps the one who manages learning knows what learning and content to manage, the objectives, how to manage to learn, how to use materials, and the approach to measure and assess results. In any case, learning management plans are the results of the preparation of planning schooling management system by using essence and learning standards, individual subject explanation, and the learning process to write lesson plans according to the potentials of learners.

2. From the results of assessing assessment forms of geography concepts of students with visual impairments, research results revealed that overall assessing assessment forms of geography concepts came out with having qualities that were suitable at a high level. When details were taken into consideration, it was found that the geography concepts of students with visual impairments had qualities that were suitable at the highest level in characteristics of main rivers, regions, characteristics of highlands, characteristics of river plains, and characteristics of islands. Because the idea of developing concepts for students with visual impairments developed by the researcher is measuring concepts of students with visual impairments who cannot convey concepts as drawings or written thinking diagrams. From experiences of working with students with visual impairments for at least 10 years, the researcher realizes that learners with visual impairments perceive and learn with hearing and senses of perception. Then, they transfer ideas through narration, explanation, or description in writing, leading to concepts. This is in line with Lertchanlit & Niyomsub (2012) stating that concepts are understandings which are an overall picture of a particular subject matter originating from distilling information, and facts which people then organize systematically and correctly according to the received data. Moreover, Wongyai & Pattapol (2019) propose that a clear concept of a particular subject matter for learners will help connect it with other concepts until coming up with an idea of creating innovation. Any idea of innovation must have supportive concepts to develop the idea to be innovative truly.

5. Summary

Enhancing geography concepts to students with visual impairments is regarded as promoting learning management guidelines which will help develop the thinking process for learners with visual impairments, opening up viewpoints of learning of an exciting and challenging form. Moreover, this also helps motivate learning for learners with visual impairments, making them happy and understanding the content of the geography subject more clearly. Moreover, handmade teaching materials produced by the researcher for teaching and learning help stimulate and enhance the interest of learners, making them have fun, including building a good atmosphere in learning. This makes teaching and learning more efficient. When learners can concentrate on teaching, learning usually becomes more efficient accordingly. Only lectures from teachers cannot convey pictures or something sufficiently to make learners understand exactly what teachers want. On the contrary, handmade teaching materials can complement this part by presenting pictures, which makes learners see pictures together with lectures clearly and therefore makes them understand correspondingly with teachers most efficiently. Production of handmade teaching materials for students with visual impairments at this time was building experiences for learners to have an opportunity to access new contexts equally in education equivalent to one of the normal people in general. This has made students have knowledge and understanding of the learned content profoundly. Moreover, it is a matter of increasing experiences in teaching and learning of teachers and students who will be able to develop learning materials leading to building equity education and reinforcing the value of education which does not leave anyone behind.

6. Suggestions

From research results, the researcher has suggestions as follows:

6.1 *Suggestions from the Research*

6.1.1 For implementing the developed handmade teaching materials in schooling management, teachers must build agreements between students and teachers to understand before the implementation. This is because the handmade teaching materials are made from materials that place major emphasis on natural materials and waste materials, they can be easily damaged. They must be kept in the proper environment and temperature.

6.1.2 Handmade teaching materials on Thailand maps to enhance geography concepts for students with visual impairments which have been produced can be used as a master in making copies as embossed picture media for students with visual impairments.

6.1.3 Handmade teaching materials on Thailand maps to develop geography concepts for students with visual impairments can be produced to extend commercially through cooperation with government agencies or private sectors to produce media for sales or distribution to schools with students having visual impairments throughout the country.

6.2 *Suggestions for Next Research*

6.2.1 There should be research conducted regarding results of schooling management based on handmade teaching materials on Thailand maps to develop geography concepts for students with visual impairments in contexts.

6.2.2 Handbooks for producing handmade teaching materials on Thailand maps to develop geography concepts for

students with visual impairments in Thailand should be developed.

6.2.3 Innovative developments in digital technology support create material to promote geography concepts for students with visual impairments.

6.2.4 Development of a platform to provide access to learning materials for social studies teachers to promote geography concepts of students with visual impairments.

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