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The development of digital tools to assess and enhance the ethic children development in early childhood development centers

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Abstract

The research aimed to study the effects of digital tools on ethnic children in child development centers from four districts of Lamphun Province, Thailand. The samples were teachers, parents and health promoting hospital staff from the early childhood development centers 57 people in total from cluster sampling and randomized pretest-post-test control group design. The research instruments were interviewing form, focus group discussion recording form, questionnaire, and child development evaluation form. All digital tool assessment items were qualified with higher accuracy than the specified criterion of 0.50. Its correlation coefficient was higher than 0.85 at 0.05 significantly level. Conditions and needs for context analysis of digital tools had been conducted to develop and use it for evaluating the development of ethnic children in the centers. The data were analyzed using descriptive statistics and T-test. The results revealed that the digital tools compared with documents was different in use between the experimental and the control group of the study with statistically significant at 0.05 and teachers' satisfactions of using the digital tools were also in high level. The study outcomes demonstrated that the development of digital tools in early childhood could enhance the ethical development of young children and provide educators and parents with valuable insights into a child's progress.

Keywords: Child development centers, Child development, Child health, Digital tools, Healthy.

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Contents

Contribution of this paper to the literature
Children's development in child development center of Thailand has been conducted using assessment reports which is not up to date in digital era. Digital tools for accessing and promoting the development of children in child development centres have been designed and developed to become a new process of children's assessment.

1. Introduction

Health plays an essential role in enhancing the quality of human life. A healthy body is free from diseases and leads to a good quality of life. A newborn to 6 years old is an elementary age due to the brain and body growing and developing continuously. Therefore, an adequately nurtured child in that period will encourage fully potential child development in all aspects (Areemit et al., 2017). Parents are vital people close to a young child so they can care for their child in age-appropriate development. However, in some societies, parents and guardians may have limited access to health care knowledge and health systems, such as in ethnic groups, especially the hill tribe Karen people in Thailand. Significant problems for them are their diverse beliefs and traditions.

Furthermore, they need help learning to speak, read, and write the Thai language, which is hard to communicate, gain information, or misunderstand health content from many agencies. Taking care of young children aged between 3-5 years may have to rely on a childcare agency rather than their parents. The child development center in Thailand is considered an important area in taking care of children for proper growth and development and seeking a non-normal child. The child development centers evaluate their quality via a document-based standard assessment. Ethnic parents who cannot communicate in Thai need help to answer and assess their child's development. Understanding common issues in assessing and promoting child development is quite challenging.

Thung Hua Chang district, Lamphun province, Thailand, has a lot of ethnic communities. The child development centers are under Thung Hua Chang subdistrict administrative organization, and there are seven centers mostly for ethnic Karen children (Pakakenyo). Interviewing personnel in these child development centers showed that ethnic Karen parents love and care for their children. However, they cannot do health and developmental care well because of communication limitations, especially in reading the Thai language. Therefore, if there is an assessment tool promoting child development according to the center's standards in a language that ethnic groups can read and communicate. It will establish a chance for parents to evaluate and promote child development at their age appropriate. An easy-to-use application will improve the evaluation and promotion of ethnic child development and increase the performance of child development centers. This solution is in line with the concept of the Department of Health, which would like to have a convenient information system such as using a mobile phone system.

As mentioned above, researcher teams are focused on the "Development of digital tools to assess and promote the development of ethnic children in child development centers" in order to create a good solution between the child development centers and the ethnic parents who play a role in taking care of their children. Currently, all groups of people can access internet services and already have a smartphone used in daily life; therefore, downloading a child health care application will be a great benefit to teachers in early childhood centers and parents of ethnic children to access health information in their language. When the parents of ethical children are fully accessible and understand health information as well as assessing and promoting child development, they can jointly take care of the development of children in the childcare centers.

2. Research Objective

1. To create and determine the quality of digital tools for accessing and promoting the development of children in child development centres.
2. To study the results of using digital tools to evaluate and promote the development of ethnic children in child development centres.

3. Literature Review

3.1. Research Area Background

The Child Development Center of the Thung Hua Chang subdistrict administrative organization is an educational establishment for taking care of a 2 to 5 years old child .and aims to promote the aged 2 to 5 years to physical, emotional, mental, social, and intellectual readiness according to their age. There are 7 locations of child development centers such as 1) Ban Hua Khua, 2) Ban Pong Daeng, 3) Ban Mae Pan Daeng, 4) Ban Sanchai, 5) Ban Nong Pha, 6) Ban Sandon Moon, and 7) Ban Doi Wong. These child development centers provide teaching and learning that focuses on nurturing and reducing the burden on parents, as well as providing experiences that are consistent with the area and ethnicity of children and promote learning development appropriate to their age. A vision of these child development centers in educational development in a good way of life alongside virtue, inculcating wisdom that inherits the culture leading in sports and focusing on promoting and developing students to learn and enhancing teachers to be effective in modernization management systems with an emphasis on community involvement. Furthermore, it supports the organization of student development activities, preserving culture and traditional local wisdom (Early Childhood Development Center, 2019). Digital tools, measuring and evaluating early child development should be quality tools for assessing children's development according to educational standards in terms of physical, emotional, mental, social, and intellectual development, and it can be interpreted that how children's development is promoted? to achieve appropriate child development. The digital tool for assessing and promoting early child development should be an application on smartphones called mobile applications that can be used on the website as well. Teachers in child development centers or related agencies can use this application and learn children's behavior, enabling them to continuously plan ways to promote early child development. Therefore, the purpose of using this mobile application is to achieve more effective learning (Laohajaratsang, 2018). Researchers have studied the concept of mental engineering learning in order to use it for systematic development. Metal engineering is a new concept of learning management that involves making what is imagined into reality in practice and then creating the image according to six learning processes (Nilsook &

Wannapiroon, 2013). First, imagining is the process of defining the problem, brainstorming, and analyzing the feasibility of the work. Second, the design involves planning the draft schedule and storyboard and writing the simulation script. Third, development involves creating and testing work. Fourth, presentations show innovations and listen to opinions for improvement. Fifth, improvement is the process of modifying the work to make it suitable for use. Finally, evaluation is the process of evaluating the innovation quality. The digital tools developed by researchers consist of five essential multimedia components: 1) text, 2) audio, 3) image, 4) animation, and 5) video (Manoo, 2016). These components are helpful for teachers to assess child development and for parents and guardians to access information and promote the quality of early child development. A conceptual research framework shown in Figure 1.

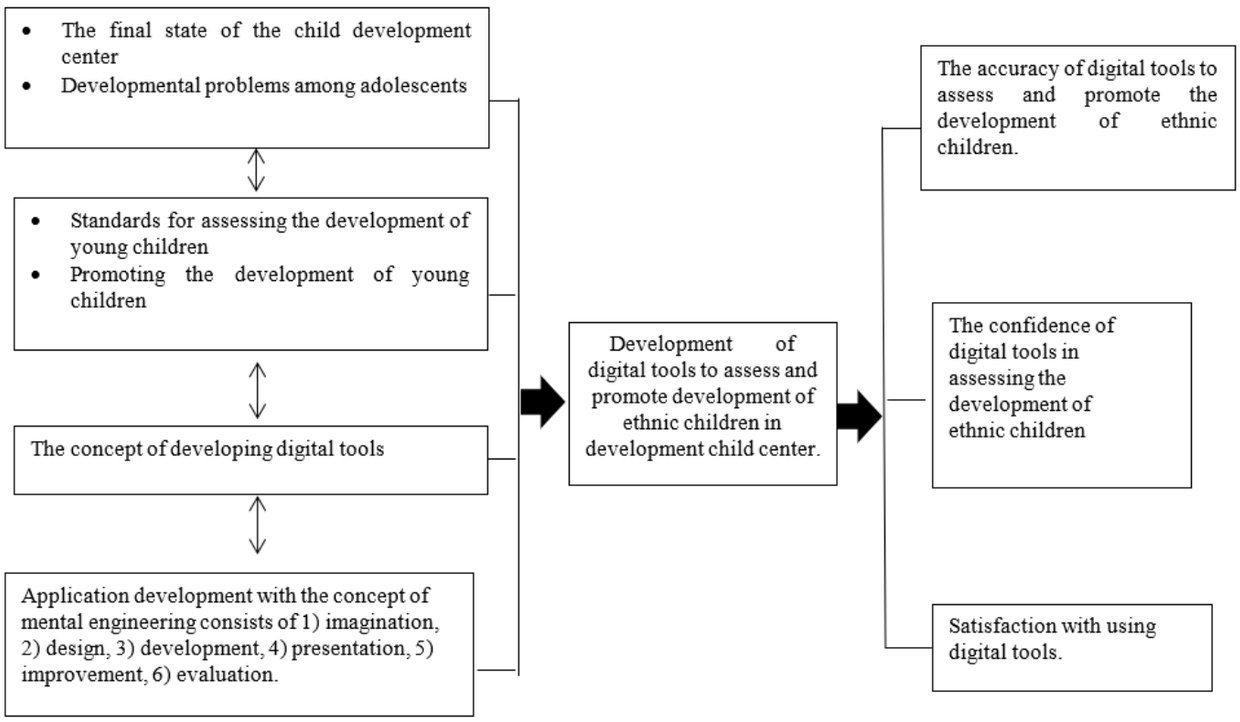

Figure 1. Conceptual framework of the Development of digital tools to assess and promote development of ethnic children in development child center.

3.2. Assessment and Promotion of Early Childhood Development

A process of assessment is an examination to determine the development of early childhood, and it can solve problems in these children promptly by using the assessment results as a guideline to develop the potential of each child. Assessment is an important and necessary process for managing knowledge and the development of children according to their age and curriculum (Early Childhood Development Center, 2019). This quality standard consists of 1) assessing the child's development in all aspects. 2) Regular assessment of the individual. 3) Assessment using various methods. 4) Developmental Surveillance and Promotion Manual for promotion of early childhood development (Ministry of Public Health, 2014) or related agencies. 5) Taking the results from the developmental assessment to consider organizing activities to provide opportunities to learn and develop appropriately according to age and encourage early childhood children to have competencies in age-appropriate development. For those 2 to 5 years old ethnic children in the child development center are divided their performance into two groups: 1) children aged 0 to 3 years old (25-30 months) and 2) children aged 3 to 6 years old.

4. Method

4.1. Population and Sample Groups

The population in this research consisted of teachers, personnel, parents, and guardians of ethnic children in the child development center under sub-district administrative organizations across the country—the experiment aimed to study the effects of digital tools on ethnic children in child development centers. The development centers are from four districts of Lamphun Province, Thailand, consisting of Thung Hua Chang District, Mae Tha District, Li District, and Ban Hong District by random sampling. Thung Hua Chang and Li districts are selected. They are randomly divided into two groups: 1) the experimental group is a group that uses digital tools to assess and promote the development of ethnic children consisting of teachers, personnel, parents, and guardians in child development centers under Thung Hua Chang sub-district administrative organization, Thung Hua Chang district, Lamphun Province in 7 locations. These are child development centers in 1) Ban Hua Khua, 2) Ban Pong Daeng, 3) Ban Mae Pan Daeng, 4) Ban Sanchai, 5) Ban Nong Pha, 6) Ban Sandon Moon, and 7) Ban Doi Wong. All children in these child development centers are ethnic (Pakakenyo), and these centers are willing to participate in developing digital tools to assess and promote child development. A total of 57 persons were included in the study. The control group was used for the comparison. The development of ethnic children is evaluated and promoted according to the standard criteria of the Child Development Center. It consists of teachers, personnel, parents, and guardians in the child development center under Li sub-district administrative organization, Li district, Lamphun province, in 4 locations: 1) Ban Huai Tom, 2) Wat Phra Phutthabat Huai Tom, 3) Ban Den Yang Moon, and 4) Ban Nong Bon for 38 persons in total.

4.2. Research Tools

The research tools are steps to create and find quality as follows: interview form used for interviewing executives and teachers of the child development center. The form covers issues, problems, needs, developmental promotion, and the tools used to assess the development of early ethnic childhood. The group discussion record form consisted of 1) a group discussion record for imaginative conversations to create a framework for assessing and promoting the development of early ethnic childhood. 2) A group discussion record form for discussion forums to present applications with the teachers of child development centers and agency representatives to evaluate the digital tools in the form of applications and practical trials. 3) A group conversation record form for group conversations with parents and guardians who had tried digital tools and contributed suggestions on these digital tools.

The questionnaire used in this research consisted of two copies: the first questionnaire for experts to assess the validity of the digital tools in the form of an application on their quality and suitability, and the second questionnaire for teachers and staff in childcare centers that have tried using digital tools to assess and promote the development of ethnic children in child development centers. Child development assessment forms allow teachers to assess child development in childcare centers according to the child development assessment standard framework by constructing and determining the quality of the tools. It includes 1) studying the method of creating and interviewing forms, group discussion record forms, questionnaires, and child development assessment forms from documents, textbooks, and related research. 2) Create a data collection tool by setting guidelines and criteria for the tool's validity in the questionnaire. It consists of three assessment criteria: system usability, content, and component. The child development assessment form determines the evaluation framework in four aspects (physical, emotional, mental, social, and intellectual). All these tools have been taken to experts for content validity by using the criteria for considering the Index of Congruency (IOC) of 0.50 and above. It was found that every tool had a consistency index between 0.80-1.00 which was considered a quality tool. Therefore, these tools were accurate for collecting further data.

4.3. Research Data Collection

Data collection was conducted by the research team in 2 phases as follows.

Phase 1: Study, survey conditions, and need to analyze the context of the digital tools for assessing and developing young ethnic children in child development centers. There were three steps to proceed: 1) study documents, journals, textbooks, and related research, learning experience activities, promoting the development of young children's activities and their assessment, and the health learning of ethnic groups. 2) Analyze the condition of problems and needs to be related to the developmental promotion of young ethnic children in child development centers by interviewing the executives, teachers, and staff of the child development center in Lamphun Province. 3) Synthesize conditions, problems, and needs and analyze elements related to child health promotion to develop additional digital tools for assessing child development.

Phase 2: Develop and evaluate the use of digital tools to assess and develop young ethnic children in child development centers according to the mental engineering learning process (Nilsook & Wannapiroon, 2013). There were six steps: 1) Imagine stage: organizing a focus group forum with ethnic community representatives, administrators, teachers, local government organizations, education service area office, health-promoting hospital, early childhood education specialist, and innovative technology for developing digital tools. 2) Design stage: Creating a storyboard using brainstorming with contributing opinions and analyzing the possibilities. The design framework was based on document synthesis, field visits, and assessment standards for young children's development. 3) Development stage: A development application that can be used on smartphones in an Android operating system. This application has a list of assessments of young children's development, texts, images, sounds, and videos to promote the development of young children. The researchers proceeded to install the mobile application and check its suitability. 4) Presentation stage: The digital application was verified by medical developmental and pediatric specialists. The early childhood forum was organized to present applications to teachers in the child development center before implementing this application. 5) Improvement stage: Continuing to improve the application based on suggestions. The web application can be logged into a real host on a computer with a web browser and imported into Google Play for use on a smartphone in the Android operating system. 6) Evaluation stage: Trial the digital tool in the child development centers and assess the quality of digital tools. The effectiveness of these digital tools was evaluated.

4.4. Data analysis and Statistics

Questionnaires and assessment forms were analyzed and presented as means and standard deviations. Seeking the correlation of the assessment results between teachers in the child development center and the hospital staff (two assessors). We compared opinions on the appropriateness of child development assessment tools in childcare centers between the teachers in the control and experimental groups using the t-test analysis method. Interviews and focus group data were analyzed and presented in terms of frequency, content analysis, and descriptive analysis.

5. Results

5.1. Construction and Quality of Digital Tools for Assessing and Promoting the Development of Ethnic Children in Child Development Centers

The digital tools to assess and promote the development of ethnic children in child development centers are called "Healthy, Kids," which can access at http://healthykids.lpru.ac.th/. The quality of the application was then analyzed. The results of the validity analysis of the digital tools are presented in Table 1. The conformity index (IOC) value ranged from 0.80-1.00 for all items (Table 1). All digital tool assessment items were found to be qualified with higher accuracy than the specified criterion of 0.50 (Carlson, 2002; Rovinelli & Hambleton, 1976; Turner & Carlson, 2003).

Table 1. Result of digital instrument accuracy analysis.

Assessment items	IOC	Meaning
System usage		
1. The system has fast processing, precise, and accuracy	1.00	Usable
2. Explanations of the components on the system screen are clear	0.80	Usable
3. The system displays accurate reports and meets the needs of users	1.00	Usable
4. The main menu has a structure, elements, complete, suitable for the purpose of use.	1.00	Usable
5. The operation of the system is simple and convenient in accordance with the purpose of use	1.00	Usable
Content		
1.Assessment items are accurate and reliable	1.00	Usable
2.Assessment items cover developmental assessment of young children	1.00	Usable
3.The assessment items are clear and easy to understand	0.80	Usable
4.Assessment items are useful for assessing the development of young children	1.00	Usable
5. Assessment items are beneficial to the development of young children	1.00	Usable
Multimedia elements		
1. The screen design is reasonable	1.00	Usable
2. Appearance, size, color of letters is clear and beautiful	0.80	Usable
3. Pictures, animations, sounds, videos used are appropriate	1.00	Usable
4. The form of presenting information is beautiful and interesting	1.00	Usable
5. The layout of the menu, the icon is in an appropriate position, clear	1.00	Usable

Table 2. Correlation of ethnic child development assessment results in childcare centers between teachers in childcare centers and personnel of the health promoting hospital in sub districts.

Child development assessment	r_{xy}
1. Body	0.959*
2. Emotional-mental	0.857*
3. Social	0.951*
4. Intelligence	0.948*

Note: * Statistically significant at the 0.05 level.

Table 3. Comparison of appropriateness of ethnic child development assessment tools in childcare centers between the control group and the experimental group.

Items	Group	$\bar{x}$	SD.	T
1.Assessment forms are complete in terms of both assessment methods and child development promotion guidelines.	Exp.	4.50	0.52	7.61*
	Cont.	3.00	0.47	
2. Appropriate assessment format	Exp.	4.50	0.52	8.87*
	Cont.	3.10	0.32	
3. The information is up to date and appropriate for the assessment	Exp.	4.50	0.52	5.91*
	Cont.	3.30	0.48	
4. The system is easy to use and uncomplicated	Exp.	4.50	0.52	7.61*
	Cont.	3.00	0.47	
5. You can easily find or access the information you need	Exp.	4.50	0.52	5.28*
	Cont.	3.40	0.52	
6. Assessment results are accurate and complete	Exp.	4.50	0.52	0.98
	Cont.	4.30	0.48	
7. Able to know the assessment results immediately after the assessment is completed.	Exp.	4.75	0.45	11.03*
	Cont.	2.70	0.48	
8. Able to promote child development immediately upon knowing the assessment results	Exp.	4.56	0.51	9.53*
	Cont.	2.80	0.42	
9. Appraisal methods have a modern look	Exp.	4.63	0.50	8.13*
	Cont.	2.90	0.57	
10. Data analysis system for individual and overall assessment	Exp.	4.50	0.52	6.45*
	Cont.	3.00	0.67	
Average	Exp.	4.53	0.48	9.44*
	Cont.	3.06	0.32	

Note: Exp. means experimental group, Cont. means control group, * Statistically significant at the 0.05 level.

5.2. The Results of Using Digital Tools to Assess and Promote the Development of Ethnic Children in Child Development Centers

The correlation coefficient of ethnic child development assessment in childcare centers between teachers and personnel of sub-district health promotion hospitals was higher than 0.85, and it was significant at the 0.05 level. This indicated the high accuracy of this digital tool, which was evaluated physically, mentally, socially, and intelligently for young ethnic child development (Table 2).

A comparison of the suitability usage of the Healthy Kid application between the experimental and control groups is presented in Table 3. The results revealed that child development in the experimental group was higher than in the control group. The satisfaction usage of the Healthy Child application by teachers in child development centers is shown in Table 4. Teachers were satisfied with the application.

Table 4. Mean and standard deviation of satisfaction with digital tools to assess and promote the development of ethnic children.

Items	$\bar{x}$	SD.	Meaning
Usefulness	4.75	0.37	Very good
Suitability	4.71	0.34	Very good
Accuracy	4.75	0.43	Outstanding
Average	4.74	0.35	Outstanding

6. Discussion

The systemic development of healthy child applications using mental engineering involves six steps (Husain, 2021; Nilsook & Wannapiroon, 2013). Data analysis of problem conditions and the needs of users of accurate assessment tools was a high-quality method for developing a high-accuracy digital tool for evaluating the development of young children in childcare centers. The results of using digital tools to assess and promote the development of ethnic children in child development centers showed that digital tools had high confidence. The quality was assessed at a constant value. This may be because of the creation a framework for assessing young children based on the framework of Office of Academic and Educational Standards (2017) in the early childhood education curriculum in 2017. The early childhood development promotion Developmental Surveillance and Promotion Manual (DSPM) (Ministry of Public Health, 2014) sets standards for assessing all aspects of child development. This is an individual evaluation regularly, and assessment methods are suitable for children before using digital tools. Before implementing the Healthy Kid application, the administrator, teachers, and personnel of the sub-district health-promoting hospital shared their knowledge with the research team. This activity leads to understanding how to use digital tools to assess and promote the development of ethnic children in child development centers. Teachers and personnel of sub-district health-promoting hospitals understand and have the skills to use these tools, which can then be assessed systematically. This aligns with the idea of Office of the Civil Service Commission (2022) stating that digital technology skills are essential for today's affective skills covering four dimensions: using, understanding, creating, and accessing digital technology effectively. This digital technology will enable individuals to develop work processes to create work systems in modern organizations. After the trial of a tool to assess and promote child development between the experimental and control groups, it was found that the difference was statistically significant at the 0.05 level.

It can be concluded that assessment using digital tools is more appropriate than document assessment. According to research (Ngophol & Tepsamrithporn, 2017). The guidelines for developing the quality of child development center management in Khok Charoen Sub District Administrative Organization, Thap Put District, Phang Nga Province. It was found that the child development center still encountered problems in monitoring and evaluating teachers' performance. On the other hand, research on the development of digital tools in this study will allow teachers in every childcare center to assess the quality of young children more accurately and quickly. In addition, teachers who used digital tools had the highest levels of overall satisfaction. This is in line with the research of (Areemit et al., 2017) that has developed an application on "Khun look" to track development and screen primarily children's health.

However, the Healthy Child scale was developed to evaluate the development of young ethnic children. It consisted of knowledge enhancement on ethnic child health promotion for parents who have problems communicating in Thai. The advanced digital tools include videos that enhance parents' child development. Parents can learn with a complete understanding because they are in ethnic dialects. They can contribute this knowledge to their children through efficient communication. Therefore, the development of digital tools to assess and promote the development of ethnic children in child development centers provides teachers and young child caregivers with modern tools for assessing and promoting development. It also promotes the health of young children, including parents in the community, to ensure good health. Furthermore, agencies involved in the care and development of young children, such as sub-district administrative organizations, sub-district health promotion hospitals, sub-district municipalities, and schools, can apply knowledge about using digital tools to assess and promote the development of ethnic children in child development centers. This will be used to formulate policies of organizations and agencies for integration, promotion, and planning for the sustainable development of children's health. Recent studies have shown that digital tools can be used to enhance the development of children development (Pala & Yildiz, 2021). Using digital tools can help children develop key skills such as language, social interaction, and cognitive skills. In comparison with other studies, these findings are consistent with previous research that has examined the benefits of integrating technology in early childhood education; however, it is essential to note that the effectiveness of digital tools may depend on several factors, such as the age of children, the type of device used, and the content of the programs. While some studies have demonstrated the need for a balance between digital and non-digital activities, others have found that children who have been exposed to digital tools at an early age tend to be more proficient in technology and are more likely to benefit from them in the long run (Ngophol & Tepsamrithporn, 2017). Despite some debate, it is undeniable that digital tools can be effective in fostering the development of ethnic children in early childhood development centers. By providing a platform for interactive learning and making lessons more engaging, digital tools can help children develop key skills and prepare them for future success. As technology evolves, it will be interesting to see how educators continue incorporating digital tools into early childhood education.

Early childhood is crucial for children's development, particularly regarding social development. This is where the role of early childhood development centers comes in. The development of digital tools to assess and enhance the ethical development of children in these centers has been gaining traction in recent times. The present study explores the benefits of such tools, including increased awareness among educators and parents, better communication and collaboration, and the ability to track and monitor progress. The article also highlights some challenges and potential drawbacks of these digital tools, such as the need for specialized training, digital literacy, and privacy concerns. Despite these challenges, the potential of these tools to support the ethical development of children in their early

years is immense. Overall, developing digital tools in early childhood development centers can enhance the development of young children and provide educators and parents with valuable insights into a child's progress.

7. Conclusion

Developing a digital tool called "Healthy Kids" contributed to the index of concordance (IOC) at 0.80-1.00 in all items. This indicates that all the digital toll evaluation items are of good quality for assessing the development of ethnic children—results of using digital tools to assess and promote the development of ethnic children in child development centers. There was a high correlation coefficient for all aspects between the childcare center teachers and the sub-district health promotion hospital personnel. The suitability of the tools between the experimental and control groups, it was shown that the difference was statistically significant at the level of 0.05. Therefore, assessment with digital tools is more appropriate than assessment with documents. Teachers were also satisfied with the application's usefulness, suitability, and accuracy.

8. Suggestion

For applying the research results

1. Assessing and promoting the development of ethnic children in child development centers using digital tools, schools and parents' homes should have an environment that covers the Internet so that they can effectively conduct assessments and study issues related to the development of ethnic children.

2. Persons who use digital tools to assess and promote ethnic children should understand the system and components of the application before proceeding with the tools to assess and promote young children.

3. Teachers in child development centers should communicate, meet, and talk with parents or guardians of young ethnic children to become familiar with each other. During the implementation of this application, teachers must allow parents or guardians to generate ideas and discussions about their usage in health child applications.

For further research

1. There should be research on the development of digital technology tools for use in other fields to support education for ethnic students and reduce inequality in education.

2. There should be continuing research on managing child development centers using digital technology, especially the skills needed in the 21st century.

3. The factors affecting the use of digital technology in student/ethnic groups should be studied.

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