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The Development of Digital Knowledge Sets for Child Development First 1000 Days

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Abstract

The objectives were 1) to study the current condition, problems, and needs of digital knowledge sets for child developmental promotion during the first 1,000 days, 2) to develop digital knowledge sets for child developmental promotion during the first 1,000 days, 3) to evaluate digital knowledge sets development for mother's family for child developmental promotion during the first 1000 days. This study is Research and Development (R&D), divided into 4 phases namely, qualitative data collection from observations, semi-structured interviews, and in-depth interviews. Analyzed data by interpreting and using a questionnaire to collect quantitative data, descriptive analysis with average, percentage and standard deviation.

The results found that:

1. Digital knowledge sets for child developmental promotion during the first 1,000 days of Ko Phlapphla community are characterized by handbooks, e-books, websites, social media, and the need for digital knowledge.

2. The development of digital knowledge will use a digital platform consisting of applications, line, and web apps, able to bridge the gap between knowledge, accessibility, comprehension, can be practiced, and promote child development to age.

3. Digital knowledge sets during gestation; this will help create comprehension to mother's family until be able to take care or observe herself if found abnormality during pregnancy. Digital knowledge sets for infants aged 0-12 months; this life stage is a life stage that changes quickly so developmental stimulation is important. Developmental assessment through web applications to collect data, which allow mother's family and officers of the Health Promoting Hospital can retrieve data for child developmental surveillance throughout this life stage, and digital knowledge sets for toddlers aged 13-24 months; this life stage is a life stage that requires developmental surveillance to reduce risks, mother's family can self-assessment if found abnormality then can consult doctors or officers of the Health Promoting Hospital to solve the problem in a timely manner.

Keyword: Digital Knowledge Sets; Child Developmental Promotion; First 1,000 days

Introduction

The situation of Thai early childhood development tends to decrease and is lower than the target of the country's integrated plans for human capital development based on each age. The situation report on Developmental Surveillance and Promotion on Early Childhood in the fiscal year 2021, found that 1,187,875 children, accounting for 72.50% were proper developmental, 450,417 children, accounting for 27.49% were suspected of delayed developmental, therefore, 400,384 children with suspected of delayed developmental were sent to get developmental

stimulation within 30 days, resulting in children with proper developmental increased to 1,584,515 children, accounting for 96.70% (Department of Health, 2021) also, the situation of Covid-19 pandemic affected people of all ages, especially early childhood aged 0 - 5 years, which is a life stage that needs developmental promotion and stimulation properly on age with various factors such as place but they have to stay in the house, limited the outing and going to hospital due to fear, resulting in the communication of child development knowledge between parents and health personnel was not as good as it should be. For nutrition; staying at home for a long time may have to eat the same menu repeatedly, resulting in incomplete nutrition and contributing to the children's nutrition is not complete as well.

Factors associated with child development include maternal and paternal factors, child factors, caring during pregnancy, environment, and health officers should place importance on child developmental surveillance and screening each age by using appropriate and correct screening instruments (Nuengruetai K., Bhunyabhadh C. and Somkiattiyos W., 2018). Due to Covid-19, it was found that the internet usage behavior of Thai people in 2021 averaged 10 hours and 36 minutes per day which the number one online activity was online communication, followed by watching television programs, video clips, movies, listening to online music, and searching for information respectively (Electronic Transactions Development Agency, 2021). Learning based on interests, needs, opportunities, readiness and potential for learning through online communication via Web, Page, Line, Facebook and Youtube resulted in the elderly gain knowledge and skills in way of life (Wilaiwan I., 2021), which most are child caregivers.

Knowledge about child developmental promotion and comprehension of children's conditions in each age is an important basis for human development to be quality people as an important resource of the country in the future. A woman's preparation during pregnancy and after childbirth until child is 2 years old, can determine human health in the future by mother, father, intimate people who are related by blood and surrounding people including health personnel which coexist under beliefs, values and social culture affects child developmental. Knowledge of child care has been transferred from generation to generation. Researchers developed digital knowledge sets for child developmental promotion during the first 1,000 days for mother's family and interested parties have knowledge, comprehension, and use them as a guideline for properly and effectively child developmental on age.

The objectives were**;**

1. To study the current condition, problems, and needs of digital knowledge sets for child developmental promotion during the first 1,000 days.
2. To develop digital knowledge sets for child developmental promotion during the first 1,000 days.
3. To evaluate the development of digital knowledge sets for child developmental promotion during the first 1 0 0 0 days for mother's family.

Research Methods

This study is Research and Development (R&D) which researchers defined the research step and process by divided into 4 phases as follows:

Phase 1: Study the current conditions, problems and needs of digital knowledge sets for child developmental promotion during the first 1000 days.

Step 1 : Study the current situation, problems and needs of digital knowledge sets of Ko Phlapphla Health Promoting Hospital, including taking care of the mother's health that affects child developmental during the first 1 ,0 0 0 days by using an Ex-Post facto designs of mothers who passed child care experience, collect data by observation, focus group, in-depth interview by entering the area under the responsibility of Ko Phlapphla Health Promoting Hospital, Mueang District, Ratchaburi Province and then applied with data on child developmental of new born, infant aged 9 months, and toddlers aged 1 8 months.

Step 2: Create an involvement in the production of digital knowledge sets for child developmental promotion during the first 1,000 days by introducing itself with sincerity, build familiarity with naturally through the kinship then moved to the main organizational

structure. Brought acquired and existing information to analyze until seeing the critical problems of using or accessing digital knowledge sets for child developmental promotion. Researchers collaborate with mother's family, intimate people, VHV and Ko Phlapphla Health Promoting Hospital for lesson learned, analyze, synthesize and draw conclusions from the lessons then jointly write content and produce digital knowledge sets for child developmental promotion during the first 1,000 days.

Researchers used Theoretical Sampling to find the Key Informant by searching for people who have highly experience, fist-hand experience, able to suggest or guide, with practical skills that are evident in that field, which are specific abilities appropriate to community's conditions both medical and explicit knowledge for mother's family, 3 groups of key informant namely, family, experienced mothers, VHV and officers of the Health Promoting Hospital.

Researchers brought audited data from focus group to organize categories then analyzed by linking the factors from existing information to the phenomena that occur and analyze the effects that arise from those factors and phenomena with different steps systematically. Using time, situations, events to participate in the process of accepting and developing innovations by innovation evaluation which researchers used Miles and Huberman's Analysis Criteria (Miles, MB, & Huberman, AM, 1994), which proposed data analysis into 3 steps namely Data Reduction, Data Display, and Conclusion Drawing.

Step 3: Review papers from concept, theory, and further relevant research to be used to design, create and develop digital knowledge sets for child developmental promotion during the first 1,000 days that are consistent with the mother's lifestyle education information from the research in Step 1 and Step 2 . Researchers have studied the documents by checking from the list of doctoral and master's theses of various universities in Thailand by searching on the internet during 2014-2020 to expand to searching from manuscripts and journals or publications of concepts, theories, and related research both domestic and abroad to be used as preliminary information for research planning, formulating directions for research methods to help gain knowledge, comprehension about child developmental promotion in the community, child developmental promotion manual, learning, and development process of people in the community, process of accepting and developing innovations related to behavior modification decisions for child developmental promotion.

Phase 2: Design, build and develop digital knowledge sets for child developmental promotion during the first 1,000 days

Step 1 : Bring results of analysis, synthesis, documents, opinions, lessons learned, and child developmental assessment in the early stages to design digital knowledge sets for child developmental promotion during the first 1,000 days.

Step 2 : Once get the prototype of digital knowledge sets for child developmental promotion, then researchers would take the prototype to be audited by 5 experts.

Step 3 : Improve digital knowledge sets for child developmental promotion during the first 1,000 days according to expert opinion.

Phase 3: Bring digital knowledge sets for child developmental promotion during the first 1,000 days to use in the community.

Step 1: Bring digital knowledge sets for child developmental promotion during the first 1,000 days to use in the Ko Phlapphla Health Promoting Hospital, Ratchaburi Province, collect data by interviewing via online media every week and brought data to analyze and improve digital knowledge sets and evaluate the utilization of digital knowledge sets.

Researchers select a target group from mothers, husbands, and caregivers of a woman during pregnancy and newborn babies to be healthy, such as grandparents, uncles, aunts, of babies, as well as the VHV who care for baby health in the community which can read Thai. Researchers select purposive sampling.

Researchers use research instrument 2 sets which consisted of the instrument used in research methodology and instrument used to collect data.

The instrument used in research methodology is digital knowledge sets for child developmental promotion during the first 1,000 days which is divided into 3 phases namely, 1) 270 days of gestation, 2) 365 days

for infants aged 0-12 months, and 3) 365 days for toddlers aged 13 – 24 months.

The instrument used to collect data includes a form for collecting information on child development during the first 1,000 days. It is the collection of individual children's information. Data collectors include officers of Health Promoting Hospital, VHV, and mother's family. Data contains date of assessment, individual development assessment results, providing advice and monitoring through online applications, and semi-structured interviews online via a content validation check by developing a questionnaire based on literature review as well as related documents, after that, improvements were made according to the advice of 3 experts.

Data analysis; researchers divided the data analysis into 2 parts are quantitative data analysis and qualitative data analysis.

Quantitative data analysis; researchers brought the data obtained to verify the correctness, then analyzed by computer using a packaged program. The details are classified according to the data nature as follows: 1) Analyzing the personal data of the sample group and 2) Analyzing the child development data during the first 1,000 days by using the average and percentage.

Qualitative data analysis; researchers brought the data obtained from visiting the study area, observations, and interviews to verify the correctness then analyzed with data analysis in phenomenology studies and interpreting the data. The main guidelines are as follows (Phothisita, C., 2019, Streubert & Carpenter, 1995, Leonard, 1989).

1. Read the interview several times to truly understand the mood and feelings of the informant.

2. Cut off the irrelevant to the core and understand, search for key text to see the significance of the story.

3. Identify the key points, look in the records for any important observations or points, categorize the relationships as main issues and sub-issues with the same content into the same group and consolidate them into the same subject.

4. Find connections of all key points, and arrange based on rational connections because some key issues may be subordinated to other key issues.

5. Write the findings from the analysis and write a summary of the findings.

Phase 4: Assess satisfaction and dissemination in different areas.

Step 1: Bring completed digital knowledge sets for child developmental promotion during the first 1000 days to disseminate at the Nong Kop Health Promoting Hospital, Ban Pong District, Ratchaburi Province for utilization and brought back to improve digital knowledge sets to be more complete.

Step 2: Assess user satisfaction with digital knowledge sets for child developmental promotion during the first 1000 days in various areas, collect data of users with digital knowledge sets via an online system, and analyzed satisfaction by using average, percentage, and standard deviation.

Co-Researcher Right Protection

Researchers have protected the rights of co-researcher by submitting the research outline to be considered by the Research Ethics Committee No. 3/2564 from the Ethics Committee of Health Center Region 5 , Ratchaburi Province, Department of Health, Ministry of Public Health and began collecting data after approval. Co-researchers can cancel participating in the research at any time.

Results

Phase 1: Study the current situation, problems, and needs of digital knowledge sets for child developmental promotion during the first 1000 days, found that child developmental of 77 children in an area were screened by developmental surveillance and promotion manual (DSPM), 43 children (55.84) were proper developmental and 34 children (44.16) were suspected of delayed developmental. Child developmental promotion of Ko Phlapphla Health Promoting Hospital helps the mother's family to gain knowledge from using online communication via Web, Page, Line, Facebook, YouTube from listening stories from relatives and intimate people. Knowledge from VHV and public health officers will be carried out along with the vaccination appointments in children aged 2 , 4 , 6 , 9 months, and 2 and a half years by using brochures, posters, and handbooks as shown in Table 1.

Table 1: Current status of child developmental aged 0-2 years at Ko Phlapphla Health Promoting Hospital and existing knowledge for child development in the community.

Developmental	Amount (person)	%
Child developmental aged 0-2 years old		
Having proper developmental	43	55.84
Suspected of delayed developmental	34	44.16
Knowledge used for child developmental in the community		
Mother and Child Health Handbook	77	100.00
Developmental Surveillance and Promotion Manual (DSPM)	2	2.60
Brochures, Posters	11	14.29
Online Communication via		
Web	20	25.97
Page	5	6.49
Line	68	88.31
Facebook	5	6.49
YouTube	27	35.06
Knowledge from public health officers	63	81.82
Listening stories from relatives & intimate people	39	50.65

Phase 2 : Design, build and develop digital knowledge sets for child developmental promotion during the first 1 ,0 0 0 days. It is designed by taking synthesized data from the first stage to integrate as digital knowledge sets then giving to experts for checking the correctness of the content and create to be images, text, video clips, and web applications to communicate and collect data as shown in Figure 1.

Figure 1

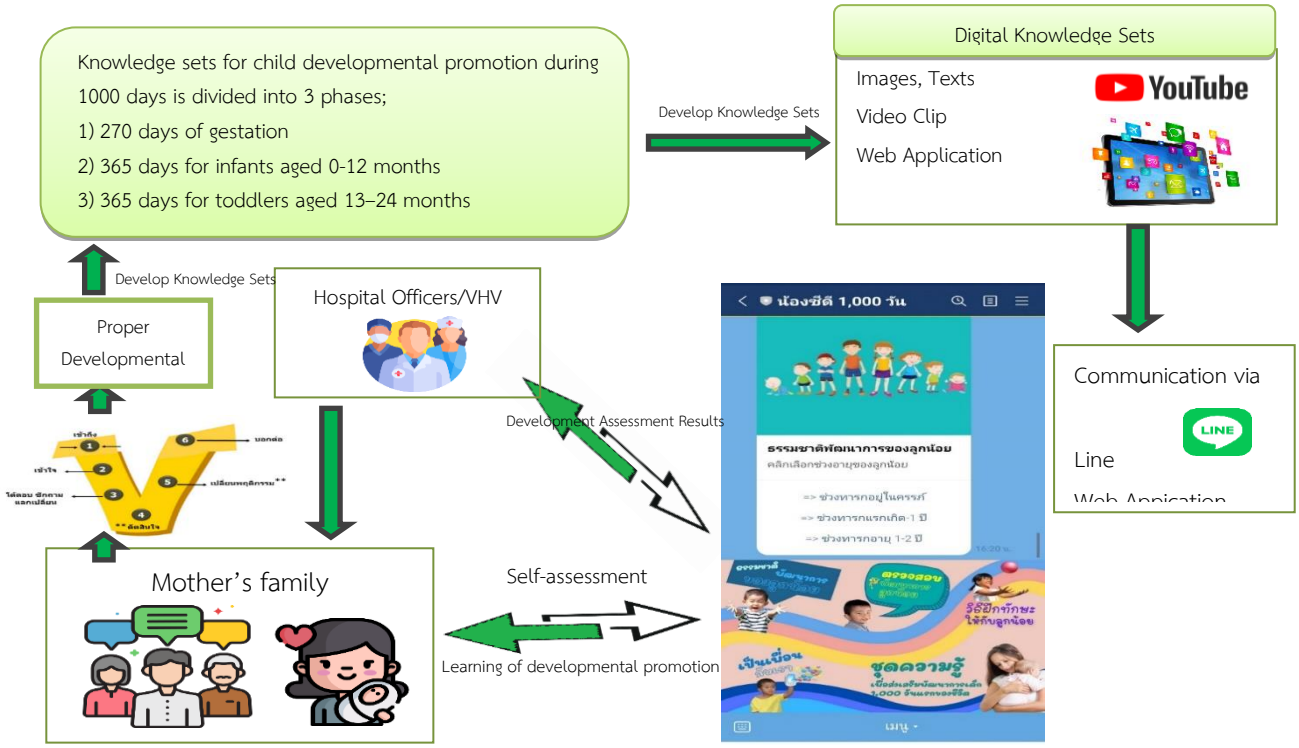

Figure 1: Structure of digital knowledge sets for child developmental promotion during the first 1,000 days.

Phase 3: Bring developed digital knowledge sets for child developmental promotion during the first 1,000 days to use in the community after that assess child development by users of digital knowledge sets and self-assessment through the system, found that 6 children aged 0-12 months were proper developmental (85.71) and 1 child (14.29) was suspected of delayed developmental due to development of language utilization and comprehension are not yet passed criteria and 9 children (81.82) aged 13-24 months were proper developmental but 2 children (18.18) were suspected of delayed developmental due to development of language utilization is not yet passed criteria.

Digital knowledge sets during 2 7 0 days of gestation, the mother's family has expectation that the child will be healthy, therefore, this innovation help solve the problem of accessing information and communicating knowledge between mothers and officers of Health Promotion Hospital because it is easy to access with Line, communicate with images, text and video clips which is widely used, able to collect mother's health information through web application, having comprehension, able to do self-checking, able to chat about child developmental during gestation between group chat, if found abnormality during pregnancy.

Digital knowledge sets during 3 6 5 days for infants aged 0-1 2 Months, this life stage is a life stage that changes quickly so if the mother's family knows the natural development of baby by using media via Line together with web application for accessing knowledge, communicate with images, text and video clips that help to understand easier than using a manual or e-book which has functions to promote comprehension, able to assess developments through web application to collect data which the mother's family and officers of Health Promoting Hospital can retrieve data for developmental assessment and surveillance. Knowledge sets are channels of communication, stimulation and exchange, questioning amongst the mother's family for baby developmental surveillance and promotion the development to have a proper development throughout the ages.

Digital knowledge sets during 3 6 5 days for toddlers ages 13 - 24 months, toddlers require developmental surveillance if knowing late, it will cause the child to miss the opportunity or may miss it for the rest of own life. Digital knowledge sets will help manage and reduce risks, mother's family can self-assessment, if found abnormality then can consult a doctor or officers of the Health Promoting Hospital in a timely manner, such as language development, if the child is still unable to speak, shall send a video or audio clip to officers of the Health Promoting Hospital, and once officers assessed that there is a risk so can solve this problem in a timely manner.

Phase 4: Assess satisfaction and dissemination in different areas, it was found that the satisfaction in using digital knowledge sets was at a high level. When considering each aspect, it was found that being an intelligible knowledge source (4 .6 5) was at the highest level, followed by convenient to use and easy to access (4 . 6 4) , being beneficial to the mother's family (4 . 5 9) , being beneficial to public health personnel and VHV (4 .5 2) and application of digital knowledge (3 . 8 4) , respectively, as shown in Table 2.

Table 2; Showing satisfaction level of digital knowledge sets users for child development first 1,000 days.

Satisfaction Level	$\bar{x}$	SD	**Impression Level**
Being an intelligible knowledge source	4.65	.3863	Highest
Convenient to use and easy to access	4.64	.3836	Highest
Being beneficial to the mother's family	4.59	.3571	Highest
Being beneficial to public health personnel and VHV	4.52	.4727	Highest
Application of digital knowledge	3.84	.4645	High
Total	4.45		High

Discussion

In today's world, knowledge transfer takes many forms; innovation of digital knowledge sets for child developmental promotion during the first 1,000 days is necessary digital knowledge sets through communication on a digital platform which is easily accessible, interesting, easy to understand, including practicable under mother lifestyle, be able to surveillance and promote for child developmental properly. Digital knowledge sets during gestation; this will help create comprehension to mother until be able to take care or observe herself if found abnormality during pregnancy. Digital knowledge sets for infants aged 0-12 months; this life stage is a life stage that changes quickly so developmental stimulation is important. Developmental assessment through web applications to collect data, which allow mother's family and officers of the Health Promoting Hospital can retrieve data for developmental surveillance throughout this life stage, and digital knowledge sets for toddlers aged 13-24 months; this life stage is a life stage that requires developmental surveillance to reduce risks, mothers can self-assessment if found abnormality then can consult doctors or officers of the Health Promoting Hospital to solve the problem in a timely manner.

Suggestions

This study made researchers aware of the problems and guidelines for the development of digital knowledge sets for child developmental promotion during the first 1,000 days and used as a guideline for effectively developmental promotion of this children group in further, details as follows:

1. Public health departments at the level of district and sub-district should place importance on implementing digital communication innovations for child developmental promotion during the first 1,000 days to apply for advantage thoroughly.

2. Public health departments at the level of provincial and region should promote policy-oriented and support to use of digital knowledge sets for child developmental promotion during the first 1,000 days.

3. Should provide research and development of digital knowledge sets for child developmental promotion at kids aged 3-5 years in further.

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