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Development of Work-Based Learning Skills Bank to Enhance Learning and Innovation Skills on Early Childhood Education for Caregivers

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Abstract

This study aims to develop work-based learning skills bank to enhance learning skills and innovation in Early Childhood Education (ECE) among the caregivers under the Department of Local Administration. It focuses on shaping the direction of caregiver's development according to the existing environment. A caregiver means a person taking care of children aged 2-5 in their local area at daycare center under the Department of Local Administration. The study includes the analysis which is drawn from the Confirm Factor Analysis (CFA) to determine the factors of work-based learning skills bank. The sample group comprises of 10 experts in ECE and technology, and 1,467 caregivers which were selected from a total population of 46,673 through multi-stage sampling. The qualitative data was collected from the experts by the semi-structured interview, and content analysis. Then, the questionnaire on Work-Based Learning Behavior was used to acquire the quantitative data from the caregivers with reliability 0.945. according to the first order confirmatory factor analysis. The study found five factors of work-based learning skills including (1) technology, (2) knowledge, (3) learning activities, (4) outcome analysis and evaluation, and (5) work. The results showed that each factor had its key indicator and each one has resonated with the empirical evidence according to the Goodness of Fit Index (GFI). The GFI revealed that the chi-squired value of 0.04 and relative chi-squared value of 0.04. The standardized factor loading of each factor and factor indicator ranged between 0.756-0.936 and 0.436-0.936, respectively.

Introduction

"Caregiver" means a person who is taking care of and providing education for young children aged 2-5 in his/her local area at daycare center under the Department of Local Administration, Ministry of Interior (Thailand). According to the recent record, the caregivers and daycare centers amounted to 46,673 and 19,472 nationwide, respectively (The Department of Local Administration, 2015). The caregivers have been seen as a crucial factor for the development of young

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children and daycare centers countrywide. They play an important role and exerted the influence in ECE provision to produce the future quality of Thai citizens. The fast changes in global and social environment has been driven by the advanced technology and has demanded the knowledge enhancement among the caregivers consistently.

As mentioned above, equipping the caregivers with learning and innovative skills leads to the sustainable development. Some groups of caregivers have limited opportunities in personal development due to their budget, transportation, and time span. The problem of deficiency in teaching skill has been alleviated, yet prevalent. Bhulpat (2014) found that the significant problem among the caregivers was rooted from the deficiency in teaching skills to enhance learning and development of young children. This is particularly in provision of learning experience or the use of complicated media. From a total number of 2,389 supervisors of caregivers, the result showed that the caregivers' ability in applying technological media and innovation in educational and cultural contexts was ranked at 11th and the ability in developing media and innovation covering electronic media and media applied from the local materials was ranked at 12th (Suan Dusit University, 2016). These survey results identified the caregivers' weakness which has persisted since 2014, and the issues will require sustainable solutions. As a result, it can be said that the media and innovation are the keys to young children's development requiring urgent improvement.

In this era, technology plays an essential role in creating learning innovation that enables the caregivers to learn technology while working at the daycare centers. The use of technology for the caregivers' development can be seen as a significant matter to be carried out and to keep pace with the ECE's changes in the 21st century. As these skills are considered factors of successful work, the research team is determined to investigate the development of work-based learning skills bank. It is anticipated that the contribution of this research will enhance the caregivers to equip them with their work skills and fulfill their personal needs.

Objective

The objectives of this study are divided into two phases including (1) to explore the work-based learning skills bank, and (2) to develop the skills of learning and innovation on ECE for caregivers.

Literature Review

1. Work-based learning

Work-based learning is the main pedagogy which is used for the learning design in this study. Raelin (2008) proposed the work-based learning model as the framework which is applied from Kolb's Experiential Learning Theory (1984). Raelin presented the tripartite model with two bases which is; a) the learning model that contains theory and practice, and b) learning format. The learning format contains tacit knowledge and explicit knowledge. The order of activity is focused on the task which started from individual learning level to the learning format in line with the action frame, and then extends to the collective learning level with the colleagues. (Raelin, 2008). The main objective of work-based learning is to create professional skills and to allow the learners to acquire the self-directed-learning methods leading to life-long learning. The work-based learning focuses on learning from work, tasks, interaction with colleagues, self-reflection, and the process such as the steps of work as employees (Murtazin et al., 2020). According to, Prasertsin (2021) who recommended additional components which are (1) redefining job description for teachers and eliminating unnecessary task that would affect the teaching preparation period, (2) matching subjects and knowledge expertise of teachers, and (3) continuously developing teaching materials and understanding of them through constant training, open discussion, and brain-storming among colleagues. While, Haruna and Kamin (2019) identified the policy, fundings, attitudinal and linkage as the challenging factors undermining effectiveness of work-based learning.

2. Skills bank

Skills bank refers to part of an evaluation of the experience of work-based learning to develop competence (Hatfield, 2007). The work-based learning displays the competency reflected through skills, knowledge, and work process called "professional training" (Durannt et al., 2009). Skill development modules are new roles as evidence of staff development via work-based learning, there are many skills that can be designed and the quality of design vary. The construction of a protocol for the skills bank: definition of a skill, location of the bank and access, integration, and the ownership of new skills. The protocol highlights the need for the assessor to comply with definitive course document requirements for practice assessment (Hatfield, 2007). In case of skills bank, a work-based learner might

select a skill set that they need (Durannt et al., 2009; Hatfield, 2007).

The skills bank has been identified as a case study of higher educational institution that responds to the issues of professional skills development. The skills design is articulated to competency and content by using the template which identifies the authorship and boundary of skills to be trained in the form of skills development modules.

The boundary covers the following keys; (1) Essential knowledge and (2) operational explanation. Firstly, essential knowledge can be seen as the knowledge supporting operational skills which is academically accepted and confirmed with the operational experts and/or confirmed with the relevant evidence. The important direction is being monitored by Thailand Qualifications Framework (TQF) and the Teachers Council of Thailand; the direction would be integrated and referred to as the knowledge to be acquired. In the second key, the operational explanation refers to the explanation which identifies the step-by-step action of learners or "method". The skills design according to the evaluation would depend on the specific curriculum and appropriate training (Hatfield, 2007). Felce, Perks, & Roberts (2016) have identified the steps of skill development in the form of work packages i.e. (1) Identify skills need requirements, (2) Design and implement a training center to meet skills needs, (3) Management Development Program, and (4) Development Program.

3. Mobile app design for teaching and learning

Connecting the knowledge with real experience is the concrete action to build up learning retention, and enhance personal lifelong learning skills. At the same time, the rapid advancement of the mobile and computing technologies along with abundant mobile software applications make ubiquitous mobile learning possible. The innovation in mobile apps has raised interests among educators to support their work as it can facilitate their teaching plans and learning provision (Johnson, Adams, & Cummins, 2012). Hsu and Ching (2013) investigated the study of Mobile App Design for Teaching and Learning: Educators' Experiences for an online graduate course that focused on their own design work and creative problem solving were inspired by the customized mobile apps shared by peers. The learning activities, including sharing customized apps, providing peer feedback, composing design proposals, and keeping design journals (blogging), complemented each other to support a positive sense of community and form a strong virtual community of learning mobile app design. Later, Al-Harrasi, Al-Khanjari, & Sarrab 2015) proposed the direction of designing mobile learning application which states three important phrases including (1) starting dimensions (SD), (2) M-Learning Development (MLD), and (3) Learning Content Design (LCD). The objective is to create learning materials matched with the smartphone's special properties and responding to individual users. The design of content in this study has been integrated with microlearning principles, which are modern learning concept, focusing on formulating the bite-size content or chunks called 'Nuggets'. Bezhovski and Poorani (2016) asserted that the concept enables learning completeness because of easy access, particularly suitable for mobile learning. Its format is in line with the behaviors of learners having limited time (Gassler, Hug, & Glahn, 2014).

4. Micro-learning

Micro-learning stands for any pedagogy encouraging learning in short segments, and it can be supported through many platforms (Major & Calandrino, 2018). Mohammed, Wakil and Nawroly (2018) implemented microlearning tools i.e., playing and activities, short tutorial video, flashcards, posters infographics, and telling stories to arrange learning activities for the graduate students. They found that the students' capabilities increase by 18% compared with those with traditional learning. The students memorized the information efficiently and it was in long-term memory. Park and Kim (2018) noted that the points that need to be considered for microlearning improvement. The points include (1) when a course is planned, (2) when the contents are designed, (3) the diverse and complicated technologies, and (4) managing micro-learning contents. Jomah, Masoud, Kishore and Aurelia (2016) found that micro-learning concept based on mobile web learning can be used for knowledge acquisition and skill growth irrespective of diverse subjects.

5. Learning skills and innovations for the caregivers

Learning and innovative skills are important for both the caregivers and learners in the 21st century. This can be seen from Paiwithayasiritham (2014) who analyzed the factors of learning and innovative skills in the 21st century among the teacher training students. The research outcomes revealed six important factors i.e. (1) exchanging opinions and co-decision making, (2) innovation, (3) connecting ideas, (4) communication and collaboration, (5) rationality, and (6) diverse

resolutions.

In terms of continuity of professional development, Paison, Chookhampaeng, and Jansang (2015) pointed out Professional Learning Community (PLC) that focuses on learning skill and teacher's innovations, workshop-related activities, classroom research, and seminars. The behavioral indicators were identified i.e. reasoning ability, analysis and evaluation on methods used in decision making and judging, resolving problems, scaffolding, doing creative work with others, being creative and using innovative communication in both verbal and written forms, and collaborating. These factors enable the caregivers' development to create learning materials and innovation underpinned by work-based learning skills bank.

6. Work-based learning skills bank

The research team has developed work-based learning skills bank by drawing upon the aspects of work-based learning, skills bank, mobile app design for teaching and learning, and micro-learning to enhance learning and innovation skills for caregivers. The work-based learning skills bank concerns designing mobile application which focuses on learning and practice. The caregivers can learn necessary skills from the skills set in the system to produce learning materials.

Conceptual Framework

The concepts to enhance learning and innovation skills on early childhood education for caregivers appear as variables in the conceptual framework below. Work-Based Learning Skills Bank was used for the learning design in this study. They are also integrated with Work-Based Learning, Mobile app design for teaching and learning and micro-learning. These concepts will be linked in Learning and Innovation Skills and are shown in Figure 1.

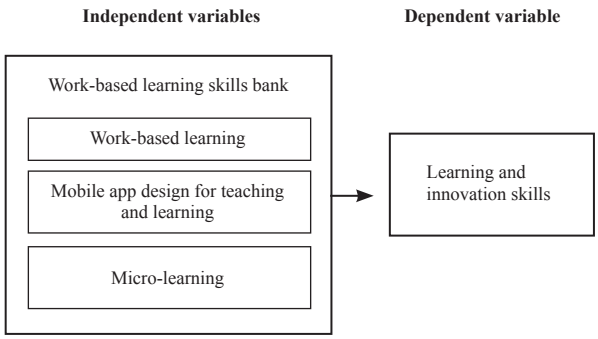

Figure 1 Conceptual framework

Research Methodology

1. Population and Samples

Scope of the population and sample group were as follows:.

Phase I: To explore the work-based learning skills bank

The experts in ECE and educational technology working in the existing environment and direction of caregivers' development embodies the experts in ECE, experts in educational technology, Director of Academic Collaboration Rormorpor Project, lecturers of Suan Dusit University in Rormorpor. Project, and network institutions, teachers, management of La-orutis Demonstration School, and management of daycare centers as the graduate users. The purposive sampling was adopted and 10 participants were selected.

Phase II: To develop the skilsl of learning and innovation on Early Childhood Education for Caregivers.

The sample group was randomized from the population of 46,673 caregivers under the Department of Local Administration. Various random techniques was applied i.e. multistage stage sampling, cluster sampling, stratified random sampling, and simple random sampling from the JAGER's Formula to acquire the sampling group of 1,467.

2. Research Instrument

Phase I: To explore the work-based learning skills bank

At this stage of the study, the semi-structured interview questionnaire was adopted (McIntosh & Morse, 2015). The researchers sought to obtain an in-depth understanding of work-based learning skills bank to enhance learning and innovation skills and its related factors from the perspective of the Thai experts in caregivers (Creswell, 2012). The data was organized in a way that increased the understanding of researchers on effective factors.

Phase II: To develop the skills of learning and innovation on Early Childhood Education for Caregivers.

Implementing quantitative research through a survey. A pilot test of survey was confirmed by experts IOC 0.82-1. The internal consistency was evaluated in terms of the Cronbach Alpha score, with values of 0.945. All the questions were based on a five-point (1–5) Likert scale which was used to assess the least to the most appropriate responses. Also, the quantitative data was collected from the caregivers by exploring their work-based learning and conducting the confirm factor analysis (CFA) through SPSS and LISREL.

3. Collection of Data

Phase I: To explore the work-based learning skills bank

Collected data from interviewing the key informants who are the experts in ECE and educational technology. The research team interviewed the participants to acquire the data concerning factors and process used for the direction of caregivers' development. This direction was applied in determining the scope and activities of the system of work-based learning skills bank, the teaching style grounded on work-based learning from electronic skills bank on ECE to enhance learning and innovation skills for the caregivers.

Phase II: To develop the skills of learning and innovation on Early Childhood Education for Caregivers.

The questionnaires were collected from the caregivers. The research team collaborated with the selected representatives, who are qualified and have mutual understanding, in collecting the data. The number of 2,000 questionnaires were submitted to the sample group during February, 20th –April, 9th 2018, along with explanation on the objectives of research and guidance on answering the questions. The number of 1,480 questionnaires were returned with answers. From verifying the questionnaires returned, the number of questionnaires completed for data analysis amounted to 1,467 or 73.33%.

4. Data Analysis

4.1 Phase I: To explore the work-based learning skills bank

4.1.1 Analyzing the documents related to the existing environment and direction of caregivers' development to enhance their learning and innovation skills on ECE, learning and innovation skills on ECE, factors of skills, and direction of skills development by content analysis.

4.1.2 Analyzing data from the interview through content analysis by considering the congruence of important points of contents acquired from the interview related to the teaching model grounded on work-based learning skills bank to develop the learning and innovation skills on ECE.

4.2 Phase II: To develop the skills of learning and innovation on Early Childhood Education for Caregivers

Conducting Standardize score (λi), standard error of measurement (SEM), statistical significance (t), square multiple correlation (R2) of confirmatory factor analysis (CFA) to verify the construct validity of work-based learning, and employing the chi-square to examine the correspondence between the model and empirical data.

Results

1. Phase I: To explore the work-based learning skills bank.

The results of interviewing the experts in ECE and experts in educational technology demonstrated the following.

1.1 The direction of caregivers' development underpinned by work-based learning to enhance learning and innovation skills.

The caregivers need to be cognitive, creative, and inspective. They must be eager to find the process to develop their imagination to become reality. They need to be equipped with creating and designing skills to develop their imagination into the teaching materials or innovation concretely.

Improvement leading to the innovation development. In general, the caregivers do not consider about the innovation development. They only developed the teaching materials to be used in their classrooms. Therefore, it is very necessary to identify the objectives of creating instructional materials. Developing the instructional materials started from "Think from the teaching materials in the classrooms to solve the classrooms' problems". Next, the caregivers should consider the instructional materials in their hands whether they can solve the problem in the first level from their current instructional materials or not. Then, they improve the instructional materials available in the markets to be able to solve more problems, rather than only one problem like the existing instructional materials.

1.2 The evidence of work-based learning revealing the obvious progress of learning and innovation skills among the caregivers should start from the skills in producing and creating the instructional materials because the instructional materials are the key of ECE. The instructional materials need to be used and they can evaluate and assess the outcomes clearly. Particularly, they can show the skills development step by step. The derived piece of work can be evaluated and assessed concretely.

1.3 The caregivers can be classified into three levels. Each level should have the capability to develop the instructional materials and innovation as follows:

Level 1: Emerging. The caregivers can develop the instructional materials from copying. The

structure needs to be strongly monitored and the recommendations from the advisors are required.

Level 2: Expected. The caregivers can develop the instructional materials by themselves through relying on the prototype of instructional materials. The materials are adjusted according to the availability or context. The advisors give limited recommendations.

Level 3: Exceeding. The caregivers can use the local materials or develop different ways of using the instructional materials. They can transfer and disseminate their concepts to inspire the others. The work has been carried out independently with some recommendations provided.

2. Phase II: To develop the skills of learning and innovation on Early Childhood Education for Caregivers

According to the exploration on the conditions of 1,467 caregivers in total made by the research team through the survey on basic information and use of technology, the survey revealed that the majority of informants was female, aged 31-40. Most of them worked at the daycare centers under the Department of Local Administration, followed by the second largest group working at the daycare centers under the sub-district office. Thay have 6-10 years of experience. They have less than 5 years of experience in using technology. The device in use is smartphone.

The results of analysis on factors of work-based learning skills bank show that the model's confirmatory factor analysis is congruent with the empirical data. The model fit indices are $\chi 2$= 0.04, df = 1, p-value > .05; Relative $\chi 2$= 0.04; GFI = .99; AGFI = .99; RMR = .00; SRMR = .00; RMSEA = .00; NFI = .99; CFI = 1.00; NNFI = 1.00. The skills bank consists of five key factors 1) technology, 2) knowledge, 3) outcome analysis and evaluation, 4) work, and 5) learning activities. The standardize score of main factors ranges between 0.756-0.936. The detailed analysis is represented in Table 1.

Table 1 Standardize score (λi), standard error of measurement (SEM), statistical significance (t), square multiple correlation (R^2) of confirmatory factor analysis (CFA) of the elements of skills bank (n = 1467)

Skills bank	Standardize score (λi)	Standard error of measurement (*SEM*)	statistical significance (*t*)	Square multiple correlation (R^2)
TN	.756			.572
KL	.756	.032	33.982	.572
AE	.853	.028	31.565	.727
WL	.936	.033	32.982	.876
LA	.796	.036	28.439	.634

According to the first order confirmatory factor analysis of work-based learning skills bank for the caregivers' development on their learning and innovation skills, under the Department of Local Administration in Table 1, the researchers concluded the results drawn from the factor analysis as shown in Figure 2.

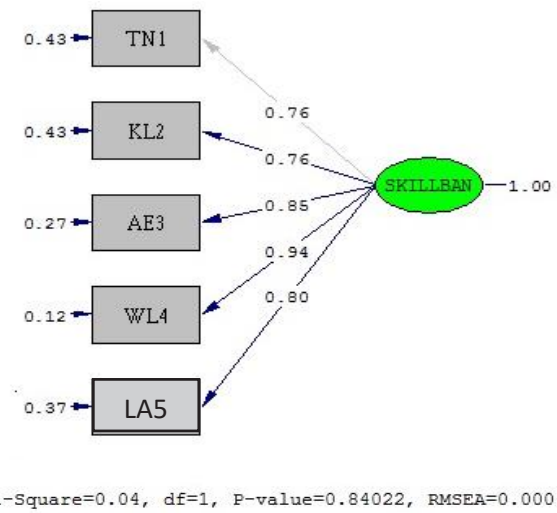

Figure 2 Factors of work-based learning skills bank

The results consisting of caregivers' conditions and directions of their development have been analyzed with the data from confirmatory factor analysis. It was found that the work-based learning skills bank for the caregivers' development on their learning and innovation skills under the Department of Local Administration involves five key factors as displayed in Figure 3.

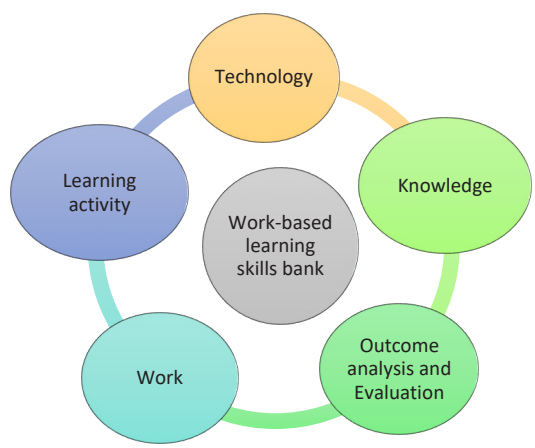

Figure 3 Factors of the work-based learning skills bank for the caregivers' development on their learning and innovation skills under the Department of Local Administration.

The five key factors consist of the following details.

1. Technology. It is technology facilitating caregivers' learning underpinned by work-based learning skills bank which consists of the minor factors: (1) search engines, (2) online and electronic databases, (3) online journals, (4) content learning, (5) data acquisition, (6) data analysis tool, (7) collaboration tool, (8) communication tool, (9) learning log, and (10) updates.

2. Knowledge. It covers the principles and approaches that may arise from the transfer of experience from the experts, documents, documentations, learning resources, or schemata created by self-directed learning of the caregivers.The knowledge consists of (1) thinking systematization by diverse approaches (2) data presentation (3) concept transfer by electronic media (4) idea summary from work (5) exchanging of opinions (6) knowledge management (7) analysis of case studies or prototypes (8) storage and collection of knowledge, and (9) documentations.

3. Outcome analysis and evaluation. This mean searching for the causes, factors identified by splitting knowledge into parts. Each part of knowledge is investigated in order to manage the outcomes. The outcome analysis and evaluation consist of (1) seeking answers or direction of resolution of work, (2) initiating new ideas, (3) stepwise planning, (4) selecting the study or learning resources corresponding to the personal interest, (5) comparing information for work development, (6) seeking concepts, principles, instructional materials, and innovation in ECE, (7) following up and correcting work, (8) evaluating quality of work, (9) concluding data from numerical analysis or IT related to work.

4. Work. This means performing or creating work according to the assigned framework. This work covers individual actions and collaboration under its framework and operational period as required. It consists of (1) situations or urgent problems in work, (2) evidence supporting work, (3) answers or resolutions, (4) opinions provided by friends and experts, (5) group work, (6) targets and plans, (7) performance, (8) brainstorm, (9) publicity and presentation, 10) recommendations.

5. Learning activities. The learning activities refer to practices leading to the knowledge attainments of caregivers. They are comprised of (1) application of knowledge to solve problems in the communities or local areas, (2) participation of community members in the activities or work, (3) selection of local wisdoms for work development, (4) activities to exchange knowledge and create learning with the communities, and 5) articulation of ECE issues from the local to global levels.

Development of learning and innovation skills for the caregivers should be proper with their learning abilities. The factors enhancing the caregivers' development in learning and innovation skills, are listed below.

1. Having fun. It starts from the caregivers enjoying their ideas and then create the piece of work. Thinking needs to rely on theme and the outcome should be expected clearly.

2. Thinking from their work. Their work should be sculpted, added, and innovated concretely.

3. Development of learning and innovation skills have the following patterns and levels.

Pattern 1: Creating the instructional materials by adding the designs into the existing ones according to the caregivers' contexts.

Pattern 2: Creating the instructional materials following the existing models, but replacing the materials in the prototype with the local materials.

Discussion

According to the findings, the research team can draw the main conclusions as follows:

The innovation of work-based learning skills bank to enhance the learning and innovation skills on ECE for the caregivers has been developed from Thailand's contexts. The conditions found are lack of competency, concepts to be connected, and principles of ECE aligned with work in the daycare centers, particularly the development of instructional materials or innovations to be used for their contexts. The findings comply with the research of Bhulpat (2011) which sheds a light on the lack of knowledge in providing learning experiences or using the complicated instructional materials. The lack of personal development among the caregivers aligns with the study conducted by Chuensuksomwang and Charuchainiwat (2014)

Similarly, Chuensuksomwang and Charuchainiwat (2014) who stated that the average of practice to enhance the competencies among ECE's teachers in the real and ideal environments shows the significant statistical differences of .01. Due to the limitations of caregivers caused by the limited time and their presence in the classroom which hinders them from attending trainings or classes in the normal system, Janthon (2013), it is needed to develop the learning format relying on the

technologies to reduce the gaps. This concept is in line with the study titled the Educational Management Model for Caregivers on the Basis of Work-based Learning Concept (Nichanong, Janthon, Sakulrattanakulchai & Panjamawat, 2018), and Work-Based Blended Learning and Technological Scaffolding System to Enhance Communication Skills for Caregivers (Janthon, Songkram, & Koraneekij, 2015). The studies found that the model is appropriate for the caregivers in Thailand. Thus, the research team proposes the innovation of work-based learning skills bank to enhance the learning and innovation skills on ECE for the caregivers. In this regard, Hatfield (2007) and Felce, Perks, and Roberts, (2016) have identified that the skills bank is suitable for the development of professional learners. The innovation in this research presents the five key factors of work-based skills bank which are aligned with the caregivers in Thailand involving (1) technology, (2) knowledge, (3) outcome analysis and evaluation, (4) work, and (5) learning activities. The mobile application is selected to gather the work-based skills bank because the caregivers can use the smartphones. In spite of their limited experience in using technologies, most of them are familiar with the social media i.e. LINE and Facebook. The microlearning concepts are employed to develop the content in skills development modules, to enable learning in short period of time and easy access. The concepts respond to the behaviors of caregivers having limited time who need the flexible learning platforms including short effort, short time, and short content. After learning, they can acquire the immediate use and ease to access. The microlearning tools contain short tutorial videos, flashcards posters, infographics, and telling stories. This implementation is congruent with the research of Gassler, Hug and Glahn (2014) noted that it is available for lifelong learning. In addition, the research of Mohammed, Wakil and Nawroly (2018) mentioned that the students were excited about learning and motivated to gain more knowledge during the lessons and aids their long-term memory.

Suggestion

In this study, the research team has proposed the policy to the authorities responsible for the development of human resource involved with the care of young children or ECE by applying the innovation of work-based skills bank in the form of mobile microlearning to enhance the learning and innovation skills among the caregivers located in the daycare centers nationwide. The learning of caregivers needs to be formed as network along with recommendations provided by the ECE specialists to enable lifelong learning. This work-based learning skills bank can be used for the students registered in the normal semester by incorporating the model with the regular learning format of the higher educational institutions, and for creating the innovation to facilitate personal development in other online formats established on the bite-sized content or microlearning. This is the technology suitable for the caregivers or learners in the 21st century.

Further studies

The factors can be used on other platforms such as AI-and machine learning-based platforms. The factors can also be extended to cover parents. Parents play important role in assisting young children in online learning or for homeschooling.

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