An Overview of Knowledge Management in Early Childhood Education for Sustainable Education

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Abstract. This paper presents a review of the current trends in Knowledge Management (KM) implementation for sustainable education. The review includes critical and analytical discussions on the extent of KM at early childhood education (ECE) level. The search of the papers that were included in the review used keywords strings that are related to KM at early childhood education through three (3) phases of review processes namely identification, screening and eligibility. Content analysis was employed as data analysis method. This paper presents some recommendations for future researchers to include three (3) critical components: team work, ICT and training in KM for education to achieve a comprehensive sustainable early childhood education.

Keywords: Knowledge management, education, sustainable education, review paper.

1. Introduction

Knowledge management (KM) was introduced four (4) decades ago to support knowledge in terms of knowledge storing, knowledge communication, and facilitate and reuse of knowledge. In organizational, KM helps its fellow members to be more competitive in power, having elasticity and producing innovations. In another circumstances, KM concepts have included knowledge-based systems (KMS), organizational behaviour, artificial intelligence (Ai), information communication technology (ICT), and human resources management [1].

In a more recent instances, the aggregate trends of using technological tools in many organizations including business, industries and academic institutions is inevitable especially post Covid-19 spread. The pandemic outbreak has forced many to adapt to the new norm which is contactless communication to break the chain of the deadly disease as vaccine has yet to be discovered. However, the argument on using technological tools in learning is not new as it has been discussed to impact positively on both the instructors and learners [2], [3]. The citizens of knowledge economy era have embrace lifelong learning cultures so that they are updated with the current demands of twenty-first century knowledge workers [4]. Regrettably, many academicians refuse the technology application in KM in their instructions due to several hindrances which will be discussed in this paper.

This paper attempts to address the implementation of KM in education at early childhood education (ECE). This review will also discuss the recommendations for KM in the related education institutions for sustainable education. To achieve all the objectives of the review, this paper is guided by these following research questions:

1. How KM in early childhood education is being implemented?

2. What recommendations are proposed to implement KM for sustainable early childhood education?

2. Knowledge Management in Learning

The new directions of including KM in academia has been growing [5]–[7]. The inclusion of KM offers positive impacts such as systematic management for all the school's educational purposes and lifelong learning cultures. The systematic management of school's activities requires both effective human resources, as well as science and technology equipment. On top of that, due to the complex knowledge growth, the need to include KM in the teaching and learning has escalated which is in line with the increasing trends of ICT integration in the teaching and learning [8]. In understanding the role of KM in teaching and learning, several general concepts in KM were discussed previously: Santo [9], Nodine and Petrides [10], and Sallis and Jones [11]. In general, there are four (4) processes of KM that are widely in consensus as in Figure 1.

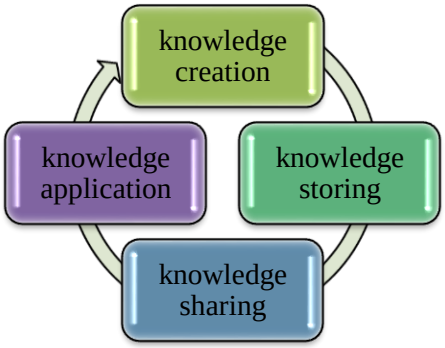

Figure 1. Four (4) processes of knowledge management.

From the four (4) processes involved in KM, an Educator's Knowledge management competency model (EKMCM) that comprises of sixteen (16) items is developed [12] as in Table 1.

Table 1. Educator's Knowledge management competency model (EKMCM).

Knowledge generation	I acquire information regarding teaching and learning through…	experiences shared by other lecturers collaborative effort with other lecturers open discussions internal network (intranet)
Knowledge storing	I store and retrieve the knowledge through…	information boards databases in resources rooms internal network (intranet)
Knowledge transfer	I transfer new knowledge through…	discussions in-house trainings internet briefing/meeting/workshop/conference/course
Knowledge application	I apply new knowledge in…	preparing teaching and learning lesson plan. implementing teaching and learning activities in the classrooms giving tasks to students improving teaching and learning process presenting lessons

3. Methodology

The literature review processes underwent three (3) phases namely identification, screening and eligibility. In the identification phase, the search of the papers to be included in the review used keywords strings that are related to KM at ECE. The search of articles was conducted on two major databases namely Springer and Scopus alongside with another web-based academic search engine which is Google Scholar (GS) [13]. Only studies published in English for the past two (2) decades (year 2000-2020) were included. Then, in the screening phase, only the studies with full papers that were retrievable were included to be reviewed. Any review and meta-analyses studies were also excluded for the review. Lastly, any papers that do not fulfil the eligibility criteria were excluded in the review.

3.1 Data Analysis

In reviewing the articles this study used content analysis [14] to describe the trends of KM implementation at early childhood education level. During the review process, the discussion was directed to the following: (1) types of ECE institution, (2) types of data collection method, (3) sample selection and region studied.

3.2 Papers selected for the reviewing process

After the three (3) phases, only ten (10) papers were finalised to be reviewed as in **Table *2***. Some of the papers were disregarded because of the type of publication is review papers, the papers are not available in English language and the full version of the papers were not retrievable. Besides that, after reading the abstract and the full paper of the research, some papers worked on knowledge management at industrial institutions, higher education, secondary education and primary education which are not related to ECE.

Table 2. Previous studies on knowledge management conducted at early childhood education level.

Author & Year	Source	Type of ECE	Data collected	Sample	Country
Chaijeena, 2008 [15]	Humanities, Arts and Social Sciences Studies	Private early childhood schools	Survey questionnaires	315 participants: 105 admin-istrators and 210 teachers in 121 private schools	Thailand
Ikhsan, 2018 [16]	Majalah Ilmiah BIJAK	Franchise preschool educational institution	observation and surveys	40 parents	Malaysia
Hesterman, 2009 [17]	Knowledge Management & E-Learning: An International Journal	A small independent school	ethnographic methodology. Participant observations, semi structured interviews, and document and video analysis	17 students aged between five and six years, an early childhood teacher, one teacher assistant and one IT specialist	Australia
Maman, Sugiarti &	4th International	ECE: kindergarten	Rapid Application	89 ECE teachers	Indonesia

Ratnawati, 2016 [18]	Conference on Cyber and IT Service Management (CITSM)	(TK), play group (KB), Qur'an Education Park (TPQ)	Development (RAD) questionnaire and UML modelling in designing the web-based KM system		
Purwandari, 2017 [19]	IEEE Conference on Open Systems (ICOS)	ECE Organization	Interviews and surveys	Principals and teachers at 24 institutions	Indonesia
Forsen & Soukainen, 2020 [20]	Early Childhood Education Journal	ECE centres	an electronic questionnaire ECE leadership quality	participants were 110 ECE professionals, comprising experts, directors, teachers, and nurses	Finland
Boe & Karin, 2015 [21]	International Journal of Leadership in Education	early childhood education and care	Qualitative shadowing by investigator triangulation, contextual interviews and compiled field notes, recorded observations video	six (6) experienced formal teacher leaders	Norway
Ulber & Strehmel, 2019 [22]	Leadership in Early Education in Times of Change. Research from five continents	an early childhood centre and a primary school	Survey, observation, qualitative interviews and questionnaires	24 participants from early childhood centres and 19 primary school teachers	Germany
Furukawa, 2019 [23]	ProQuest thesis- Royal Roads University	Canadian Kindergarten to a Chinese Based Subsidiary	Case study: interviews, observations, documentation, and survey.	CEO, chairman, principal, academic leaders, teachers, business leaders, children	Canada & China
Chee Howe et al., 2011 [24]	Final year research report	Franchise pre-school	Questionnaire survey	103 participants from 12 states	Malaysia

Based on **Table *2***, most of these studies employed surveys and questionnaires as a method for data collections. The countries involved in the studies include China, South East Asian countries such as Thailand, Malaysia and Indonesia, European countries such as Finland, Norway and Germany as well as Western countries namely Canada and Australia. More discussions on the implementation of KM at these ECE institutions at various countries from different continents will be elaborated in the following sections.

4. Knowledge Management in Early Childhood Education (ECE)

Quality early childhood education is important for children's cognitive and emotional development. This will enable the children to be a functional society member that will help to contribute to the future national revenues. The following sections will review these selected studies according to the four (4) process of KM: (1) knowledge creation, (2) knowledge storing, (3) knowledge sharing and (4) knowledge application.

4.1 Knowledge creation

The strategies involved in knowledge creation when it comes to teaching and learning are acquired from shared experiences by other instructors, networking with other educators through collaborations and discussions, or simply by using the internal network. For instance of Early Childhood Private Schools in Chiang Mai Province, a study [15] aimed to develop the learning organization (LO) model and users' manual, and to inspect the impacts after the implementation. It was reported that due to the poor quality of leadership and administration in some ECE centres, children's development in terms of cognitive, emotional, and psychosocial were interrupted. This situation is worrying as ECE sets as a foundation for learning for young learners. Furthermore, it is highly regarded that ECE centres should be a LO that promotes lifelong learning. Hence, to ensure that the ECE centres are following the right direction, the new LO model was developed and implemented. Positive development on the knowledge, understanding, opinion, satisfaction and attitude of the ECE administrators and teachers were observed after the new LO model was implemented.

4.2 Knowledge storing

The implementation of knowledge storing would involve the educators in retrieving knowledge from information boards, databases available in the resource centres, and the institution's internal network. For instance, Purwandari and Rusli [19] applied KM to fill in basic educational data using ICT at ECE organization in Indonesia. It is described that qualified human capital are needed to handle the knowledge that derived from various human's interactions, experiences and habits at ECE centres. For the purpose of storing or retrieve the data, a video was made to ensure that it will be accessible easily at one' convenience.

4.3 Knowledge sharing

The educators involved in new knowledge transfer by discussing, participating in in-house trainings, browsing the internet, or joining briefings, meetings, workshops, conferences and courses. However, the issues of knowledge sharing in ECE is portrayed to be linked with leadership skills of the leaders at the respective ECE centres. For example, the low quality of pedagogical since last two (2) decades in Germany still prevails even after various efforts in improving the trainings for ECE teachers. Ulber and Strehmel studied the impact of knowledge transfer during the training to explain the issues of low quality pedagogical among the ECE educators in Germany [22]. It is described that effective knowledge transfer derives from effective leadership skills in enabling a conducive environment to implement the knowledge after training. In their findings, both the leaders and educators had very low motivation of knowledge transfer. On top of that, the educators were not given proper encouragement in exploring the new methods. Furthermore, even after the trainings, the educators were not given the liberty to change their daily practiced routines. Hence, ECE leaders at institutional level should be competent to train by

equipping themselves with the needed knowledge and pedagogical skills to ensure effective and quality service of ECE at their respective centres.

In another study, Fonsen and Soukainen [20] on sustainable ECE in Finland mentioned the inclusion of quality pedagogical leadership. Having a quality pedagogical leadership skills is described as investments in capacity development of social and educational capital for learners, and academic and professional capital for educators [25]. The authors mentioned the components of the pedagogical leadership which includes: leadership of the organisation, structure of the organisation, human resource management, pedagogical leadership, knowledge management and work well-being, and leadership of self for a better and more sustainable leadership in the ECE. With proper and systematic implementation, having a quality pedagogical leadership could facilitate knowledge management and work wellbeing of ECE centres. While Maman and Sugiarti [18] promoted the use of learning system design to improve teacher's competency in ECE. These findings could be reacted to the progress of ICT evolvement in the teaching and learning and the high urgency in integration of technology in KM at ECE level.

While in Norway ECE centres, a study implemented a hybrid leadership framework to study teacher leaders' pedagogical leadership towards directing and facilitating the staff resources for knowledge sharing [21]. A significant new category of knowledge development is observed. As hybrid leaders, they are able to expands the existing leadership actions in a greater deal which moving towards a new identity of leadership that able to manage the complex and dynamic workforce at ECE institutions. One of the traits is characterized by the constant challenges in managing diversities of human resources and able to handle unprecedented situations especially when it comes to the young learners at ECE centres.

4.4 Knowledge application

In KM, it is important for the teachers to apply their new knowledge when preparing teaching and learning materials and lesson plans. This could be reflected in their teaching practices implemented in the teaching and learning activities in the classrooms. The tasks given to the students would also revealed that knowledge application is applied.

Children of the millenniums or the millennials are highly engrossed with high end technology devices in their daily lives. Hence, the practice of e-learning and KM are easily established in many institutes of early childhood. However, it is challenging for teachers who are not adopting to the needs of the millennial children in KM especially for the teaching and learning purposes [26]. It is also challenging as children have yet to be practicing KM on their own without adult's supervision. A study in western Australian schools [17] examined how KM and e-learning can support multiliteracies in ECE. The use of ICT in supporting multiliteracies for young learners is addressed in the study by showing the possibilities of socially constructed environment in enriching the children's multiliteracies experiences.

Other discussion on KM application for instance, Ikhsan [16] studied the KM implementation among the top franchisor of Islamic pre-schools in Shah Alam, Malaysia. In ensuring sustainable franchise system operation of pre-school, KM application should be maximized and this can be achieved by having good environment that foster: knowledge creation, storage, transfer and application between all affiliates in the franchising network. The franchise system that are equipped with KM systems have benefited the ECE administrative works as well as preferred by many parents of the proven results in their children's essential development. Furthermore, the case of Malaysian franchise pre-schools, leadership is the most significance organizational factor that affects KM implementation. Other related factors are knowledge process, culture, structure of organization as well as human capital.

5. Discussion

This paper may lead to better understanding on the overviews of KM execution in multiple ECE institutions in several countries such as Malaysia, China, Canada, Thailand, Indonesia, Australia, Finland, Germany and Norway. This review highlights the importance of understanding KM that are currently needed due to the Covid-19 pandemic outbreak. The main challenges are due to the refusals and rebuttals in equipping one's familiarity in KM which may impacted the teaching and learning

patterns when both educators and learners are home bound due to the enforcement of isolation policy as a pandemic control measure.

5.1 Technology paving the road to innovation in learning and teaching

Here the potential of technology in ICT for KM at ECE levels are demonstrated for these purposes: (1) leadership management, (2) assessment of students' learning, (3) the use of educational resources and (4) medium of communication. For instance, the introduction of ICT in teaching multiliteracies in a Western Australian school has shown positive impacts towards the children's development. Furthermore, the integration of ICT in the four (4) processes of KM at ECE levels is highly recommended if sustainable education in the ECE centres is desired. Furthermore, the integration of technology in KM is getting more popular as technology is highly regarded as the enabler towards KM implementation [27]. Some of the discussions in the past studies comprised the promotion of a strategy model for e-learning and technology assisted KM assessment, the possibilities of innovation towards learning and teaching experiences, and advancements of communication technological tools that increased the chances of better and quality KM in ECE.

5.2 Teacher professionalism and human resources development

The discussion on the need to develop educational human resources is explicitly explained in preparing for the twenty-first century workforce. Harris [28], for instance, stresses the importance to prepare the professionals and managers in managing the knowledge culture. Similarly, in Petrides and Guiney[29] presented the idea to ensure that school leaders are capable to enforce KM in their particular institutions. In a much recent study, the importance of developing teacher's competency on KM system which is highly needed to build ECE teachers' professional competence [18]. This is crucial because teacher is an important factor towards success of knowledge transfer. Hence, training these ECE academic members towards KM implementation is highly needed to foster self-development for ECE teachers' professionalism. It is also regarded that KM implementation at ECE institutions will not be possible without integration of team work from various involved parties.

6. Recommendation

This study design seems to be advantageous compared with the majority of studies on KM as this review illuminates the current KM implementation at ECE level. However, this study only selected several articles as points for discussion hence the analysis of implementation of KM are limited to these selected ECE institutions. Future research should therefore seek to address the importance of KM at respected education level by integrating these three (3) components: ICT, team work and training in promoting sustainable education.

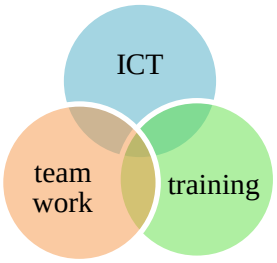

Figure 2. Three (3) critical components for promoting sustainable education at ECE centres.

7. Conclusion

The main conclusions of this work are drawn together and presented in this section. Our study is nevertheless a valuable contribution to the field of knowledge management in ECE as we have presented the trends of KM implementation at various ECE institutions in nine (9) countries for the past two (2) decades (2000-2020). In the era of post Covid-19, this paper has recommended the implementation of

KM is highly needed to ensure continuous learning is made available to all the students despite of the disrupted face to face learning. Hence, this paper urge relevant instructors and members of the ECE institutions to take proactive measures in combating the foreseen challenges by equipping one's skill in KM for more sustainable education for the young learners at ECE level.

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