



The Relationship between Knowledge Management and Organizational Learning with Academic Staff Readiness for Education 4.0

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ARTICLE INFO

Article History:

Received: 17 Apr. 2019

Received in revised form: 21 Nov. 2020

Accepted: 11 Jan. 2020

DOI: 10.14689/ejer.2020.85.8

Keywords

organizational learning, knowledge management practices, Education 4.0, Malaysia

ABSTRACT

Purpose: Education 4.0 paves the way for a new form of the university where academicians teach, research and provide services in different ways, which raises the question of the readiness of academicians to face the challenges. This study attempts to explain to which extent the university and its academic staff are ready to face Education 4.0 challenges through the initiatives of knowledge management and organizational learning.

Research Methods: Questionnaires were administered to all academic staff in one education university in Malaysia and 218 completed questionnaires were received and analyzed in this study. Data were collected using modified items from two sources to measure knowledge management and organizational learning practices at the university. Items for measuring staff readiness for Education 4.0 were developed based on criteria found in the recent literature. Descriptive and inferential statistics were used to analyze the data.

Findings: Results indicated that the academic staff and the university were ready to face the Education 4.0 challenges. The level of organizational learning practiced by the academic staff is high, the same as the knowledge management practiced by the university. Pearson's correlation analysis showed that both organizational learning and knowledge management practices had significant positive relationships with the readiness of academic staff for Education 4.0. However, multiple regression analysis with stepwise procedures found that only one knowledge management practice and one organizational learning practice were the predictors of the readiness of the academic staff in facing the Education 4.0 challenges.

Implications for Research and Practices: This study provides new insight into Education 4.0 through the perspective of knowledge management and organizational learning. Universities need to put more initiatives for knowledge creation, knowledge organization, knowledge storing, knowledge dissemination and knowledge application. Furthermore, academicians also need to put more effort into supporting new learning and ideas, formal learning and external/interface learning.

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Introduction

The excitement of arguing, debating and discussing the Fourth Industrial Revolution (4th IR) by Schwab (2016) led to the exploration of the idea in the field of education. Education 4.0 is born from the observation of educational thinkers that 4th IR will bring a new wave to the world, not only in the field of the industry but also a huge impact on education. Hence, various assumptions are made about how teachers and academics can adapt to the changes brought about by Education 4.0. Education 4.0 is to meet the needs of an innovative society. Learning in the era of this 4th IR supports every individual to equip themselves with their best ability.

Abersec (2017) stated that Education 4.0 produced new challenges in education. The challenge is marked by two big requests in the 4th IR, a new way of solving problems and new thinking methods. It is important to understand the effects of this change as it involves the use of various new learning tools that are still being explored to date. Therefore, Education 4.0 is not just about mastering the basic deep core knowledge. In fact, Education 4.0 provides unlimited opportunities for multiple learning at all times. Learning and knowledge of this era is a new learning system that enables every individual to acquire knowledge and skills for a lifetime.

This learning system helps to develop the individual's ability to apply new technologies, which enable them to adapt to changes in the working environment. Therefore, organizational learning (henceforth referred to as OL) must respond to the changing social and economic environment to meet these human capital requirements. Conventional learning provides knowledge and skills to start a career yet organizational learning provides life-long learners. Knowledge management (henceforth referred to as KM) helps in building and developing individual potentials and providing them with the ability to be creative and innovative.

Knowledge Management (KM) and Organizational Learning (OL)

The concept of KM was introduced around 1990s. Drucker (1993) coined the knowledge-intensive organizations (KIOs) term based on related studies on knowledge workers and the rapid development of information technology. Most of KM definitions are based on the process. The processes often incorporated into KM definition are the access and creation of knowledge, knowledge use and dissemination (Nonaka & Takeuchi, 1995). Liebowitz (2000) added processes such as identification, acquisition, storage, sharing, application and sale of knowledge. In further discussion, Bhatt (2001) argued that the second generation of KM shifts from managing knowledge to creating new knowledge. Thus, Lin (2014) and Teece (2014) added another string to the list - generate, facilitate, integrate, nurture, transfer and knowledge protection in defining the KM. Looking further, Castaneda (2015) added state-of-the-art processes, such as electronic transfer, face-to-face sharing and reuse of knowledge.

The growing interest in KM related field - OL opened up long debates among researches for more than twenty years. Cyert and Mac (1963) proposed the OL concept in the context of the decision-making model. However, the term "organizational

learning" was first used by Cangelosi and Dill (1965) in their research title. OL began to grow as a field of study after Argyris and Schon (1978) introduced single and double-loop learning, followed by a few more studies, such as Shrivastava (1981) who discussed learning system and Fiol and Lyles (1985) who discussed the level of learning within the organization.

This basic concept was explored until the 1990s when Argote and Epple (1990) described the learning curve, while Weick (1991) discussed the frequency of learning and the shape of OL. Mac (1991) widened the border of learning to knowledge activities in which he studied the exploration and exploitation of knowledge. Meanwhile, Huber (1991) extended his research on OL services, such as knowledge acquisition, information distribution and interpretations and came to the term with organizational memory. The Community of Practice (CoP) – a term prominently used in KM was discussed by Brown and Duguid (1991) in relationship with OL. Undoubting that OL is a key area in organizational management research (Bapuji & Crossan, 2004), Argote and Miron-Spektor (2011) affirmed that OL has three sub-processes consisting of creating, maintaining and transferring knowledge, which has been included as part of KM. The KM and OL KM literature have grown significantly from this foundation.

Research conducted by Massingham (2014a) based on the ProQuest database for 1996-2009 found six most frequent themes in KM and OL. He concluded that since 2008, OL and KM have moved towards integrating learning concepts and practices. Parts of the topics were knowledge acquisition, learning creation and learning models are part of it. Hence, Massingham (2014b) suggested that OL and KM be sub-concepts in the learning organization (LO). However, Newman and Newman (2015) pointed out that LO is not a broad category that can include OL and KM but instead, OL focuses on processes and practices, while KM emphasizes on the content, practice and process of OL and theory. The debate between KM, OL and LO will never end. The term used may differ, but they are related and exist by supporting each other. OL needs a good practice of KM to develop an excellent LO.

Education 4.0

There are currently not many researches that can be referred to in Education 4.0 as it is among the agendas that are still under discussion. Among the many discussions, innovations and general transitions in the learning world, Fisk (2019) suggested nine prominent learning trends in Education 4.0: 1) diverse time and place of learning, 2) personalized learning, 3) free choice, 4) project-based learning, 5) field experience, 6) data interpretation, 7) changes in examination, 8) students ownership and 9) mentoring programs. First, learning can take place anytime and anywhere as Fisk (2019) noted as diverse time and place of learning. Students will have more opportunities to learn at different times in different places. The e-Learning tool facilitates learning opportunities from far-off places with the adaptation of student's self-esteem capabilities. Flipped Classroom will be the practice where the theoretical part is learned outside of the classroom, while the practical part is taught face-to-face and interactive. In personalized learning (Fisk, 2019), students learnt with the learning

tools tailored to their abilities. This means that students will be challenged with more difficult questions and tasks when certain levels are reached. Students who are having problems with the subject will have the opportunity to practice more so that they reach the required level. Students will be guided and assisted during their personal learning process. This can result in a positive learning experience and will reduce the number of students who lose their confidence due to low academic achievement. Additionally, academicians will be able to identify and provide appropriate assistance to students who need help in any field. Third, students have their own choice of learning tools. Although each subject being taught has the same purpose, students can modify their learning process with learning tools that they feel are appropriate. Students will learn with different devices, programs and techniques based on their own priorities. Blended learning, flipped classroom and BYOD (Bring Your Own Device) form important terms in this change. Another trend proposed by Fisk (2019) was Project-Based Learning. By adapting to project-based and work-based learning, students learn how to apply their skills in various situations. Field experience (Fisk, 2019) provides the students with skills that only require human knowledge and face-to-face interaction. Educational institutions should provide more opportunities for students to acquire skills to bring into their workplace. New trends in Education 4.0 looked into students' assessment differently. Students' competency measured through question form and the only answer may be irrelevant and insufficient. The application of their knowledge is better tested when they work on field projects. Furthermore, students' opinions will be considered in designing and updating the curriculum. This is what Fisk (2019) considered as students' ownership. Lastly, as students will become more independent in their own learning, teachers should assume a new role as facilitators to guide the students through their learning process.

Higher education institutions in 4th IR not only focus on producing knowledge-based skilled workers but also targets innovative talents, especially scientists and high technology experts. Blended learning will be a learning method implemented at every level of learning. In the field of research, more multi-dimensional innovations will be generated. The innovation will also be more evolutionary and revolutionary. Revolution innovation focuses on the discovery of new technologies, while evolution innovation introduces new research directions (Xing & Gao, 2014). The new technological advancement such as University-as-a-Platform (UaaP), Education-as-a-Service (EaaS) as well as Internationally-linked Programs is among the services that will be offered by universities to support and encourage more research as well as shorten the innovation cycle (Xing & Marwala, 2017.) However, checks in four large journal publishers with keywords Education 4.0, 4th IR and academicians found insufficient researches in the area. Literature related to readiness for 4th IR or Education 4.0 among academicians cannot be found anywhere. This raises the question of the readiness of academicians to face the Education 4.0 challenge. Furthermore, the question arises as to what initiatives can be taken by universities and academic staff in preparing them for the challenge. This study attempts to explain to which extent the university and its academic staff ready to face Education 4.0 challenges through the initiative of KM and OL. Therefore, the following research questions were developed:

1. Are the academic staff ready to face the challenge of Education 4.0?
2. What is the level of KM practices in the university?
3. What is the level of OL practices among academic staff?
4. Is there any significant relationship between academic staff readiness for Education 4.0 with KM practices?
5. Is there any significant relationship between the academic staff readiness for Education 4.0 with OL practices?

Method

Research Design

This study used a quantitative approach with a survey research design. This research was conducted in the one and only education university in Malaysia to measure the level of readiness of the university and its academic staff in facing the challenge of Education 4.0. The university was selected because it is the only education university in Malaysia. The university's vision to become a leading education university in the Asian region demanded a very strong argument that the university and its academic staff should be prepared to face the challenges of Education 4.0 in the 4th IR.

Research Sample

No sampling process was planned for this study. There were 835 permanent and contract academic staff at the university when this study was conducted. We distributed the questionnaires to all the academic staff using email. The email was blasted three times, one in August, then September and October. Two hundred and twenty-seven (227) of them returned the questionnaires, which means the return rate was about 27.2% from the total population. However, only 218 sets were completed and can be used in this study. Thirty-eight percent (38%) of the academic staff were males and the other 62 % were females. Eighty percent (80%) of them were Malays and the rest were Chinese (7.5%), Indians (5.3%) and other ethnic (7.2%). Fifteen percent (15%) of them were more than 55 years old, 26.1% were in the 46-55 age range, 38% in the range of 36-45 years old, and the rest (20.9%) were in the range of 26-35 years old. Meanwhile, most of them had around 1-10 years of experience as an academic staff (58.8%). Thirty-four percent had 11-20 years of experience, 6.4% had 21-30 years of experience and another (0.8%) had more than 30 years of experience.

Research Instrument and Procedures

Questionnaires were used to collect the responses from the respondents. The instrument consisted of four parts, Section A, B, C and D. Section A asked about respondents' demographic information. Section B consisted of 18 items measuring KM practices adapted from Ramachandran et al. (2009). The items comprising six knowledge management practices such as creating knowledge, capturing knowledge,

organizing knowledge, storing knowledge, disseminating knowledge and applying knowledge. Responses were measured using five-point Likert's Scales (1=strongly disagree, 2=disagree, 3= not totally agree, 4=agree, 5 strongly agree). Examples of statements in Section B are:

My institution has mechanisms for creating new knowledge from existing knowledge.

My institution has mechanisms for filtering, cross-listing and integrating different sources and types of knowledge.

Section C contained 22 items measuring OL. Items were adapted from Findlay et al. (2000). Items comprised four practices of organizational learning such as support for learning and new ideas, formal learning, external/interface learning and informal learning. Examples of statements in Section C are:

As part of my work, I am encouraged to meet and learn from people in different industries.

I gain a lot of useful information about the best way of doing my job from other people in my institution.

Items in section D used for measuring academic staffs' readiness for Education 4.0. Items were developed by researchers based on nine trends in Education 4.0 criteria by Fisk (2019). However, this research adopted only eight of these trends, leave out the data interpretation. Examples of statements in Section D are:

I allow students to use different devices, programs and techniques based on their learning preferences.

I am willing to teach wherever the place is suitable for my students.

Validity and Reliability

Two language experts helped with the translation of the items in the questionnaires. Another three subject matter experts (SME) help to validate the items. Reliability analysis using the internal consistency approach (Cronbach's Alpha coefficients) showed that the items were satisfactorily able to measure each variable. (knowledge management=.96, organizational learning=.95, readiness for education 4.0=.93)

Data Collection Procedure

Data collection procedures started from the process of obtaining permission from the University Registrar for the purpose of distributing questionnaires to all academicians. At the same time, the questionnaire was developed in the Google Forms to facilitate interaction and receive feedback from respondents. Forms were administered to all academic staff using an internal email network. Google Form allowed respondents to respond directly online. Of the 835 academic staff, only 227 responded to the email and 218 completed their survey forms. The emails were blasted

every month for three months consecutively as a soft reminder for those who have not yet responded.

Data Analysis Procedure

Data were analyzed using descriptive and inferential statistics to obtain the answer to the research questions. The software used for the analysis was IBM SPSS Statistics 23. For questions 1, 2 and 3, the data were analyzed using measures of central tendency, meanwhile inferential analysis used to find the answer for questions 4 and 5. After the data cleaning process, only 218 sets of data can be used. Some of the questionnaires were incomplete with missing scores, and some have a redundant responses. To determine the suitable types of statistics for the collected data, we run the normality test to analyze the distribution of data. The normality test showed that the data were skewed (Statistic of Skewness and Kurtosis out of +2 and -2 and Kolmogorov-Smimov and Shapiro-Wilk test were significant). Normal Q-Q Plot showed there were some outliers in the group of data for academicians' readiness for Education 4.0 and OL practices. From the histogram, the outliers were identified and cleared from the dataset. The data that had been eliminated were from respondents number 11, 146 and 160. We conducted the second normality test. The Skewness and Kurtosis value became smaller (between +1 and -1) and Kolmogorov-Smimov and Shapiro-Wilk Test showed both were not significant ($p > .05$). Therefore, we assumed that the data were normally distributed and proceeded with data analysis for the 215 sets of data ($N=215$).

Results

Academic Staff Readiness to Face Education 4.0 Challenges

The findings on the readiness of academic staff for Education 4.0 are shown in Table 1.

Table 1

The Level of Academic Staff Readiness for Education 4.0

Readiness for Education 4.0	Mean	Sd
Diverse time and place	4.08	.74
Personalized learning	4.20	.55
Free choice	4.26	.56
Project-based	4.25	.54
Field experience	4.20	.66
Changing in examination	4.25	.58
Students' ownership	4.20	.65
Mentoring	4.19	.60
Total	4.20	.52

Analysis in Table 1 showed that the level of academic staff readiness for Education 4.0 at the university was high ($M=4.20$, $SD=.52$). Of all the elements of Education 4.0, free choice ($M=4.26$, $SD=.56$) and project-based ($M=4.26$, $SD=.54$) had the highest mean. Meanwhile, diverse time and place got the lowest score ($M=4.08$, $SD=.74$).

The Level of KM Practices at the University

The findings on the level of KM practices at the university are shown in Table 2.

Table 2

KM Practices at the University

KM practices	Mean	Sd
Creating knowledge	3.71	.71
Capturing knowledge	3.75	.68
Organizing knowledge	3.67	.71
Storing knowledge	3.82	.65
Disseminating knowledge	3.80	.62
Applying knowledge	3.56	.71
Total	3.72	.60

Analysis in Table 2 showed that KM practices at the university were at a high level with ($M=3.72$, $SD=.60$). Of all these practices, storing knowledge was the highest practice ($M=3.82$, $SD=.65$). Meanwhile, applying knowledge was the lowest practice ($M=3.56$, $SD=.71$).

The Level of OL Practices among Academic Staff

The findings on the level of OL practices at university are shown in Table 3.

Table 3

OL Practices by Academic Staff of the University

Organizational learning	Mean	Sd
Support for learning and new ideas	3.71	.59
Formal learning	3.90	.54
Internal learning / interface	3.94	.53
Informal learning	4.04	.51
Total	3.90	.49

Analysis in Table 3 showed that the level of OL practices by the university's academic staff was high (M=3.90, SD=.49). Of all these learning activities, informal learning was practiced at a high level (M=4.04, SD=.51). Meanwhile, support for learning and new ideas had the lowest score (M=3.7, SD=.59).

Relationship between KM and Academic Staff Readiness for Education 4.0

The findings of the relationship between KM and the academic staff readiness for Education 4.0 at the university are shown in Table 4.

Table 4

Relationship Between KM and Academic Staff Readiness for Education 4.0

	N	Pearson's Correlation (r)	Sig.
Readiness for Education 4.0			
	215	.313**	.000
KM			

** Correlation is significant at 0.01 level (2-tailed).

Pearson's correlation analysis in Table 4 showed that there was a significant and positive but weak relationship between KM practices in the university and the academic staff readiness for Education 4.0 (r = .313, p <.01).

Relationship between OL Practices and Academic Staff Readiness for Education 4.0

The findings about the relationship between OL practices by the academic staff and their readiness for Education 4.0 at the university are shown in Table 5.

Table 5

Relationship Between OL Practices and Academic Staff Readiness for Education 4.0

	N	Pearson's Correlation (r)	Sig.
Readiness for Education 4.0			
	215	.325**	.000
OL			

** Correlation is significant at 0.01 level (2-tailed).

Pearson's correlation showed that there is a significant and positive but weak relationship between OL practices by the academic staff and their readiness for Education 4.0 (r = .325, p <.01).

The findings about which practices in KM and OL significantly predicted the readiness of university and its academic staff for education 4.0 presented in Table 6.

Table 6

Variable Predictors of the University and Academic Staff Readiness for Education 4.0

Model		Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
		<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
1	(Constant)	2.11	.26		7.97	.00
	Informal learning	.52	.07	.51	7.99	.00
2	(Constant)	1.85	.27		6.73	.00
	Informal learning	.45	.07	.44	6.52	.00
	Capturing knowledge	.15	.05	.19	2.91	.00

a. Dependent Variable: Education 4.0

Multiple regression analysis with stepwise procedures found that only two practices were the factors that contributed to university and academic staff readiness for Education 4.0. The two practices were, capturing knowledge ($\beta = .19$, $p < .05$) and informal learning ($\beta = .44$, $p < .05$).

Discussion and Recommendations

Fourth IR produces a new form of university where academicians teach, research and provide services in ways that they have never experienced before. Based on the findings, this study concludes that the academic staff and the education university are ready to face the challenges of Education 4.0. They are ready to teach anytime anywhere (diverse time and place of learning), personalized teaching to each student (personalized learning), let the students choose their preferred style of learning (free choice), let the students learn through project-based (project-based learning) and gain experience through fieldwork (field experience). They are also ready to change the ways they assess the students (changes in examination), consider students' opinions in designing and updating the curriculum (students' ownership) and ready to assume themselves to a new role as facilitators. However, there are other new trends or challenges which are still emerging in Education 4.0. As has been discussed above, there is no clear picture of how Education 4.0 will change our education landscape in the future because of the rapid changing of education technology and the accessibility of the technology itself. The measurement will differ from time to time (Puncreobutr, 2016). There will be a lot of technology things based on intelligent technology that is

powered by artificial intelligence. However, for most of all we do agree with Xing and Marwala (2017) who insist that improving the quality of service in higher education can bring about a significant change in society. Technology is just an enabler. Human readiness and ability to use, explore and exploit the technology is our most concern in this digital and knowledge era.

The findings showed that KM had been practiced at a high level at the university. KM initiatives cover a lot of activities and the list is growing with new terms. The activities' focus moved from just capturing, organizing, storing and reusing or applying the knowledge to the process of upgrading the knowledge, unlearn and relearn new knowledge and creating new knowledge. This study found that KM mostly practiced by storing knowledge, the least practice is applying the knowledge. The result points out that much of the knowledge has been stored without being applied by academicians. By applying knowledge, new knowledge can be created. However, knowledge creating activities had been practiced successfully at the university. On that matter, we cannot agree more with Bhatt (2001) that the second-generation KM had moved from managing knowledge to creating new knowledge.

OL is well-practiced by academicians. The results confirmed that they do a lot of informal learning than other types of learning. Most of the academicians feel that they do not receive enough support in their learning and in presenting new ideas. This finding did not align with a recent definition of OL by Popova-Nowak and Cseh (2015), who define OL as a social process in which individuals participate collectively to reproduce and develop knowledge simultaneously. Moreover, the finding points out that the possibility of learning had been done informally by the individual, not in teams or groups. Such practice imparted risk to the knowledge gained by the individuals. It will be stored as tacit knowledge in the person's mind or it will lead to the wrong way. By learning, knowledge should be created, retained and shared throughout the organization as suggested by Argote (2011).

Conclusion and Recommendations

The findings showed that both KM and OL had a significant, positive, but weak relationship with the academic staff readiness in Education 4.0. Analysis of the variable predictors confirmed that only capturing knowledge in KM and informal learning in OL are the predictors for the readiness of the academic staff. These findings offer a wide range of discussions. Alas, to our knowledge, there is no related literature that can be found from the university database to explain this result. Furthermore, no research can be found to support the relationship either between OL and Education 4.0 or KM and Education 4.0. Thus, we conclude that Education 4.0 is still under-researched for now. Subsequently, the findings obtained in this study suggested that there is a significant and positive relationship between Education 4.0 and KM, which means that if KM practices increase, the academic staff readiness will increase accordingly. The same goes for OL. However, a weak relationship, added to the previous findings, indicated that only one practice in both KM and OL are the predictors for the staff readiness leads to another factor for staff readiness. Further

studies are needed to explore more of these unidentified factors. This research concluded that capturing knowledge activities and informal learning by the academic staff contributed to their readiness to face the Education 4.0 challenges. Therefore, we propose some KM initiatives that the university needs to work on, which are the initiatives for knowledge creation, knowledge organization, knowledge dissemination and most of all is knowledge application. In addition, academic staff also needs to encourage new learning and ideas within the university, extending formal learning as well as learning from other universities and industries through external and interface learning.

Acknowledgement

This study was funded by *Geran Penyelidikan Universiti Berteraskan Pendidikan* (Education-Based University Research Grant), *Universiti Pendidikan Sultan Idris* (Sultan Idris Education University), Tanjung Malim, Malaysia.

References

- Abersek, B. (2017). Evolution of competences for new era or education 4.0. *The XXV Conference of Czech Educational Research Association (CERA/ČAPV)* on 13 - 14 September 2017.
- Argote, L., & Eppele, D. (1990). Learning curves in manufacturing. *Management Science*, 247(4), 920-924.
- Argote, L., McEvily, B, & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*. 49(4), 571-582.
- Argote, L., & Miron-Spektor, E. (2011) Organizational Learning: From Experience to Knowledge. *Organization Science*, 22, 1123-1137.
- Argyris, C., & Schon, D. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.
- Bapuji, H., & Crossan, M. (2004). From questions to answers: reviewing organizational learning research. *Management Learning*, 35(4). 397-417.
- Bhatt, G. (2001). Knowledge management in organization: examining the interactions between technologies, techniques and people. *Journal of Knowledge Management*, 5(1), 68-75.
- Bratton, J.A. (2001). Why workers are reluctant learners. *Journal of Workplace Learning*, 13(7/8), 333-344.
- Brown, J. S., & Duguid, P. (1991). Organizational learning and communities of practice: Toward a unified view of working, learning, and innovation. *Organizational Science*, 2, 40-57.

- Cangelosi, V., & Dill, W. (1965) Organizational learning: Observations toward a theory. *Administrative Science Quarterly*, 10(2), 175-203
- Chiva, R., & Habib, J. (2015). A framework for organizational learning: zero, adaptive and generative learning. *Journal Of Management & Organization*, 21(3), 350 - 368.
- Cyert, R., & March, J.G. (1963). *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Drucker, P.F. (1993). *Post-Capitalist Society*. Oxford: Butterworth-Heineman.
- Findlay, P., McKinlay, A., Marks, A., & Thompson, P. (2000). Labouring to learn: organizational learning and mutual gains. *Employee Relations*, 22(5), 485-502.
- Fiol, C. and Lyles, M. (1985) Organizational learning, *Academy of Management Review*, 10, 803-813
- Fisk, P. (2019). *Education 4.0: The future of learning will be dramatically different, in school and throughout life*. Retrieved on January 12, 2019 from <http://www.thegeniusworks.com/2017/01/future-education-young-everyone-taught-together/>.
- Flores, L., Zheng, W., Rau, D., & Thomas, C. (2012). Organisational learning: subprocess identification, construct validation, and an empirical test of cultural antecedents. *Journal of Management*, 38(2), 640-667.
- Goldie, J. G. S. (2016). Connectivism: A knowledge learning theory for the digital age? *Medical Teacher*, 38(10), 1064 -1069.
- Hedberg, B. (1981). *Handbook of Organizational Design*. London: Oxford University Press.
- Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organizational Science*, 2, 88-115.
- Liebowitz, J. (2000). *Building organizational intelligence: a knowledge management primer*. Boca Raton: CRC Press.
- Martinez-Leon, I. M., & Martinez-Garcia, J. A. (2011). The Influence of organizational structure on organizational learning. *International Journal of Manpower*, 32(5/6), 537-566.
- McAfee, A., & Brynjolfsson, E. (2012). Big data: the management revolution. *Harvard Business Review*, 90 (May), 230-245.
- Massingham, P. (2014a). An evaluation of knowledge management tools: Part 1-managing knowledge resources. *Journal of Knowledge Management*, 18(6), 1075-1100.
- Massingham, P. (2014b). An evaluation of knowledge management tools: Part 2-managing knowledge flows and enablers. *Journal of Knowledge Management*, 18(6), 1101-1126.

- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. London: Oxford University Press.
- Newman, N., & Newman, D. (2015). Learning and knowledge: A dream or nightmare for employees. *The Learning Organization*, 21(1), 58-71.
- Puncreobutr, V. (2016). Education 4.0: New challenge of learning. *St. Theresa Journal of Humanities and Social Sciences*, 2(2), 92-97.
- Popova-Nowak, I. V., & Cseh, M. (2015). The meaning of organizational learning: A meta-paradigm perspective. *Human Resource Development Review*, 14(3), DOI: 10.1177/1534484315596856
- Ramachandran, S.D., Chong, S.C., & Hishamudin, I. (2009). Knowledge management processes: A comparative study of public and private higher education institutions in Malaysia. *VINE The Journal of Information and Knowledge Management Systems*, 39(3), 203-222.
- Sallis, E., & Jones, G. (2002). *Knowledge Management in Education*. London: Kogan Page.
- Schwab, K. (2016). *The Fourth Industrial Revolution*. United States: Crown Business, Crown Publishing Group.
- Shrivastava, P. (1981), "Strategic decision making process: the influence of organisational learning and experience", unpublished doctoral dissertation, University of Pittsburg, Pittsburg, PA.
- Sinlarat, P. (2016). Education 4.0 is more than education. *Annual Academic Seminar of the Teacher's Council 2016 on the topic of Research of the Learning Innovation and Sustainable Educational Management*. Bangkok: The Secretariat Office of Teacher's Council.
- Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday.
- Teece, D. J. (2014). The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. *Academy of Management Perspectives*, 28(4), 328-352.
- Tynjala, P. (2008). Perspectives into learning in the workplace. *Education Research Review*, 3(2), 130-154.
- Wang, Y, & Ellinger, A.D. (2011). Organizational learning: perception of external environment and innovation performance. *International Journal of Manpower*, 32(5/6), 512-536.
- Wilson, M. S., Yip, J. (2010). Grounding leader development: cultural perspectives. *Industrial and Organizational Psychology*, 3(1), 52-55.
- Xing, B. (2015). *Furthering Higher Education Possibilities through Massive Open Online Courses*. USA: Hershey PA.

- Xing, B., & Gao, W. J. (2014). *Innovative computational intelligence: a rough guide to 134 clever algorithms*. Cham Heidelberg New York Dordrecht London: Springer International Publishing.
- Xing, B., & Marwala, T. (2017). *Implications of the Fourth Industrial Age on Higher Education*. Retrieved on February 19, 2018 from <https://arxiv.org/ftp/arxiv/papers/1703/1703.09643.pdf>

