Analysis of Experiential – Based Knowledge Management System on Cloud Technology in Software Engineering Model Enhancing Life and Career Skill with Professional Internship for Undergraduate Students

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ABSTRACT

The purposes of this research were 1) to analyze the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students,2) to assess the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for the undergraduate students. The samples were 5 experts in knowledge management system, teaching skills and techniques, information technology and communication and professional internship, derived from purposive sampling. The research instruments were 1) Experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for the undergraduate students. 2) Evaluation form of analysis, and 3) Evaluation form of model analysis. The data was statistically analyzed by mean and standard deviation. The findings of the research were as follow:

1) The experiential-based knowledge management system on cloud technology in software engineering model to promote life and career skills with professional internship for the undergraduate students comprised of 1.1) Experiential-based Approach with 7 procedures performed including 1.1.1) Pretest, 1.1.2) Briefing, 1.1.3) Experience Coping, 1.1.4) Reporting, 1.1.5) Debriefing. 1.1.6) Conclude and 1.1.7) Posttest. 1.2) Knowledge management process with 4 procedures performed including 1.2.1) Socialization, 1.2.2) Externalization, 1.2.3) Combination, 1.2.4) Internalization, 1.3) Curriculum for a bachelor of science in software engineering, 1.4) System users, including 1.4.1) administrator, 1.4.2) instructor 1.4.3) students 1.4.4) alumni, and 1.4.5) entrepreneur, and 1.5) cloud technology.

2) The results as shown in the evaluation form and suitability test of analysis results assessed by the experts in relation to experiential-based knowledge management system on cloud technology in software engineering model to promote life and career skills with professional internship for the undergraduate students were at the high level. Therefore, the software engineering model can be applied to experiential-based knowledge management system as well as socialization.

Keyword: Knowledge Management System, Experiential-Based Approach, Software Engineering, Cloud Technology, Life and Career Skills, Professional Internship

1. Introduction

At present, technology is the important function for country development and applied to varieties of country development. (Nattaphol Thanachawengsakul, 2015: 536-543) Many organizations adapted themselves by using the technology for a better choice. The smart organizations learned to adapt towards the sharp rising of conversion. The issue on organization development is to use knowledge management for driving by constructing, collecting the skill and competency of personnel systematically. Moreover, the process of knowledge management should have the communication, idea, knowledge and skill transferring, to perceived by people and apply until the new knowledge is occurred. (Thitinon Maneetham, 2014: 6)

In Thailand, the problem and obstacles of knowledge management was mentioned by Mongkolchai Wiriyapanich (2010: 34) that the knowledge management obstacle was a seniority system in Thai society. In the government organization, the social status depended on the work position. The boss or commander in the organization would be accepted in any idea. This reflexed one way communication and led to have no knowledge sharing or any new idea for working.

The curriculum of software engineering provides the instruction on the principles of project management, analysis and development of software system in terms of object oriented method, including the technical construction, development and test of software. Moreover, the curriculum also studies the process of new software development, data banking technique, data mining management, and software quality measurement (Faculty of Information Technology, 2010) which focuses on direct experience learning in the workplace and from the professional internship in industrial trade, private section or government organization. (Students Manual of 2015-2016, 2015)

As mentioned about the importance of knowledge management and the study in software engineering science and the problem including the functions influence to the knowledge management. The researcher concentrated to analyze the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students, and challenged the instructors, students, alumni, and the entrepreneurs to participate in knowledge management, collect, diffuse and share knowledge via the experiential-based knowledge management system on cloud technology in software engineering model.

2. Research Objectives

2.1 to analyze the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students

2.2 to assess the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for the undergraduate students.

3. Research Limitation

3.1 Population and Samples

Population was the experts who had qualification in 4 aspects; knowledge management system, teaching skills and techniques, information technology and communication and professional internship

Samples were 5 experts in 4 aspects; knowledge management system, teaching skills and techniques, information technology and communication and professional

internship and had at least 3-year experience, derived from purposive sampling.

3.2 Variables

Independent Variable: experiential-based knowledge management system on cloud technology in software engineering model

Dependent Variable: the result on analysis of experiential-based knowledge management system on cloud technology in software engineering model

4. Research Methodology

The research was conducted by 3 phases as follow:

Phase 1 – An analysis of experiential-based knowledge management system on cloud technology in software engineering model. The steps of system analysis process and the content analysis from the documents, theories and related literature were as follow:

1.1 Input analysis
1.2 Knowledge management process analysis
1.3 Need analysis
1.4 User analysis
1.5 Module analysis

Phase 2 – A development of experiential-based knowledge management system on cloud technology in software engineering model. This step was derived from the study on phase 1 and synthesized to design and develop the model and presented by the illustration and description of the model.

Phase 3 - An evaluation of experiential-based knowledge management system on cloud technology in software engineering model.

5. Research Instruments

5.1 A system analysis form of experiential-based knowledge management on cloud technology in software engineering model

5.2 An experiential-based knowledge management on cloud technology in software engineering model

5.3 An evaluation form of experiential-based knowledge management system on cloud technology in software engineering model –the evaluation form used 5 rating scales composed of 5 aspects: the analysis result on input, knowledge management process, need analysis, and user analysis. The results of analysis were from the mean of the opinion of experts according to the criteria (Luan Saiyot and Angkana Saiyot, 1995)

4.50-5.00	referred to	extremely agree
3.50-4.49	referred to	much agree
2.50-3.49	referred to	average agree
1.50-2.49	referred to	little agree
1.00-1.49	referred to	least agree

5.4 Evaluation form of model analysis for the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students. The evaluation form was 5 rating scales consisted of 2 items; the appropriateness of the analysis result on the experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students, and the appropriateness of the analysis result application on the experiential-based knowledge management system

on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students. The criteria to refer the mean score were as follow: (Luan Saiyot and Angkana Saiyot, 1995)

4.50-5.00referred to	most appropriate
3.50-4.49referred to	much appropriate
2.50-3.49referred to	average appropriate
1.50-2.49referred to	little appropriate
1.00-1.49referred to	least appropriate

6. Research Findings

The research findings were as follow:

Phase 1 The analysis result on experiential-based knowledge management system on cloud technology in software engineering model consisted of 5 items.

1.1 The result of input analysis

1) Experiential-based learning is the learning management that the learners expected to learn by investigating the knowledge for the learners' task, work, and skill from the learning resources provided by the instructor or to provide the experience for learners to practice according to the concept of Chaiyong Brahmawong (2012: 8-12) There were 7 steps of learning management; 1) Pre-evaluation before experiencing 2) Orientation for experience 3) Encountering the experience 4) Progress report 5) Reporting experience 6) Summarizing the experienced learning, and 7) Post Evaluation

2) The curriculum for a bachelor of science in software engineering is the curriculum to integrate variety of science for the production process, quality control, test, inspection, and evaluate the efficiency of software to gain the satisfaction of the users under the limitation on time and cost. (Students Manual of 2015-2016, 2015) The curriculum was classified into 2 parts; system engineering – to plan, control the project, design, analyze, and identify the need of software development, and development engineering – to study the feasibility of software need by users, including to produce, test, inspect, and evaluate the efficiency of the developed software. (Waman, S, J. 2005)

3) Cloud technology is the networking computer system applied in educational system. Cloud technology takes important role to help the learners to use information technology for learning effectively. Cloud technology is response by portable electronic devices and supports ubiquitous learning, and knowledge sharing among learners. Cloud technology also supports the cooperation learning and trustable in data accessing and data collection. (Wiwat Meesuwan, 2014: 149-157) The study of Gartner in 2015 found that cloud technology enabled to apply effectively without basic resource management. The information was processed via online system without information technology infrastructure. Cloud technology is able to reduce cost on hardware software, and reduce time in working and learning process for any organizations and institutes. (Juajan Watakeecharoen, Paisarn Jantarangsee, and Panita Wannapiroon, 2015: 66-76)

This research took cloud technology in terms of Software as a Service or SaaS; the application for ubiquitous learning and in any equipment with services and necessary computer program for users. (Pradit Songsangyot and Namon Jirangsuwan, 2015: 9-15) and apply in Knowledge as a Service or KaaS. This system contains knowledge management process from users such as the system administrator,

instructors, students, alumni, and entrepreneur. All of the information is processed via cloud technology.

The input analysis can be concludes as shown in figure 1.

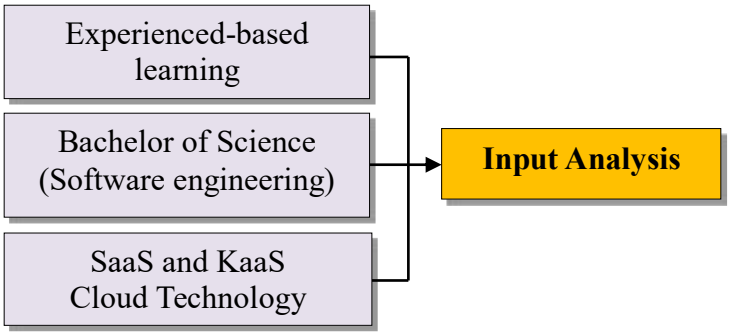

Figure 1 the input analysis

1.2 The result of knowledge management process analysis

The knowledge management process of experiential-based knowledge management system on cloud technology in software engineering model in terms of SECI Model by IkujiroNonaka and Hirotaka Takeuchi (1995) mentioned by Jaitip Na Songkhla (2007: 48-49) that composed of 4 steps; 1) Socialization – this is to convert or construct the knowledge composed of experience, idea and skill sharing by observation, imitation, and practical, 2) Externalization - this is the conversion of knowledge transferring to record learning by metaphor, comparison, conceptuality, hypothesizing, and model implementation, for example, the transferring of concept from picture and express by using language. 3) Combination – the construction or conversion of knowledge to concrete. This is the process for concept identification system to the knowledge system, knowledge sharing, and knowledge diffusion via media such as document record, meeting, and conversation. The information is classified, collected, and categorized by educational system. And 4) Internalization – this is the process of recording explicit knowledge in terms of literally recording, illustrations, or description. The knowledge is occurred from practicing and assimilated to be knowledge.

The knowledge management process can be summarized as shown in figure 2.

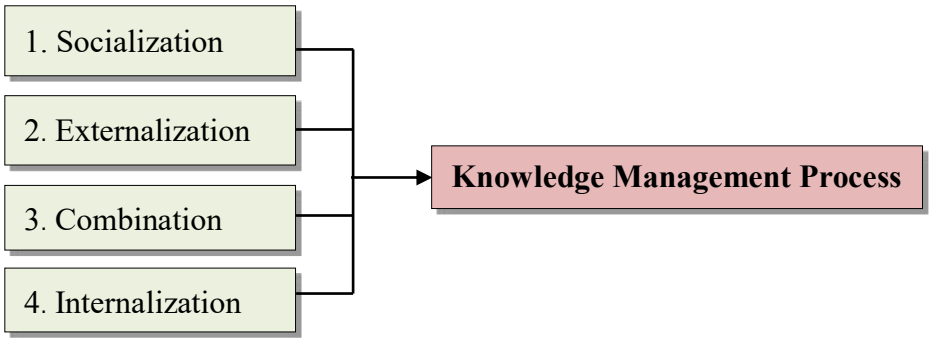

Figure 2 Knowledge Management Process Analysis

1.3 The result of need analysis

The knowledge of software engineering mostly existed in external knowledge. Group of real experience were experts, community, entrepreneur, alumni, knowledge asset, learning resources and internet. So the organization needed the process of knowledge management from external knowledge especially from professional internship that really occurred in the workplace to the internal knowledge and can be applied in software engineering instructional system.

The result of need analysis can be summarized as shown in figure 3.

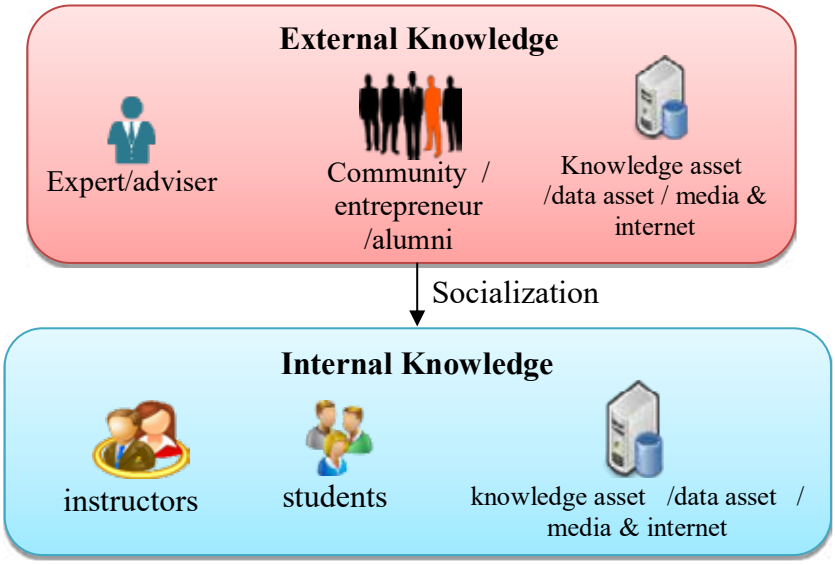

Figure 3 Need analysis

The instructional management in 21st century to enhance life skill and career skill from professional internship towards UNESCO Bangkok (2010: 24-25) mentioned the 21st century student outcome and support systems. In this research, the instructional management focused on the enhancement of life and career skill of undergraduate students. The description composed of 5 aspects according to the concept of Wijarn Panich (2012: 48-55)

1) Flexibility and Adaptability – this aspect means to adapt with the different role, and to do the assigned work under any situation. It is the ability to take different idea and believes from any other culture by understanding, negotiating, balancing for an accomplishment of the work.

2) Initiative and Self-Direction – this aspect means individual learning in terms of interdependence and independence by managing with the goal and time. This composes of goal identification by both touchable goal and untouchable goal, including how to manage the time and task management effectively. The individual task of people will succeed by self-task identification, task follow up, and task importance sequencing to extend individual proficiency and gain professional level of working.

3) Social and Cross-Cultural Skills – this aspect means to work and live in different environment and live with different people in society effectively. The goals are to interact well with others by appropriate speech and being a good listener, respect the different culture and social of people, work well with different culture and social of people, open mind to response with others, shift the social and cultural difference to create innovative aspect of working for a quality of work.

4) Productivity and Accountability – this aspect means to work with project base learning using information technology and communication tools for effective work. The data collection is clear and can be checked for output perception and knowledge sharing. There should be a goal identification, importance sequencing, planning, and task management, includes the represent of special ability to work effectively such as working with moral and positive way, do time and project management effectively, multitasking ability, good participation, trustable, patient, professional self – representation appropriately, team working ability, respect and appreciate the individual difference in teamwork, and responsibility to the output work.

5) Leadership and Responsibility – this aspect means the distributed leadership and responsibility with 3 levels: 1) self - responsibility, 2) responsibility of cooperative in team working, and 3) cooperation of team working for goal. The skills used are human relation skill, problem solving skill to motivate others for goal achievement, inspiration for goal accomplishment, inspiration for using potential of working by good example modeling, believe in benefit of mankind, use moral authority, and be responsible for benefit of mankind.

1.4 The result of user analysis

The 5 components are:

1) System administrator responses about data management of the system and take care of the users in the system to use the system effectively.

2) Instructors have knowledge of software engineering, information technology and other related science to deliver and transfer to the learners in higher education institutes.

3) Students are people studying in software engineering or other fields of study in the higher education institutes classified into 2 groups; being internship in the workplace and had been passed the internship in the workplace.

4) Alumni are people who graduated in software engineering or other related science and gained direct experience. This group of people can give knowledge by experiential based learning in software engineering.

5) Entrepreneurs have knowledge and expertise for the work experience directly on software engineering.

1.5 The result of module analysis

Module of experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students are classified into 5 modules: 1) Admin Module, 2) Instructor Module, 3) Student Module, 4) Alumni Module, and 5) Entrepreneur Module. The description was shown in figure 4.

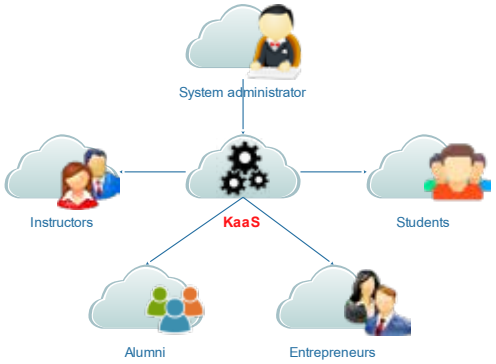

Figure 4 Module Analysis

Phase 2 A development of experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students is as shown in figure 5.

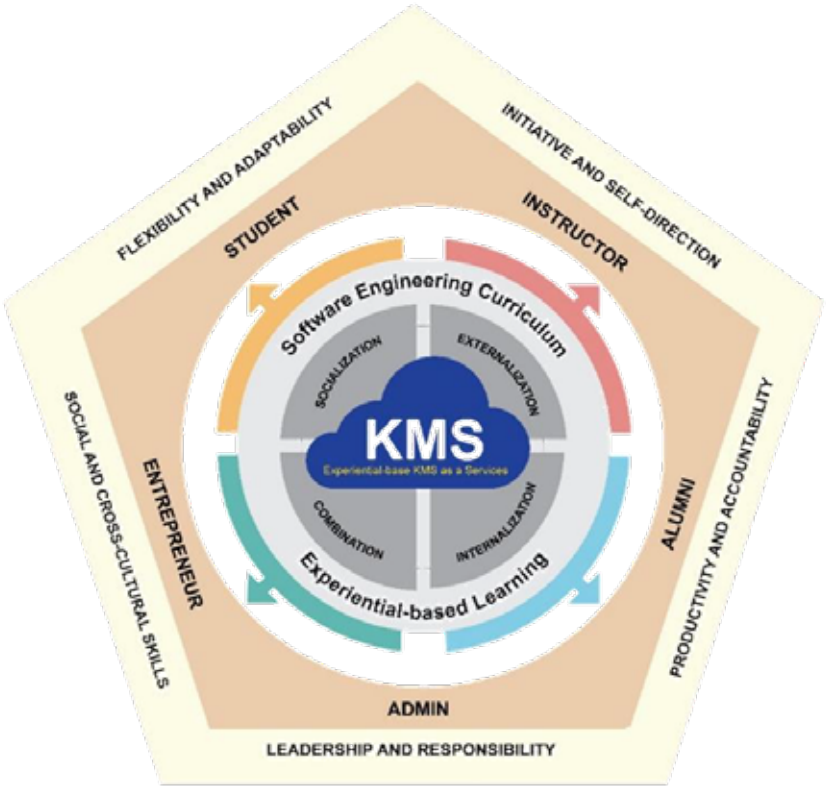

Figure 5 the analysis of experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students

The analysis of experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students has description as follow.

2.1 The experiential-based learning composed of 7 procedures 1) Pretest, 2) Briefing, 3) Experience Coping, 4) Reporting, 5) Debriefing 6) Conclude, and 7) Posttest.

2.2 The knowledge management process composed of 4 steps; 1) Socialization, 2) Externalization, 3) Combination, and 4) Internalization.

2.3 Curriculum for a bachelor of science in software engineering.

2.4 The system users included 1) administrator, 2) instructor, 3) students, 4) alumni, and 5) entrepreneur.

2.5 Cloud technology

The expectation of the implementation of experiential-based knowledge management system on cloud technology in software engineering model were life and career skills

with professional internship for undergraduate students, composed of 1) Flexibility and Adaptability, Initiative and Self-Direction) 3) Social and Cross-Cultural Skills, 4) Productivity and Accountability, and 5) Leadership and Responsibility.

Phase 3 the results on evaluation of experiential-based knowledge management system on cloud technology in software engineering were as follow:

3.1 The evaluation on opinion of undergraduate students toward the experiential-based knowledge management system on cloud technology in software engineering enhancing life and career skills with professional internship.

Table 1 The evaluation on opinion of undergraduate students toward the experiential-based knowledge management system on cloud technology in software engineering

Description	Level of opinion		
	$\overline{X}$	*S.D.*	**Meaning**
1. Input Analysis	4.40	0.55	much
2. Knowledge Management Process Analysis	4.40	0.55	much
3. Need Analysis	4.20	0.45	much
4. User Analysis	4.20	0.45	much
5. Module Analysis	4.40	0.55	much
Total average	**4.32**	**0.48**	**much**

From table 1, the total average of the undergraduate students' opinion toward the experiential-based knowledge management system on cloud technology in software engineering was at the level of "much" ($\overline{X}$=4.32, S.D. = 0.48). Considering in any item, the input analysis composed of experiential-based learning, curriculum for a bachelor of science in software engineering, and cloud technology. Knowledge management process analysis composed of socialization, externalization, combination, and internalization. And module analysis composed of admin module, instructor module, student module, alumni module, and entrepreneur module was at the level of "much" ($\overline{X}$=4.40, S.D. = 0.55), the less was need analysis and user analysis composed of admin, instructor, student, alumni, and entrepreneur was at the level of "much" ($\overline{X}$=4.20, S.D. = 0.45) respectively.

3.2 An evaluation on appropriateness of model analysis toward experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students.

Table 2 The evaluation on appropriateness of model analysis toward experiential-based knowledge management system on cloud technology in software engineering model

Issue of evaluation	Appropriateness level		
	$\overline{X}$	*S.D.*	**meaning**
1. The appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students	4.20	0.45	much
2. The appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model for application	4.20	0.45	much
Total average	**4.20**	**0.42**	**much**

From table 2, the appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model was at the level of "much" ($\overline{X}$=4.20, S.D. = 0.42). Considering in item, the appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model and the appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model for application both were at the level of "much". ($\overline{X}$=4.20, S.D. = 0.45).

7. Discussion

The analysis of experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students was presented as follow:

7.1 The opinion of undergraduate students toward the experiential-based knowledge management system on cloud technology in software engineering model was at the level of "much" ($\overline{X}$=4.32, S.D. = 0.48) and considering in standard deviation found that the data distribution was little (less than 1.00). This showed that the experts had opinion in the same way and this study was harmonized to the research of Siriporn Angsopha, Surat Promchan, and Sirilak Harnwatanukul (2015: 40-48) which found that the opinion of the experts on counseling system for student teachers was at the level of "much" ($\overline{X}$=4.24, S.D. = 0.61) and be able to apply in the

real internship. The study was still harmonized to the research of Thipawan Khantama, Kritsaman Wattanarong, and Kanda Poonlarpthawee (2015: 135-143) that found the opinion level on a development of community process of Investigating for Web Based Learning was at the level of "much" ($\overline{X}$ =4.27, S.D. = 0.43) and could be applied in all courses and level of study. Moreover, the research of Pensri Srisawat, Kritsaman Wattananarong and Kanda Poonlarpthawee (2015: 78-87) found that the opinion of a development of knowledge sharing system via mobile phone was at the level of "good" ($\overline{X}$ =4.46, S.D. = 0.07) and could be applied in a real situation.

7.2 The appropriateness of analysis result on experiential-based knowledge management system on cloud technology in software engineering model enhancing life and career skills with professional internship for undergraduate students was at the level of "much" ($\overline{X}$ =4.20, S.D. = 0.42) and considering in the standard deviation found that the data distribution was little which referred to the experts' opinion was similar. This study was harmonized to the research of Yoosomboon, S., and Wannapiroon, P. (2015: 2102-2107) which found that the appropriateness of a development of a challenge based learning model via cloud technology and social media for enhancing information management skills was the level of "most" ($\overline{X}$ =4.56, S.D. = 0.01). In addition, the research of Narongsak Sangpom and Panita Wannapiroon (2012: 54-67) found that the appropriateness of a development of instructional model using experiential based learning via online media to enhance higher education vocational qualification by MIAP learning process was at the level of "much" ($\overline{X}$ =4.12, S.D. = 0.61). The research of Warit Kankaew and Namon Jirangsuwan (2015: 197-204) found that the appropriateness of a design of cooperative learning model via cloud technology to enhance creative thinking skill of undergraduate students was at the level of "much". ($\overline{X}$ =4.00, S.D. = 0.27) and could be applied. And the study was also harmonized to the research of Noppadon Phumeechanya and Panita Wannapiroon (2012: 235-242 that studied the appropriateness of a design of learning activity using problem based learning in U-Learning environment to develop problem solving skill was at the level of "much" ($\overline{X}$ =4.40, S.D. = 0.50).

8. Suggestion

8.1 Suggestion for research application

The educational institutes to apply the experiential-based knowledge management system on cloud technology in software engineering model should be well preparation on application for learners in the system. It should be realized the importance of knowledge management system on cloud technology in software engineering to gain most benefit in the instruction and work effectively in advance.

8.2 Suggestion for the future research

The educational institutes should apply the analysis of experiential-based knowledge management system on cloud technology in software engineering model for a design and develop the knowledge management system together with the use of cloud technology for enhancing the life skill career skills with professional internship for undergraduate students.

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REFERENCES

Anderson, J. 2010. ICT Transforming Education; A Regional Guide. Thailand, UNESCO Bangkok.

Angsopha, S., and Promchan, S., and Harnwatanukul, S. 2015. The Model of Counseling System for Student Teachers. *Journal of Industrial Education, KMUT North Bangkok*, 6(2) July – December, p40-48.

Brahmawong, C. 2012. Experiential Based Learning via online media. *Rajapruek Journal*,9(3), February - May, p8-12.

Faculty of Information Technology. 2010. *Software Engineering Program*: retrieved 15 March, 2016 from http://www.northbkk.ac.th/it/swe.php

Kankaew, W and Jirangsuwan, N. 2015. A Design of Cooperative Learning Model via Cloud Technology to Enhance Creative Thinking Skill of Undergraduate Students. *Journal of Industrial Education, KMUT North Bangkok*, 6(1), January – June, p197-204.

Khantama, T., and Wattanarong, K., and Poonlarpthawee, K. 2015. A Development of Community Process of Investigating for Web Based Learning. *Journal of Industrial Education, KMUT North Bangkok*, 6(2), July – December, p135-143.

Lo, S. K., and Wang, C. C. and Fang, W. 2005. Physical Interpersonal Relationships and Social Anxiety among Online Game Players, *CyberPsychology and Behavior*, 8 (1), 15-20.

Meesuwan, W. 2014. Cloud Computing Education, *Naresuan University, Faculty of Education. Phitsanulok: Naresuan University*, 16(1) January – March, p149-157.

Maneetham, T. 2014. A Study of Problem and Guidelines of Knowledge Management Information Technology and Communication Service Center, University of Phayao. Phayao: University of Phayao.

Nonaka, I., & Hirotaka, T. 1995. The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. New York: Oxford University Press.

Panich, W. 2012. How to Create the Students' Learning in 21st Century. 1st edition. Bangkok: Sodsri – Saritwog Foundation.

Phumeechanya, N., and Wannapiroon, P. 2012. *Design of Learning Activity Using Problem Based Learning in U-Learning Environment to Develop Problem Solving Skill.* Retrieved 26 May, 2016 from http://joomla.icit.kmutnb.ac.th/2012/nec2012.pdf

Sangpom, N., and Wannapiroon, P. 2012. A Development of Instructional Model Using Experiential Based Learning via online media to Enhance Higher Education Vocational Qualification by MIAP Learning Process. *Academic Service Journal*, 23(3), September – December, p54-67.

Schierholz, R., and Glissmann, S., and Kolbe, L. M., and Brenner, W. 2006. Don't call us, we'll call you – Performance Measurement in Multi-Channel Environments, *Journal of Information Science and Technology*, 3 (2), 44-61.

Saiyot, L. and Saiyot, A. 1995. Educational Research Techniques. Bangkok: Suwiriyasarn.

Songkhla, J. N. 2007. *E-Instructional Design*. Bangkok: Textbook Center and Academic Document, Faculty of Education, Chulalongkorn University.

Songsangyot, P., and Jirangsuwan, N. 2015. Cloud Computing and Learning Skill in 21st Century. *Journal of Technical Education Development*, 27(95) July – September. p9-15.

Srisawat, P., and Wattanarong, K., and Poonlarpthawee, K. 2015. A Development of knowledge sharing on mobile phone. *Journal of Industrial Education KMUT North Bangkok*, 6(1) January - June, p78-87.

Students Manual 2015-2016. 2015. Course Description of Software Engineering Program. Bangkok: North Bangkok University.

Thanachawengsakul, N. 2015. Acceptance Function on Information Technology in Work Operation of Military Financial Division, Royal Thai Armed Forces Headquarters. *Journal of Industrial Education*. 14(2), p536-543.

Waman, S., Jawadekar. 2005. Software Engineering: Principles and Practice. Second Edition, McGraw-Hill.

Watakeecharoen, J., and Jantarangsee, P., and Wannapiroon, P. 2015. Opinion toward online media application by cloud computing and mobile application for education of Ph.D. students. *Journal of Nursing Science*, 32(1), 66-76.

Wiriyapanich, M. 2010. Obstacles and Problem in Knowledge Management in Thailand. *Prachachat*. 16-19 September, p34.

Yoosomboon, S., and Wannapiroon, P. 2015. Development of a challenge based learning model via cloud technology and social media for enhancing information management skills. *Social and Behavioral Sciences*, 174(2015),2102-2107.

Yu, C. S. 2012. Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT Model, *Journal of Electronic Commerce Research*, 13(2), 104-121.

Yu, C. S., and Lin, Y. W. 2006. Differentiating Strategy of online banking Service Quality, *Proceedings of the 7th Annual Global Information Technology Management Association World Conference*, CD-Format, Orlando, Florida, USA.