Development of a Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students

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Abstract

This purpose of this research and development was to: (1) To study the expert opinion on the Development of Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students, (2) To develop a Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students, and (3) To evaluate the Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students. Samples were 20 members of the Faculty of Education Staff (Instructors) by purposive sampling and 120 Higher Education Students by using Volunteer Sampling from the Faculties of Education nation-wide. The research findings indicated that: (1) On opinions of experts towards the Knowledge Management System was on Very High level. ($\bar{x}$ = 4.62, S.D. = .53). The students' opinions to the Knowledge Management System was at the High Level ($\bar{x}$ = 4.22, S.D. = .16), (2) On evaluation of the creative productivity, it was found that the scored was at a high level. ($\bar{x}$ = 2.88, S.D. = .50).

Keywords: Knowledge management system; Creative instruction; Creative thinking; Higher education students

Introduction

The knowledge management system is a process of collecting, shirring, organizing, storing, and accessing to knowledge. Computer is used as a tool to enhance the power of knowledge management (Panich, 2006) to be beneficial to the development of the organizations and involving individuals, making a corporation or social bases of knowledge, and leading to lasting self-sustain. Management systems are also consistent with the process of knowledge management. This can be summarized into the following issues: (Nonaka and Takeuchi, 1995; Tiwana, 2000; Collison and Geoff, 2004) (1) Knowledge Identification, is the definition of what the organization wants employees to learn. Policies to achieve the vision, mission, values and goals of the organization, such as the SOW, defining the capabilities and characteristics of each job, etc., (2) Knowledge Acquisition, is to install the data, information and knowledge existing within and outside the organization to scrutinize and to create value, such as coaching, training, seminars, conferences, exhibitions and mentoring system, learning from direct experience and action and implementing changes in an organization's operational processes, (3) Knowledge Creation, is to create knowledge to occur in individuals by pushing Intuitive and profound understanding of the matter where anyone can be a creator of new knowledge, (4) Knowledge Storage & Retrieval, is to store knowledge so that people in the organization can search on demand. By taking into account storage methods, each organization is required to keep the information and knowledge in the best method. Storage can be saved as a database or a written record, and (5) Knowledge Transfer & Utilization is to spread knowledge and to convey quickly and appropriately throughout the organization to exchange of learning and the knowledge to use.

Knowledge management is a process that allows students to learn creatively that meets with the needs of learners and instructors effectively. Creative thinking occurs continually due to the imagination. It is different from the thoughts of others. Creative thinking bases on previous experiences; knowledge, information, reason and wisdom, creating patterns of thinking in new ways. It may show a clear concrete or abstract,

contributing to the discovery of new things. This is consistent with the data of Suwit Munkham (2004) discussing creativity as a cognitive process that can expand the scope of existing ideas to new ideas, different from the original idea and is thought to use it appropriately. Creative thinking components of (1) Fluency, (2) Flexibility, (3) Originality, and (4) Elaboration. This thorough idea needs creative process and emerged as a sequence of steps. Starting by preparing provided information and attempting to solve the problem. The incubation of thorough idea goes to a deeper level of thinking about old and new ideas, but may show a disregard for those ideas anymore. The enlightenment in the next step is to think what the answer is, or insight and monitor it. All outputs are peer reviewed. Promoting creativity is important to the individual and society, as the using of potential of individuals to benefit both them.

Purpose of the Research

The purpose of this research and development was to:

1. To study the expert opinion on the Development of Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students.

2. To develop a Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students

3. To evaluate the Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students.

Population and Sample

The population was faculty of education staffs (instructors) and higher education students from the faculty of education; Chulalongkorn University, KMUTT University, Naresuan University and Silpakorn University

The samples compress two categories as follows:

1.The sample used in the study review and the use of knowledge

management systems supporting creative instruction were 20 members of the Faculty of Education Staff (Instructors) from the Faculties of Education nation-wide by purposive sampling.

2. The sample used in the operation of knowledge management systems supporting to creative instruction were 120 Higher Education Students from the Faculties of Education nation-wide by using Volunteer Sampling.

Research Instruments

The Research instruments for data collection consisted of:

1. The focus group discussion which related to research and development of knowledge management supporting creative instruction. A discussion of issues: (1) the activities supporting creative instruction, (2) knowledge, (3) media, and (4) knowledge management system. By gathering information from a conversation of a group of 20 people, comprising experts into two aspects; knowledge management aspect and the teaching and learning that fosters creative instruction aspect.

2. Queries about needs to develop a knowledge management system supporting creative instruction. The issues in question are: (1) the process of learning and exchange knowledge, (2) The instruction that helps to deliver the creative thinking, (3) the appropriate content for knowledge management in course, (4) the communication tools for optimum learning, (5) the presentation and evaluation, and (6) the persons involved that help to build the creative thinking of students.

3. Knowledge management system supporting the creative instruction, by studying Knowledge Management and creative thinking development, then analysis details of the expert group about querying the needs to develop a knowledge management system supporting creative instruction. The program has been developing with Drupal for content management System, using PHP and installed on the Web Server using the names of www.etknowledge.com and divided into two parts: the first part is knowledge management system supporting creative instruction and the second part is activity plan for creative instruction in 12 weeks,

consisting of. 8 steps creativity, in logical order from step 1 to step 8, then applied to study the effects of the system. The sample consisted of higher education students from the Faculty of Education and evaluated the system by experts

4. Opinion surveys of instructors and students toward knowledge management system is set into a 5 Rating Scale with the following queries. (1) The content has purpose related to its content, consistent with the testing and evaluation systematically, (2) The system design. The graphics are very attractive with beautiful illustrations and provide communication tools for knowledge sharing, (3) The knowledge management activities support knowledge discovery, knowledge exchange and encourage the use of knowledge collected in a systematic way to help support teaching appropriately, and (4) The flexibility in use. The system is easy to use, convenient, fast, uncomplicated and stylish.

5. Evaluation of creative thinking measured by an objective scoring the level of success (Rubrics) and evaluated according to the 4 parts as follow.

5.1 Originality: (1) The novelty of the work, (2) The representation of concept of building works, (3) The representation of imagination and positive attitude and (4) The representation of modern concept.

5.2 Fluency: (1) Operations on schedule, (2) Completeness of contributions, (3) Clearly convey performance, and (4) Skills to resolve problems in practice.

5.3 Flexibility: (1) Shows of optional method in contribution creating, (2) Presentations demonstrating teamwork, (3) Contributions providing role model to others, and (4) Gaining reason for the performance by accepting criticism and criticize the work of others.

5.4 Elaboration: (1) Select learning content properly, (2) The presentations were shown to the knowledge, (3) Contribution can be applied to a real, and (4) Contributions are valuable and can be assessed.

Operation and Data Collection

To Begin the operation, researchers start with an orientation to samples that use the knowledge management system supporting creative instruction. The sample is the higher education students from the Faculty of Education nation-wide, 120 people from Chulalongkorn University. KMUTT University, Naresuan University and Silpakorn University, aiming to clarify suggest activities for knowledge management and roles of instructors and students. Then, follow up the plan of creative instruction and activities for 12 weeks with 8 steps. While instructors conduct the activities, researchers observe the behavior of the sample; evaluate their contributions of creative thinking and provide samples with query to comments on the knowledge management system after activities accomplished.

The researcher used quantitative information, qualitative analysis and feedback of the system use to improve findings, update details of the composition and procedures to be clearer and a summary of key points presented in the form of narrative.

Research Findings

The research findings indicated that:

1. On the expert opinions towards the Development of Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students, factors needed for considerations were:

1.1 On Content, the content should include theoretical concepts, creative productivity, product concepts and manufacturing processes.

1.2 On Activities, the activities should be an activity to promote systematic thinking with emphasis on competitive activities or contests to motivate to the acquisition of knowledge and encourage collaboration leading to creativity.

1.3 On Knowledge Management, the lessons should be delivered via online social networks. Communications should be in the

forms of telecommunications and the Internet for information sharing or served as contacting media, connecting people and supporting collaborative working.

1.4 On the Development System, the system should be flexible to use. User group access can be set at multiple levels. Appropriate communication tools and learning resources that connect to online social networking should be made available.

2. A Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking of Higher Education Students consists of 2 parts:

Part I: A Knowledge Management System consists of 6 components as follow: Member Login, Content Management, Social Media Sharing, Online Chat Channels, Website Management, and Membership Management

Member Login, Login permission are divided into four groups of users; visitors, registered student groups, the instructors and administrators. The type of visitor users is entitled to just visit the content pages. If they want to participate in system, visitors must register. Visitors can sign up with Facebook account.

Content Management, Members of the site can manage content by adding content to change the information or delete the contents of their own under permission. Contents which Members are entitled to manage are news, any questions and projects.

Social Media Sharing, such as Facebook and Twitter, and when members see that the content is found useful, they can share it instantly. The tool kit is in news page and knowledge sharing page. Users can also send mail to the person who they need personally as well.

Online Chat Channels, when members log into the system, a chat box will appear at the bottom right which can interact immediately and vote to select the best answer. This item is useful to comment in the case of members give a lot of comments on this post. Results of voting system will help users to know what comments are accepted.

Website Management, This section is intended for system administrators to facilitate the use of the system in their profile pages.

Membership management is as part of an administrator's management systems used to add members, assign permissions to members, block or remove members from the system, or edit and delete content of members.

Part II: Activity plans for Creative Instruction in 12 weeks consists of 8 Steps Creativity, in logical order from Step 1 to Step 8 as follow;

Step 1 Make friends and make plans. The process begins with the elucidation of knowledge management. Members then introduce themselves and talk or exchange information, experiences and goals of knowledge sharing to support creative thinking in teaching and learning through video conferencing and record individual skills on a knowledge tool (Weblog).

Step 2 Share problems and diagnose causes. Members record story telling by sharing knowledge of the operation through the Weblog. Then, all members help to extract the knowledge gained from reading the notes and present the issues in the Forum. Besides, members seek further knowledge from the issues presented.

Step 3 Adjust the thought and tackle the problem. The members present and determine the issues that need to exchange through Weblog. Then arrange Dialogue on issues that have been voted by the Forum. Members together prepare information, clips, images and related knowledge to record in Weblog.

Step 4 Brainstorm ideas and find out alternatives. Brainstorming to find alternative solutions leading to success, by offering solutions or opinions of fellow members as much as possible alternatively through discussion boards that members have all comments to filter and put out into the same approach, leading to the best practice.

Step 5 Propose a case and create excellence. By organizing activities to develop creative thinking and linking knowledge

with Mind map in various important issues to expresses the surrounding ideas, Members then present and jointly criticize their own contributions to develop ideas creatively. As a result; there are a lesson learned and best practices.

Step 6 Create a process and profess a skill. At this stage, members offer their own creative processes or activities by recording on a useful tool of knowledge (Weblog) to advise members to study, give compliment, and reinforce one another. Members can vote to award the procedures or creative activities.

Step 7 Share learning and construct creativities. This step, members can process with the procedure or activity in the creative instruction to students and encourage them to present innovative creations, evaluated by experts with a creativity assessment and to discuss about the innovation for revision and helpful suggestions.

Step 8 Promote delivery and top up innovation. The promotion of knowledge delivery can occur by organizing activities for members to present their creative processes and applications in teaching. Then discuss observations with experts for revision, and awards process or creative activities as an incentive to creative contributions or top-up innovation.

3. The data analysis from the study of Knowledge Management System Supporting Creative Instruction to Enhance Creative Thinking shows that,

3.1 On opinions of experts towards the Knowledge Management System was on Very High level. ($\bar{x}$ = 4.62, S.D. = .53). The students' opinions to the Knowledge Management System was at the High Level ($\bar{x}$ = 4.22, S.D. = .16)

3.2 On evaluation of the creative productivity, it was found that the scored was at a high level. ($\bar{x}$ = 2.88, S.D. = .50)

Discussion of Research Findings

The discussions of research findings indicate that:

1. Knowledge Management supporting creative instruction

should combine techniques and systematic procedures in order to store information and instructors' experiences and use as created knowledge in teaching and learning, so that students can develop creative ideas to make the innovation. The knowledge management should be opened for instructors to access its system which can be widely share experiences through various channels, and not limited to only a small group of users with similar context. This will enhance the effectiveness for a better cooperation.

2. The concept of knowledge management is used to exchange knowledge for teaching and learning. To apply the knowledge management in the teaching and learning of faculties of education, it should start up with relationship building, then share stories and experiences. After that, instructors and students define the issues that need knowledge exchange and together find alternative successful solutions by using case studies, the practices. The results of knowledge management system can further as process, guidelines and innovations.

3. To consider factors and preparation for knowledge management supporting creative instruction, instructors should understand other instructors and different cultures in each institution. Thus, the opportunities for knowledge sharing will relatively increase at high-achieved level. And if the ultimate goal is about to exchange knowledge, the teaching method of each instructor should be considered as a critical factor. The teaching method may be different by each instructor. Then, how to manage successful teaching method is used in the knowledge management. Moreover, there are suggestions and cautions to support in case of failure teaching method. This will entail a way to improve and integrate new methods of teaching. Exchanged knowledge and experiences are general benefits which one can wisely choose to use or not to use, even agree and disagree. Instructors may apply it with context of each institution.

4. The assessment of knowledge management supporting creative instruction should be modified and be different relying on each institutions' context. Instructors should create and share common vi-

sion which is concentrating on students' creation development. Each university has different contention in each courses, therefore, the creation assessment is a delicate matter. Criteria are required for creativity measuring. Objective measure should not be primarily used and subjective measure should be used for theory part. Thus, clear concept evaluation is needed for criteria selection.

5. With content and knowledge management activities supporting creative instruction, instructors should extract knowledge and categorize them. What is general knowledge and what is specific course content such as; the design of creation instruction, there must be completed with; design contents, learning and teaching and media. Then, knowledge extracted from the knowledge management system would be mostly useful depending on practices in teaching and learning activities that supports the creative instruction. This process may come from students' brainstorm and brought out to activities that suit to individuals' need to meet the difference attention. To promote creative thinking, we can use an instruction to carry it out by two cases: Physical Climate such as class atmosphere that stimulates the physicals, including classroom desks and chairs arranged to suit the activity, corner of knowledge and the cognitive performance of learners, and Mental Climate such as including enhancing the courage of learners independently. (Mahony and Ilextall, 2000).

6. The media of instruction for knowledge management supporting creative instruction should be chosen to match the needs and context which is appropriate to the nature of learners. Tacit Knowledge and Explicit Knowledge can be presented, processed and transferred to the understanding forms as documents, databases, websites, multimedia and charts. According to Nonaka, Toyama and Konno (2000) stated that the knowledge exchange needs technology and tools to assist as the facilitating tools. In each stage of the creative thinking development process on the knowledge sharing. It can be tools for storing classified information in a retrieval system which data can be accessed easily, including other things that the weblog can do; like making presentation, giving feedback or comment or sending experiences from one person to

another person without restrictions of time and place.

7. The system of knowledge management supporting the creative instruction should be considered knowledge storage in aspect of information and feedbacks storing such as; logging into a database or information recording. The knowledge storage system must be able to find and deliver knowledge instantly to use and fit users' need anytime. Besides, the knowledge retrieval is the access of users' needs. It should be screened and selected for users to use knowledge in system by choosing on the category which users can apply knowledge in practice anyway.

8. A key aspect of the user interface for knowledge management supporting creative instruction should be able to set up with user security, provide collaborative platforms and databases and support communication technology to help users access to knowledge easier. Moreover, the interface must provide expert contact channel and the ability to search for knowledge like; a digital library system, computer system and networks, internet, intranet and search engine etc. Consisting with Vorawan Vanicharoenchai (2005) information technology as the key for dissemination of knowledge throughout the organization also communication tools are needed to make it possible in connecting people thoroughly and quickly.

9. The important factors affecting to the development of knowledge management supporting creative instruction of individual students are personal factor, benefits, knowledge sharing, and a friendly usage of system users, voluntarily, trust, acceptance and external inspiration. The knowledge management system should be available a trial which researchers take a part of observation on users' interaction. They seem fun and to use system as sustainable habit or not. More, the reinforcement from Presidents or Rectors can encourage users to have participation on the knowledge management system as well. Therefore, the person in charge of system development must consider all these factors and apply them to fit with the context of the institutions in order that the knowledge management supporting creation instruction will be the most useful and effective.

Suggestions for Future Research

In this article, we suggestions for future research include the following:

1. The development of knowledge management system supporting creative instruction should be designed its system easy to use according to the user interface, not being complex. So that users can understand quickly. The system must provide tools to encourage active participation constructively in the comment full potentially.

2. The design of activities management and creative instruction should consider the differences of each student to create incentives for them to participate in the knowledge management. And instructors should help students extract knowledge and categorize the creative output, contribution or innovation in each subject.

3. The evaluation of knowledge management to support teaching and learning should be in various creative ways and flexible according to context of each institution. This should create a shared vision that is intended to developing creativity of students, and respect to different purposes in each subject.

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References

Collison, C. and Parcell, G. (2004) *Learning to Fly: Practical Knowledge Management from Some of the World's Leading Learning Organizations.* Chichester: Capstone.

Mahony, P. and Ilextall, I. (2000). *Reconstructing teaching: Standards, performance and accountability.* New York: Routledge Falmer.

Munkham, S. (2004) *Creative Teaching Strategies.* Bangkok: Phappim Publication.

Nonaka, I. and Takeuchi, H. (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation.* New York: Oxford University Press.

Nonaka, I. , Toyama, R. Konno, N. (2000). *SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation.* Long Range Planning, 33, 5 – 34.

Panich, W. (2006) *Knowledge Management for Practitioners.* Bangkok: Tathata Publication

Tiwana, A. (2000) *The Knowledge Management Toolkit: Practical Techniques for Building a Knowledge Management System.* New Jersey: Prentice Hall.

Vanicharoenchai, V. (2005) *Development of Knowledge Creation Systems using Team Learning Methods for Nursing Instructors in Higher Education Institutions.* PhD thesis, Department of Curriculum, Instruction and Technology, Faculty of Education, Chulalong korn University.