A Study on the Construction of Knowledge Sharing (KS) Platform and Its Effectiveness for Vocational Senior High School Electrical Teachers

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Abstract:

The primary purpose of the study was to construct Knowledge Sharing (KS) Platform.   In addition, the attitude and perception about knowledge sharing of teachers who participate in the quasi-experimental study was explored. For accuracy of the research results, the researchers adopted several research methods including literature review, Modified Delphi Technique, quasi-experiment study and survey, when examining the research issue.

The subjects for this study were two teachers from two classes of Department of Electrical Machinery in a vocational high school in Kaohsiung city, Taiwan, R.O.C.   In order to conduct the survey of Modified Delphi Technique, a total of 10 questionnaires were mailed out to experts in a purposeful sampling.   Based upon the result of the Modified Delphi survey, the KS platform was constructed.   Then, teachers evaluated Self-evaluation Questionnaire of applying KS platform.   The Cronbach alpha coefficient of the Self-evaluation Questionnaire was 0.94, suggesting the internal reliability to be quite acceptable. Thus, Data collected through the above two questionnaires was analyzed by Frequency, Mean, and Chi-square.

The result of the research was as follows: By the statistic results of the Modified Delphi survey, the mean above 3 which could be regard as needed to construct the KS Platform have the following ten items: "lecture courses", "team teaching", "teachers research association", "courses development committee" , "department meeting", "Q&A", "teaching achievement exhibition ",. " communities of practice", "on-line information exchange ", " study club " , " chatting " and " diary. " As to the above opinion, the 10 experts reached convergence. Based upon the above result of the Modified Delphi survey, the issues of "discussion board" "related linked websites", "search engine", "teaching database" and "electric newspaper" were constructed in the KS platform.

After the analysis of the Self--evaluation Questionnaire, we found that two teachers of experimental group had positive attitude to knowledge sharing.   This indicated that teachers were willing to implement the KS platform as an instructional tool.   Finally, the conclusion was proposed.

Key-words   Knowledge Sharing, Platform, Vocational Senior High School Teachers, Teaching Effectiveness

1. Introduction

The WWW is like a borderless e-database and e-library; anyone can get information and share knowledge through it easily.   Recently, innovations in information and computer telecommunications technology have allowed electronically networked communities a viable way of supporting learning, teaching, research, and professional development [10].   The learning process is becoming a vital factor in business and socioeconomic growth where the role of information and communication technology (ICT) is having a growing and an innovative impact [9].   Besides; teachers themselves are those who are experienced knowledge acquisition and accumulation.   Teachers generally view knowledge as something gained through individual experience.   If we can reinforce the idea which knowledge sharing is viewed as a vital part of the teachers' career, they could not only accelerate experienced acquisition but also promote their instructional efficiency and pedagogical content knowledge (PCK).   Currently, there are various kinds of instructional website and virtual community, but few studies were concern with knowledge sharing and knowledge management theory applied on the platform which was designed for teachers.   On the other hands, students now surround with excessive amount of information, and platform.   It becomes increasingly important for them to identify the most relevant contents, which fit their needs precisely.   In order to meet the demand described above, we have created a teachers' knowledge sharing platform. With the support of the platform, we hope that through the process of designing, implementing, reflecting, modifying, and sharing instructional plans for teachers can effectively manage and share their instructional practical knowledge and promote their professional development.   Therefore, how to make use of the information and technology and improve the sharing of knowledge within teachers and teachers' community has become an important area of research.   In this study, we focus on two topics including the construction of knowledge sharing platform and its effectiveness.   First, we design the platform through KS theory by Delphi method. Afterward, we try to explore the effectiveness of the platform used by vocational senior high school electrical teachers.   Finally, researchers propose the opinion to revise the KS platform to make it better and suggestions for relative study in the future.

2. Literature Review

Zhuge [21] indicated knowledge resources on the Internet could be rapidly accumulated and evoked as the common knowledge assets of the whole Internet community with the expansion of the Internet users. There are more and more studies found that knowledge sharing is not just a transfer of information but also a process of knowledge creation. Besides, [2] research cited the route form unshared knowledge in one participant's head goes through three intermediate forms (i.e., external knowledge, shared knowledge, and common ground) via four processes, namely externalization, internalization, negotiation and integration.   The study constructed the platform and allowed vocational senior high school electrical teachers to discuss and to share their knowledge in the e-community.   We hope that teacher's unshared knowledge can transfer shared knowledge and even constructed their knowledge in order to form the teachers' community.   The literature review includes two parts. Researchers first focus on the process of knowledge sharing, then discuss knowledge sharing and the community of practice.

2.1 Knowledge Sharing Processes

Knowledge sharing is the process that individuals mutually exchange their own knowledge and jointly create new knowledge. Knowledge sharing consists of both the supply of new knowledge and the demand for new knowledge [1].   Also, knowledge sharing has the following two central processes [8]:(1) knowledge donate, communicating to others what one's personal intellectual capital is; and (2) knowledge collection, consulting colleagues in order to get them to share their intellectual capital. Knowledge sharing is a dynamic interaction process through explicit and tacit knowledge [12].   The activity has the interaction through the four processes: socialization, externalization, combination, internalization each other.   This kind of interaction process causes members to be able to share knowledge, and also indirectly promotes knowledge share between the member and organization.   Then it will result in the knowledge innovation.

Based upon related literature review, we can find that knowledge acquirement can affect knowledge sharing [15]; knowledge sharing will affect knowledge innovation [12]; knowledge acquirement can affect knowledge sharing and even knowledge utilization [5].   Additionally, knowledge sharing plays an important role in knowledge management. Knowledge sharing is the most essential and important factor on knowledge management system [3], [7], and [12].   Therefore, knowledge creation, knowledge accumulation, knowledge sharing, knowledge utilization, and knowledge internalization have high mutuality.   If we can utilize the KS platform well, teachers' instructional efficiency will signalize growth.

2.2 Knowledge Sharing and the Teacher Community of Practice

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Wang [17] cited how to apply knowledge management on education and suggested teachers must learn how to use information technology (IT) and community technology well, and to build the teachers' virtual community.   As well, teachers should learn to apply knowledge management mode and to improve education organization's knowledge sharing and executive programs. A community of practice is a group of people who are bound together informally through sharing expertise and are enthusiastic for something [18].   This definition is shared by others [14].   And it is also about sharing experiences and knowledge in creative ways and this can lead to new approaches to problem solving and innovation.   Teachers' professional community is different from general community.   Teachers generally have shared norms and values, and they carry out critical reflection and continue the professional dialogues with one another [16].   Some education technology advocates [6] suggest that virtual communities for teachers' professional development and socialization could help teachers learn new skills and adopt new approaches that will facilitate their transition to reform-based practices. Knowledge sharing is important, and it can be defined as the circulation of knowledge throughout the organization [19].   Lin [11] found that team-based knowledge sharing could promote teachers' professional growth in teachers' professional cyber community.   Based upon all the above literature, researchers design and construct the platform through knowledge sharing theory and views.   We try to survey the current situation of vocational senior high school electrical teachers' use the KS platform and its effectiveness.

3. Method

This study was conducted by the Modified Delphi Technique, quasi-experiment and survey methods.   It took 6 weeks for the quasi -experimental study applying the KS platform developed by researches in two vocational senior high school teachers and their students.   The sample and instrument are described as follows:

3.1 Participants or Samples

3.1.1 Participants of a Delphi Study

A Modified Delphi study does not depend on a statistical sample that attempts to be representative of any population. It is a group decision mechanism requiring qualified experts who have deep understanding of the issues.   Therefore, one of the most critical requirements is the selection of qualified experts.   Through a rigor process of selecting experts, the participants of the Delphi study were ten reputation electrical machinery departments' related teachers, professionals, and principals.

3.1.2 Survey Samples

After defined the participants of the Delphi study and designed the KS platform, two teachers from two classes of Department of Electrical Machinery in a vocational high school in Kaohsiung city, Taiwan, R.O.C. were selected in a purposeful sampling to participate in the study for the usage of knowledge sharing platform.

3.2 Instruments

At first, a modified Delphi questionnaire was developed for surveying the above 10 participants. Second, the other questionnaire related to perception, attitudes of the teachers was also developed in order to send out to the above samples after their using the knowledge sharing platform.   The two questionnaires were presented as follows.

3.2.1 Modified Delphi Questionnaire

Based upon literature and the discussion of our research team members, the first round of Delphi questionnaire used in this study was developed.   Its type is made up of structured questions, which included a multiple-choice type of the question items, instead of unstructured questions.   Therefore, it is called Modified Delphi Questionnaire, instead of typical Delphi Questionnaire.

All the questionnaire items of this study are evaluated and replied by Likert 5 scale, the averages above 3 means experts' opinions can be regard as needed.

3.2.2 Self-evaluation Questionnaire of Applying KS Platform for Teachers

Self- evaluation Questionnaire for teachers was employed for understanding the profile of learning process after six weeks experiments.   The level of measurement includes Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Content knowledge (CK) which is just the same as the construct of knowledge sharing (KS) platform.   This part of the questionnaire consisted of 15 items of attitude and perception about knowledge sharing indicating evaluation levels of agreement or disagreement on a 5-point Likert scale.   The Cronbach alpha coefficient of the questionnaire was 0.94, suggesting the internal reliability to be quite acceptable.

4. Results

4.1 Investigation Result Analysis for the 1st

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Round and the 2nd Round Modified Delphi Technique

By the statistic results, the identification of Knowledge Sharing (KS) aspect from professional domain experts, the averages above 4 have four items; mark from high to low it arranges to be " lecture courses ", " team teaching ", " teachers research association", courses development committee, department meeting ", " Q&A", "teaching achievement exhibition, ". The averages between 3~4 have six items, marked from high score to low as below " communities of practice", "on-line information exchange ", " study club " , " chatting " , " diary ".   The above averages of items above 3(mean) evaluated from experts' opinions can be regard as needed to construct the KS Platform for this study.

After chi square examination, the results show that the chi square value of items are between 0 and 1.05(critical value(χ^2 3.841, df=1, p=.05), it means these items which evaluated by experts has homogeneity. It also means that the opinion of the experts reaches convergence.

4.2 The Construction of KS Platform

The main goal of this study was to explore how well teachers can use the platform to spread knowledge, and interact, communicate with students in construct of Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Content knowledge (CK). The second goal is aimed to help students understand the platform with the ultimate goal of using it to complete, solve, sharing their homework.

Based upon the above result of the Modified Delphi survey, the items of " Q&A", " chatting ", communities of practice" can construct the issue of "discussion board" which includes the functions of uploading the files and communicate with each other in KS platform.   The item of "on-line information exchange" can construct the issue of "linked related websites" and "search engine."   The items of "lecture courses ", " team teaching ", " teachers research association", courses development committee , department meeting ", and   "teaching achievement exhibition, " can construct the issue of "teaching database" which contents include PK, PCK, and CK.   The item of "study club "and "diary "can construct the issue of "electric newspaper." The Knowledge Sharing platform is shown as Fig. 1.

As a result, the KS platform was to provide students with theory background, practical knowledge of electrical machinery.   Students were asked to work on conducting homework that giving by teachers and to demonstrate their problem-solving skills as well as their skill in analyzing and synthesizing information by this KS platform.

Fig. 1 Knowledge Sharing (KS) Platform Website.

4.3 Self-evaluation Analysis of Applying KS Platform for Teachers

Teacher's self-evaluation analysis is to explore the growth situation of knowledge sharing which teachers took during the experimental period.   Table 1 shown as below is describing the usage of the knowledge-sharing platform for past six weeks. 174 times were recorded during an observation.   The percentage is portion out in 35 %(PK), 45.3 %(CK) and 19.7 %(PCK).   In the other hand, based upon the survey of the **Self-evaluation Questionnaire, we found that** these teachers of experimental group had positive attitude to knowledge sharing after using KS platform as an instructional tool.   The above records indicated that teachers were willing to implement the KS platform as teaching tool.   The most important purpose for KS platform is to establish the sharing regulations to spread the teaching skills or knowledge of teachers. Through the capability of uploading the files and discussion board, teacher and students can interact to determine the problems on the KS platform.

Table 1. Usage of knowledge sharing in KM platform for teachers

knowledge sharing				
	PK	CK	PCK	SUM
Week 1	61	13	26	100
Week 2	20	31	27	78
Week 3	10	2	12	24
Week 4	8	1	11	20
Week 5	8	10	23	41
Week 6	19	2	24	45
SUM	126	59	123	308

5. Discussion: The Effectiveness of Knowledge Sharing Platform

We believe that knowledge sharing platform is best considered from the flow of knowledge and information between teacher (knowledge provider)

and students (knowledge user). The design was based upon strong theoretical grounds and their benefit of previous experience and knowledge with KS platform. KS platform would be a key component of the solution and the use of KS platform could provide the necessary linking between the teachers and students in the form of distributed environment. Generally speaking, within the learning environment, the platform is being used primarily as an information resource for teachers or students for the storage of instructional material including class notes, linked related websites.

In this platform, teacher can increasingly add values through students, teaching processes, and technology whose outcomes are in the form of information. These are highly customized for the student, and also the KS platform precisely can draw up the sharing mechanisms. Besides, teachers not only can instruct their outstanding skill and experience through the KS platform, but also can implement knowledge management in practice. KS platform is comprised of subsystems and interfaces between subsystems which in serves are distinct processes that will typically have both a human and technology component, such as providing uploaded documents to the discussion board for students to communicate with each other during knowledge sharing processes. Teachers can upload the teaching materials to knowledge platform and students will be notified to download homework and share with others. In other hand, discussion board provides a space for teachers and students to interact with others on line. Interaction records show that the usage of KS platform are increasingly important for two teachers who participate in this study.

6. Conclusion

Based upon the overall study results of Modified Delphi Questionnaire's and **Self--evaluation Questionnaire's** analysis, we proposed that teachers of experimental group had positive attitude to knowledge sharing after using KS platform as an instructional tool. And it is clear that consideration of the practical issues associated with teacher's implementation is needed. The new millennium will be marked by the changing of mindsets: the teacher chance their roles from sage on the stage to guide on the side, and the student moving from dependent, passive role to self-directed and active role [4]. From this study, it could be concluded that KS platform had the potential to empower teachers in well-designed teaching environments. Therefore, in order to improve the usage of KS platform, the developmental content of KS platform should come from some deliberate strategy, which aimed at helping students to reflect on their learning processes and to have feedback from them. Besides, the professional knowledge should have more additional function such as various

hyperlinks to useful and related information. Also, there should be strong functions of interaction that teachers and students can have more communication and discussion with each other in the web. For example, FaBweb developed at City University of Hong Kong combines three individual packages in one facility: Learning Resource, Meeting Space and Play to learn [20]. Finally, since educational environments are changing rapidly; KS platform is enabling education to become more effective and is capable of supporting a wider variety of needs. And careful choices must be made of what to keep from the traditional ways and what have to change.

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