Using Knowledge Acquisition Platform in Instruction to Improve Teachers’ knowledge

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Abstract: The study reported in this paper investigated teachers of vocational high school in integrating KM platform into instruction by observing the effectiveness of the platform in promoting their teaching reflection processes. Study data was collected using literature review, self evaluated questionnaire of teachers, in depth interviews in pre, mid and post instructional stages. Factor analysis was employed to identify three dimensions for further t-test analysis: perceptions, feelings and actions of teacher attitude toward knowledge platform, the platform considered as a useful knowledge acquisition tool and overall perception of teaching on the platform. The study showed that the knowledge platform have the potential development for teacher when they are implemented appropriately. Teachers using platform to acquire knowledge for accessing knowledge accounted 34% in Content knowledge (CK), 43 % in Pedagogical knowledge (PK), and 23 % in Pedagogical Content knowledge (PCK) after the 731 times observation were recorded. The study also found, teachers tended to prefer knowledge acquisition about PK and PCK in terms of platform interactions, but teachers using platform for acquisition CK accounted the least in overall KM. In additional, after the questionnaire surveys, teachers demonstrated positive and affirmative attitudes toward knowledge acquisition platform and the results also demonstrated significant difference in overall scale rating and neutral attitude.

Key-words: knowledge acquisition platform, self evaluate questionnaire, interview, quasi-experiment
1 Introduction
The knowledge acquisition platform provides a new environment with a wealth of pedagogic possibilities. This research is to develop the model of training up teachers’ knowledge acquisition in senior vocational school, and to evaluate the effectiveness of application of knowledge management strategy. We establish a knowledge acquisition platform based on previous study and literature review in order to keep the step up with the changing educational world. Experimental instruction was implemented for evaluating the mechanism of platform and effects of improving knowledge management ability. Learning and teaching assistant function of this platform were applied in practical instruction. Questionnaire and in-depth interviews were then used to examine the knowledge acquisition attitude of teachers and the effectiveness of KA platform application.

This paper focused on the effects of knowledge acquisition ability of teachers to practical instruction, and the intermediary effects of KA platform. According to the above-mentioned facts and belief, this paper is intended to achieve the following goals: (1) Develop software learning mechanism of knowledge acquisition for vocational high school teachers. (2) Establish the knowledge acquisition platform for vocational high school teachers. (3) Investigate the attitude of applying knowledge acquisition teaching of vocational high school teachers. (4) Explore the effectiveness and influence factors of teachers for using knowledge acquisition website and web community learning mechanism.

2 Literature Review

2.1 Knowledge Acquisition and the Teacher Community of Practice
Wang [7] 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 acquisition and executive programs. A community of practice is a group of people who are bound together formally through sharing expertise and are enthusiastic for something [5]. This definition is shared by others [3]. 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 [4]. Some education technology advocates [1] 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 [6]. Lin [2] found that team-based knowledge acquisition could promote teachers’ professional growth in teachers’ professional cyber community. Based upon all the above literature, researchers design and construct the platform through knowledge acquisition theory and views. We try to survey the current situation of vocational senior high school electrical teachers’ use the KA platform and its effectiveness.

2.2 Advantages and trend of integrating KA platform into curriculum
Due to the drastic competition of globalization, network will become speedy and convenient tool of knowledge acquisition and sharing. Requirement of information is huge and complicated for people in global village. Integrating knowledge management in instruction as tactical activity is a complete development mode and paradigm to build up expanded global instruction vision through learning network. Main tools used for knowledge management are organization movement, process, reengineering and technology. Those can simplify and enhance organizing data, information and knowledge acquisition and knowledge floating. KA comprehends various knowledge resources.
including database, websites, employee and cooperator. Therefore it’s necessary to set up channels for knowledge acquisition and evaluate its’ importance in order to bestow richer meaning upon business through connection to other information. The improvement of information technology and internet in recent years accelerate the frequency of web interface operation, and network learning platform under web structure was then appear. Teachers who have technology literacy should combine this instruction trend and advantage of network platform to effectively achieve the purpose of integrating technology into instruction.

3 Research Method

3.1 Methods
In this study, we employed literature review, Modified Delphi Technique, questionnaire of teachers, a quasi-experimental of integrating KA into curriculum, and in-depth interviews to explore the effectiveness of knowledge acquisition via the knowledge acquisition platform. We described the methods as follow.

3.1.1 Modified Delphi Technique
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. 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. 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.

There will be some important issues to implement a KA instruction system as follows: (1) Users don’t have to learn new method to operate software. (2) Technology platform should provide each resource and information to users in each possible way. (3) Technology platform should be integrated with different devices such as telephone, notebook, desktop, etc. That’s for improving mobile capability of knowledge workers. (4) The platform combined with structure, application software and solution program has to supply for each kind of requirement.

3.1.2 Questionnaire and subjects
A questionnaire was used to elicit relevant information on the teacher’s perception, feeling and action attitude toward using the KA platform to acquisition the information that they needed. The questionnaire for teacher consisted of 50 perception, feeling and action statements about knowledge acquisition indicating levels of agreement of disagreement on a 5-point Likert-type scale with 5 standing for strong agreement. The Conbach alpha coefficient of the survey was quite acceptable for overall (α=.9496).

3.1.3 Quasi experiment
Two senior teachers of Dept. of Electric Machinery were invited to held experimental instruction in KM platform for six weeks, and the teaching subject is Digital Logic Design. Researchers observe and record changes of log-file everyday to understand the practical situations of experimental teachers for applying platform mechanism, including knowledge acquisition, sharing, application and creation.

3.1.4 In-depth interviews
There were in-depth interviews in pre-, mid-, and post-instructional stages. We traced changes of viewpoints and attitude of experimental teachers in knowledge acquisition through three in-depth interviews, and then investigate effectiveness and influence factors of experiment. Semi-construction interviews for one and half hours were taken and result data was analyzed by Ground theory method.
3.2 Instrument

3.2.1 Knowledge Acquisition platform

The knowledge acquisition platform is setup based on repeatedly discussions and previous research: teachers cultivate mode, and it integrated functions CK (Content Knowledge), PK (Pedagogical Knowledge) and PCK (Pedagogical Content Knowledge). This interactive instruction website is established using Share Point Team Service software and interface structure. Researchers also enriched the web by expanding plentiful and various content including PK (teaching materials, teaching methods, administration knowledge, counseling knowledge, classroom management), PCK and CK.

3.2.2 Questionnaire of applying KA attitude

Questionnaire of applying KA attitude is to examine teacher’s attitude of applying KA platform. There were three dimensions to evaluate including perception, feeling and action toward KA platform and examine effects of integrating KA platform in instruction. There were six expert reviews (three industry professionals and three experts of knowledge management), reported acceptable internal consistency and validity for each subscale.

3.2.3 In-depth interview outline for teachers

Semi-construction interview outline is made on basis of literature review and six professional reviews for acceptable internal consistency and validity. It included two subsections, one is effectiveness of website application, learning share, cooperate learning, and the other is the obstacles of knowledge acquisition and its’ influence factors.

4 Results

4.1 Investigation Result Analysis for the 1st Round and the 2nd Round Modified Delphi Technique

According to the statistic results, the identification of Knowledge Acquisition (KA) perspective from professional domain experts, the averages above 4 have 9 items; manifestation from high to low it arranges to be “pursuer further education on job”, “business exhibition”, “visit electric machinery factory”, “internet”, “newspaper or medium”, “self-teaching practice”, “instructional introspection”, “teaching achievement exhibition”, “teachers research association”, courses development committee”. The averages between 3~4 have three items, manifestation from high score to low as below “interaction with students”, “seminar with graduated students”, “chatting in leisure time”. The above averages of items above 3(mean) evaluated from experts’ opinions can be regard as needed to construct the KA 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(\(\chi^2\) = 3.841, df=1, p=.05), it means these items which evaluated by experts has homogeneity. In other words, the opinion of the experts reveals convergence.

4.2 Analysis of KA platform observation records

Operation environment and interface of KA platform is set up by Share Point Team Service. 653 interaction records in KA platform were taken and summarized during six week experimental instruction. Table 1 shows that case study teachers required knowledge most about Pedagogical Knowledge (PK), and least about Pedagogical Content Knowledge (PCK). Interaction of PCK is more stable for knowledge acquisition.

<table>
<thead>
<tr>
<th>knowledge acquisition</th>
<th>PK</th>
<th>CK</th>
<th>PCK</th>
<th>SUM</th>
</tr>
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<tbody>
<tr>
<td>Week 1</td>
<td>115</td>
<td>43</td>
<td>58</td>
<td>216</td>
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<tr>
<td>Week 2</td>
<td>67</td>
<td>69</td>
<td>0</td>
<td>136</td>
</tr>
<tr>
<td>Week 3</td>
<td>43</td>
<td>37</td>
<td>10</td>
<td>90</td>
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<td>Week 4</td>
<td>50</td>
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<td>60</td>
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<td>Week 6</td>
<td>23</td>
<td>16</td>
<td>17</td>
<td>56</td>
</tr>
<tr>
<td>SUM</td>
<td>319</td>
<td>233</td>
<td>101</td>
<td>653</td>
</tr>
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</table>

4.3 Self-evaluation Questionnaire of Applying KA 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 acquisition (KA) platform. This part of the questionnaire consisted of 15 items of attitude and perception about knowledge acquisition 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.

### 4.4 Self-evaluation Analysis of Applying KA Platform for Teachers

Teacher’s self-evaluation analysis is to explore the growth situation of knowledge acquisition which teachers took during the experimental period. Table 2 shown as below is describing the usage of the knowledge acquisition platform for past six weeks. 731 times were recorded during an observation. The percentage is portion out in 43% (PK), 34% (CK) and 23% (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 acquisition after using KA platform as an instructional tool. The above records indicated that teachers were willing to implement the KA platform as teaching tool. The most important purpose for KA platform is to acquire knowledge from platform before it is able to be transferred. Teachers might learn from its past, by doing, by borrowing and by a continuous process of searching and scanning.

Table 2. Summary of KM platform observation records.

<table>
<thead>
<tr>
<th>Subject</th>
<th>PK</th>
<th>CK</th>
<th>PCK</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge acquisition</td>
<td>319</td>
<td>249</td>
<td>163</td>
<td>731</td>
</tr>
</tbody>
</table>

### 5 Discussions

The establishment of KA platform was based upon strong theoretical and knowledge. We also believe that knowledge acquisition platform is best considered from the flow of knowledge and information between teacher (knowledge provider) and students (knowledge user).

On the other hands, we found that the integrating KA platform into practical instruction has been identified progressively but the concept and experience of teachers in knowledge acquisition are still weak, therefore, it’s difficult for them to integrate KA platform in practical instruction. Also, the weakness of computer literacy among teachers is key factor to obstruct teacher’s knowledge acquisition.

Teachers have always applied new technologies and have been very creative in their endeavor and activities. More recently, computer technologies have become popular teaching tools, such as platform, platform can prove assistants for teachers in professional capability, instruction methods and subject instruction effectiveness in Department of Electric and machinery.

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 KA platform precisely can draw up the acquisition mechanisms. Besides, teachers not only can instruct their outstanding skill and experience through the KA platform, but also can implement knowledge management in practice. KA 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 downloaded documents from the discussion board. 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 KA platform is increasingly important for two teachers who participate in this study.

### 6. CONCLUSION

To sum up, teachers of experimental group had positive attitude to knowledge acquisition after using KA platform in instruction and it is helpful for teachers understanding of knowledge
management and self instruction.

Therefore we provided some suggestions for setting up a KA platform.
(1) Multiplicity and variety: Except the professional knowledge, there should be more additional function such as various hyperlinks to useful and related information.
(2) A program of making KA practicable should place importance on integrating information technology and organization culture revolution concept into curriculum. As mentioned, it will be extremely important area and application to transfer knowledge to resources and manage effectively in future. Therefore, it is important to explore successful experience of business and apply that into vocational education including qualified teachers cultivation, knowledge management application.
(3) Plentiful professional knowledge: We have to remember the original purpose of this platform is to set up teachers' knowledge bank and provide teachers professional knowledge in good order. The instruction materials and information should be updated casual on time.

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Reference: