Knowledge Creation Community Portal for Research Development

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Abstract — Conducting thesis research remains the central requirement of graduation for most universities. Lack of personal knowledge and experience are the main challenges facing postgraduate students during their research completion. This research in progress paper seeks to provide a knowledge creation model for research development among postgraduate students. The participants are masters and PhD students at (UTM) Universiti Teknologi Malaysia faculty of computing, who either are in the process of completing their research process or have just completed it. The research was started by observation, literature review, and interviews in an attempt to understand the current situation and identify required web tools and knowledge conversions within research development activities; next, a questionnaire was used to develop the proposed model. Eventually, a knowledge creation model for research development was developed. It is envisaged that the model can help postgraduate students to overcome their research development difficulties, and thereby help the university to achieve strategically professional sustainability.

Keywords – knowledge creation; online community; research development; research development model; knowledge creation model

1. INTRODUCTION

Lack of personal knowledge and experience in thesis research remains a central problem for many of postgraduate students, which could lead them to dropping out or delay their graduation. Various factors can facilitate research completion, and learning from others’ experiences is one of them. Going through research writing can be especially beneficial and an experience resource for research students who have just started. Similarly, the new participants feel encouraged and inspired when they witness the success of their previous peers. It is also helpful to be connected with those who can do well in thesis research [1].

University Technologi Malaysia (UTM) implements key performance indicator (KPI) strategic initiative to promote research quality and performance among its postgraduate students. Through this, the university is attempting to achieve stability development and survival measures. This strategic initiative puts more workload on the students so as to improve their research quality in order to achieve university goals.

Various procedural knowledge about conducting research and what some of the students are doing can help others to perform their research easily and avoid duplication of effort. This knowledge includes, specifically: research ideas designed to identify new research gaps or problems; prior knowledge to choose appropriate methods; how to apply these research methods based on the need of each method’s need; identifying the common problems and issues facing students during conducting their research, how to avoid them; and so forth.

It is important to facilitate the creation and sharing of knowledge which gains significance through experiences with those who need it, especially new students. One of the most powerful solutions for knowledge-sharing and creation can be found in the online community.

The online community inspires self-learners to discuss and learn from the problems/situations of others, as it enhances collaborative thinking, sharing personal experiences, etc. Individuals in online communities are allowed to disseminate their own opinions and thoughts. In addition the members are also encouraged to learn from other online community members’ experiences and thoughts [2].

It also provides a variety of web tools and applications that allow anyone to create and share online knowledge and information such as Forums, Wikis, Blogs, Social Networking, Video Sharing and other Web 2.0 tools. Unfortunately, UTM does not provide such kinds of online portals and these tools are not fully utilized by the University to provide communication among the postgraduate student community. Therefore, the focus of this study is to develop an online community portal for knowledge creation and sharing in the research domain, as well as to provide an effective way of communication and interaction between the students and their research colleagues.

The paper consists of six main sections, commencing with an introduction which shows an overview of the problem background and the purpose of the paper. The second section explores the theoretical background that has been
mentioned in literature and which is used as the theoretical lens for the research. The following section indicates how the methodology has been used to guide the research towards achieving the research objectives. Section four is the process whereby the data which has been gathered through the questionnaire is analyzed. The fifth section explains the developed model and how it can help post graduate students to overcome difficulties encountered during research development. Finally, the paper ends with a conclusion section which summarizes the main points detailed and the research contribution made by this study.

2. THEORETICAL FOUNDATION

This section provides the theoretical background which has been used as a theoretical lens to guide the research towards development of the community model. This section is divided into two parts. The first demonstrates how knowledge has been managed to enhance the learning process; while the second explores how web2.0 tools have been used to support learning through knowledge management.

A. Managing Knowledge in Research

In Asia, knowledge-sharing within academic environments such as universities is individualistic and group collaboration and communication tends to be weak [3]. Knowledge management can provide a competitive advantage for academic institutions similar to that in business organizations [4] [5]. For instance, the model is been proposed to manage knowledge within E-learning, in this study, it is stated that knowledge management can significantly improve the learning process through four phases of explicit and tacit knowledge management. First of all, knowledge creation and acquisition in this context is defined as the process of developing new knowledge from data, information and prior experience respectively. Secondly, after the knowledge has been created, the next significant stage is to organize and store these intellectual capitals into corporate taxonomy or a knowledge map. The third aspect of the knowledge management is to facilitate accessing, exploring and retrieving knowledge resources. Retrieving and accessing disseminated knowledge cannot solve a learner’s problem alone; therefore, the fourth stage of the model aims to cover this concept. Assessment and feedback responses from the instructors consist of reading suggestions or comments that are very effective in helping learners solve their existing problems [6].

![Managing Knowledge in E-Learning](slam, M, et al, 2011)

Although other models have been developed for knowledge-sharing in higher education [7][8][9][10], the focus of these models is on course work study. This is intended to provide easier and faster information-sharing between lecturers and their students through e-learning and hence, does not adequately cover the area of research development.
To overcome the deficiencies currently existing within the area of research development, an integrated knowledge-creation framework has been proposed to identify which knowledge can be communicated and shared within research [11]. This framework has been adapted by the researcher as the theory lens by which to guide the research since it covers all required phases for research development. The framework of Niedderer, et al. (2008) demonstrates how the SECI model helps to understand, manage and transfer knowledge within the research process. Four stages have been identified and integrated while conducting research, according to the four modes of knowledge conversion in the SECI model. These are shown below as follows:

- **Topic Findings (Internalization):** application of the previous research outcomes or practical experience in new research or in practice. Contextual review/problem-setting; in this stage the researcher reviews the existing knowledge in the area to attempt to find a knowledge gap which could trigger the research.
- **Research Methods (Socialization):** tacit knowledge-sharing through communication among individual students to choose a suitable method from among various methods of research development. In the methods-stage, the best method is identified and applied to the hypothesis so as to achieve the research findings.
- **Elicit Findings (Externalization):** in this stage, the newly-generated knowledge in the research is elicited. These elicited findings are to be evaluated through writing or discussion with other researchers.
- **Outcome dissemination (Combination):** this refers to dissemination of the research which is articulated from the previous explicit and tacit knowledge to peers. It is to be reviewed and combined with other works.

As can be seen, the framework identifies the research accomplishment phases or stages, as well as describing the knowledge conversion process that is related for each of the steps. However, this framework covers only the theoretical part since it does not overly concern itself with knowledge application and has not been applied by other studies. In relation thereto, this research aims to develop an online community to cover the application part of using this framework which can then be used by post graduate students of the computing faculty.

**B. Knowledge-Sharing Tools**

Knowledge-sharing tools include software or web applications that can be used to support both individual and group knowledge-sharing. There are many tools that can be used during the development process of any knowledge-sharing systems. For instance, to illustrate how various web2.0 tools can be merged with each mode of the learning process, a framework has been proposed by [12].

![FIGURE 2: Managing Knowledge within E-Learning (Chatti, M., et al, 2007)](image)

Neither this framework nor others show how these tools can be used for research development purpose [13] [14]. For such a purpose, these tools have been mapped to the SECI model so that each knowledge conversion mode can be supported within research development. This mapping process has been performed based on the communication features of each tool, as well as their compatibility with the research context. For example, instant messaging and chatting can provide face to face interaction that leads to tacit knowledge-sharing which belongs to socialization.
TABLE 1: Knowledge-sharing tools mapped to SECI model

<table>
<thead>
<tr>
<th>Socialization</th>
<th>Externalization</th>
<th>Combination</th>
<th>Internalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion Forum</td>
<td>Blogs</td>
<td>Blogs</td>
<td>Post Blogs</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>Wikis</td>
<td>Wikis</td>
<td>Wikis</td>
</tr>
<tr>
<td>Audio chatting</td>
<td>Social Networking</td>
<td>Encyclopaedia</td>
<td>Social Networking</td>
</tr>
<tr>
<td>Video Chatting</td>
<td>Comments</td>
<td>Social Networking</td>
<td>Paper Documents</td>
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<tr>
<td>Videoconferencing</td>
<td>Encyclopaedia</td>
<td>Comments</td>
<td>Encyclopaedia</td>
</tr>
<tr>
<td>Email</td>
<td>Documents sharing</td>
<td>Videos Sharing</td>
<td>Photos Sharing</td>
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The knowledge-sharing tools in this context as shown above represent the web 2.0 tools or features that are preferable to be used at each research stage based on the SECI model. For example, at the second stage of research, Figure 1 demonstrates which methods are used when the students found their topic; however, they do not know how to apply this. They can access the socialization module to contact others who have just finished this stage. This can be done through forum, Instant Messaging, chatting or discussion. In this way, the students can share their knowledge and experiences at each stage of the research they are currently involved in.

3. METHODS

For this research, a multi-methodological approach introduced by Nunamaker et al. (1991) is chosen as a research methodology. The research starts by identifying the problem and, the process is undertaken through observation as the researcher is a participant within the domain. Following this, the next activity was a literature review to evaluate the scholarly research concerning knowledge management and how web 2.0 tools can support the knowledge management process within research, as well as the main point of this literature is shown in Section 2. An interview was then conducted with five post graduate students of the computing faculty to better understand the current situation, that is, the need for the model. The next step involved the collection of data through a questionnaire based on the framework introduced by Niedderer, et al. (2008) so as to develop the proposed model and integrate it with web 2.0 tools. The sample for this questionnaire consisted of post graduate students of the computing faculty; this step represents theory building according to the methodology. Since this paper is an “in progress study” the latter activities can be developed and prototype tested as proof for the theory.

4. ANALYSIS AND RESULTS

This section provides the analysis of respondents’ feedback through interviews and questionnaire results. The interviews were conducted with five mix-mode master students to gauge an understanding of the current deficiencies, how they communicate and determine what they need. To sum up their answers, they mentioned that the existing UTM main portal does not adequately support communication and knowledge-sharing for research development. Communication and sharing of knowledge is still done via email and phone. In addition, the research development is a long process which cannot be covered only by the supervisors; it is important to have a communication medium to help in this purpose. The participants used to ask friends to find others who are at the same area of interest. They all mentioned experiencing stress concerning developing such a community to help better communication and knowledge-sharing in order to overcome their research development difficulties.

The remainder of this analysis section intends to assess the research development activities framework introduced by Niedderer, et al. (2008) to be applied during research development among post graduate students in UTM. It also seeks to identify preferred web tools for developing an online community portal to improve knowledge-sharing at the different level of research development activities. Since the data collection was conducted based on the knowledge creation framework for
research development and interviews, the following sections present the result of data collection for the knowledge-sharing activities within each phase of the framework, as well as their preferred community tools.

A. Respondents' Background

This section seeks to provide an overview of the basic information concerning the respondents; the main focus was to receive the points of view of more PhD and master students. The questionnaire was distributed online to access all post graduate students from different educational levels. Responses from 33 post graduate students were received; with them the majority of the respondents being master students. The percentage of responses from master students was 73% and 27% were from PhD students. Also, the percentage of respondents who were international students was 91% while only (9%) were local students.

B. Topic Findings (INTERNALIZATION)

The questionnaire assessed the respondents’ perspectives about their need for easily a finding topic. The three questions that are closely related to this phase were analyzed as follows.

- The respondents were asked whether collecting research from all previous students into one community portal would increase their awareness about current research trends in their domain which would then lead to a coordination of their research effort. 50% of the respondents agreed with this research activity; in contrast, 32% did not agree that this activity would be helpful for them. The remaining 18% were neutral.
- The next activity considered by the framework at this phase was that of sharing practical experience. For this purpose, the respondents were asked if sharing the practical experiences of senior students could inspire them to find a new research topic. 58% of respondents agreed; while 32% indicated disagreement with this activity and the remaining 10% were neutral.
- The third question considered whether sharing of senior students’ research outcomes by one portal could help students to find a new topic easily. Forty-seven percent (47%) of the respondents agreed; while 26% did not agree with this point and the remaining 28% answered as neutral.

The next part of the question which is related to this phase attempted to determine the web2.0 tools preferred by the PG students to be used for the purpose of finding a new topic or a knowledge gap. There are five types of communication medium tools which have been indicated by the PG students as shown in Figure (3). The highest number of the respondents (32%) preferred the use of paper documents, while about 29% preferred using social networking. The rest comprise Blogs, Wikis and encyclopedia by levels of 17%, 15% and 7% respectively.

C. Research Method (SOCIALIZATION)

The second phase of the knowledge creation for research development framework is responsible for applying suitable methodology in order to achieve the research findings. This phase is considered as being one of the most important
phases for any research, since all the research activity dependent on the method has been chosen. Based on the framework, three questions about the knowledge-sharing activities of this phase have been posed as follows.

- The first question was to assess the respondents’ opinion regarding the usefulness of discussing with those who have applied their methodology successfully. The result indicates that 58% of the respondents agreed that this knowledge-sharing activity to be provided by the portal would be useful for them. In contrast, 36% disagreed with this and 6% considered it as neutral.

- The second question sought to determine whether facilitating the communication among PG students would increase their research performance. The respondents agreed by 59% with this knowledge-sharing activity; meanwhile 38% disagreed and 1% were neutral.

- The last question for this phase concerned knowledge-sharing of mistakes during the conducting of research. It was asked whether this would help them to avoid those mistakes experienced by senior students. The result of this question indicated that 62% of the respondents agreed with this knowledge-sharing activity; compared with 32% of respondents who disagreed and 6% who remained neutral.

In order to evaluate which web tools should be included in the proposed model, the respondents were asked to describe which tools they prefer to use by which to achieve the above knowledge-sharing activities. There are six types of tools which have been determined by the respondents, as shown in Figure (4). More than one third (36%) chose group discussion followed by 22% who selected forum and 19% email, instant messaging and chatting received scores of 12% and 8% respectively; finally only 3% proposed the use of a Blog for this purpose.

![Figure 4: Web2.0 tools for Socialization](image)

**D. Elicit Findings (EXTERNALIZATION)**

Eliciting findings to receive comments or feedback is the third phase of the research development framework. According to the framework, it is important for students to externalize their findings, in order to be assessed by the others who are at the same area of interest. To show the need for knowledge-sharing activities regarding this phase, three related questions were asked.

- In order to elicit their findings, respondents were asked to whether receiving feedback and comments could help them to assess their findings in terms of quality. From the responses, 56% agreed that this activity of the framework could really help them to evaluate their findings level, while 37% disagreed and 3% were neutral.

- According to the framework, eliciting findings and reading feedback from those who are in advance of the interest area will help the researchers to understand different views of their findings; as a consequence, they can improve the outcome of their findings. The respondents were asked whether sharing their findings with those who are in the same interest area could help them to refine their findings. A total of 45% agreed, 29% disagreed and 26% were neutral.

- Another difficulty related to the findings phase after students have received their outcome is that of benchmarking. Respondents were asked whether the activity of eliciting findings through the community portal could help them to benchmark their findings. A total of 56% of respondents agreed with this activity, while 36% disagreed and the remaining 9% were being neutral.

An enquiry arose regarding which web2.0 tools should be provided by the online community portal. The respondents were asked about the tools they prefer to use so that they can share, benchmark and enhance their findings. As is shown in
Figure (5), the result indicates that there are six tools which have been determined. The majority 31% preferred Social Networking, followed by 23% who favor Email. Both Forum and Feedback indicated the same result at 16% and finally Blogs and Facebook scored results of 11% and 3% respectively.

![Figure 5: Web 2.0 tools for Externalization](http://seminar.utmspace.edu.my/jisri/)

**E. Outcome Dissemination (COMBINATION)**

The last phase of the framework is concerned with disseminating the research outcomes. Any research has a contribution to be made for the knowledge body of literature; accordingly, it is important for the students who are conducting research to disseminate their findings. This process is not easy and is considered as a challenge for many of the students. Knowledge-sharing through a community portal using a communication medium can facilitate this process for whose are involved. To assess the need for knowledge-sharing activities for this purpose three related question were asked, as detailed below.

- The respondents were asked whether sharing the publications through the portal can help others who access these publications to learn how to disseminate their own. The result indicates that 57% agreed that this activity could assist them to disseminate or publish their findings, in contrast to 27% who disagreed and 15% who were neutral.
- The second important activity concerned phrasing, arranging and writing the research to be disseminated. The result shows that 51% of the respondents agreed that peer reviewing can help them to accomplish their dissemination and publication work; on the other hand, 30% disagreed with this point and 18% remained neutral.
- Finally, it was established that sharing of feedback received from some students during publishing their research can be a useful knowledge source for others who have just started this process. The respondents were asked whether sharing and accessing these types of feedback through the community portal will help in accomplishing their own. The answers illustrate that 51% agreed that this sharing activity is needed, while 27% disagree that this was necessary for them and 21% were neutral.

![Figure 6: Web 2.0 tools for combination](http://seminar.utmspace.edu.my/jisri/)
The respondents were then asked about the web2.0 tools that they would prefer to use through the community portal so as to fulfill these knowledge-sharing activities. As shown in Figure (6), six tools have been identified. It was determined that 28% of the respondents prefer using document sharing to combine their research outcome to the portal, followed by 22% who favor peer reviewing to enhance their publication. Wiki was chosen by 16%, 15% were found to favor Blog, while finally, peer editing and encyclopedia scored level of 14% and 5% respectively.

5. KNOWLEDGE CREATION MODEL FOR RESEARCH DEVELOPMENT

Based on the data analysis of previous sections, a new model of knowledge creation for research development was developed. The proposed model not only helps UTM post graduate students to support communication, but also to support all necessary knowledge creation activities required to accomplish the entire research. The new model can support entire research development need for UTM post graduate students, starting from finding a new topic to dissemination and publication.

The model seeks to support PG students during each level of their research; for instance, students who are at the beginning of the research can use the related tools to search and find a new topic from previously-shared research work. Since they found a new topic, they can find other students with the same interest area and create friendships to learn how to apply a suitable methodology. When students have achieved their findings, related tools can be used to share the findings and receive feedback or comments. This process will help them to understand a different view of their finding and improve upon it. Finally, as students accomplish the research work, related web2.0 tools such as peer review/edit can be used to help each other with reporting their research outcomes. These outcomes can be shared within the community portal to become a knowledge source for the new students to find new topics and start their own research accordingly.

FIGURE 7: Proposed knowledge creation model for research development

The proposed model as shown in Figure (7) can facilitate research development among the post graduate students through the concept of a knowledge creation community. These communities have a significant effect on the knowledge creation and application through the four knowledge conversion modes, namely: internalization, socialization, externalization and combination [15], all of which the proposed model tries to address.
6. CONCLUSION

Developing thesis research remains the central requirement of graduation for most universities. Lack of personal knowledge and experience are among the main challenges facing post graduate students during their research completion. Failure to resolve these issues, could lead to drop out or delay their graduation. It is considered that previously unacquainted research students who have already gone through the research writing can be a good knowledge and experience resource for those who have just started. It is a highly desirable technique by which to help post graduate students in order to overcome their difficulties in research development through facilitating experience and knowledge-sharing. Online communities and social networking have become important aspects in information systems technology nowadays. Developing or emerging these online communities for connecting educators can establish a powerful form of sustained professional learning. It is believed that the model can assist post graduate students overcome their research development difficulties, and to achieve such strategically professional sustainability. The model provides required web2.0 tools technologies to support explicit and tacit knowledge conversion processes for entire research development activities. Since the existing framework for research development only covers the theoretical part of knowledge creation and is not concerned with web based application, the significance of the model lies in its contribution in applying the concept of knowledge creation in higher education, especially in the field of research development.

REFERENCES