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1-1-2011

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Abstract: Personal knowledge management has been defined to be "A process and strategy for properly using the tools of technology for enhancing information, learning and inquiry skills" [1] and has been applied to student learning by using a model [2] based on that of Dorsey [3]. This paper extends that model to include interpersonal, small group knowledge management in an attempt to better reflect the way in which students are required to collaborate in their production of group projects. The model of small group knowledge management (SGKM) has then been implemented by using wikis and then utilized within an MBA unit in Information Systems Management. The students were required to work in groups to produce wiki portfolios of work and the groups also had to view and comment on other student groups' wiki portfolios. Data were collected from the students in an attempt to determine the usefulness of the model and technology utilized in the support of their learning, and the results from an initial analysis are reported.

Keywords: knowledge management, student learning, collaboration, wikis

Introduction

Students who are well organized, and manage their personal knowledge well, usually achieve higher grades than those who do not [4]. The well organized student usually has some of the following characteristics: a well structured sets of notes; a tidy desk; good physical and computerized filing systems; a well utilized diary; lists of tasks; etc. The tech savvy organized student will often make use of some form of Personal Information/Knowledge Manager. However today's systems of Education usually require students to work and collaborate in small groups for their assignment work. This suggests that it might be advantageous for a group to have some form of small group knowledge management that helps them manage their construction of knowledge when creating a solution to a task that has been assigned to them by their tutor. This paper puts forward a Small Group Knowledge Management (SGKM) model to be used by students. The model was implemented by utilizing wiki software and a cohort of MBA Information Systems (IS) Management students made use of the system when producing their major assignments. Data were collected from the students concerning their experiences using the system and some results from an initial data analysis are provided.

1. Personal and Small Group Knowledge Management

When students enrol in course at universities or colleges, one main aim is that they construct and build their knowledge in a particular domain. Defining the term knowledge is not straight forward as it can mean different things to different people, however a working definition to be used in this paper:

> *The confident understanding of a subject with the ability to use it for a specific purpose if appropriate [5]*

Most commentators agree that society is now being subjected to information overload and so it is more important than ever that students are able to manage the knowledge that they construct and this can be supported by personal knowledge management (PKM) systems. According to Frand [6]:

> *PKM is a conceptual framework to organize and integrate information that individuals feel is important so that it becomes part of their personal knowledge base. And it provides a strategy for transforming what might be random pieces of information into something that can be systematically applied and that expands personal knowledge.*

Dorsey [3] suggests that there are seven skills associated with PKM: (1) retrieval of information, (2) evaluation and assessment of information, (3) information organization, (4) information analysis, (5) information presentation, (6) security of information, and (7) collaboration around information. These seven elements have been mapped to a learning framework for students [7] in an attempt to better understand the association between PKM and student learning, however a perceived problem of this model is that the seventh PKM skill of collaboration does not fit well as it infers something more than "personal". For example, Denham [8] states:

> *PKM to me is a paradox - knowledge in my world is socially constructed - it is not about organizing your thoughts, learning to use tools or developing individual competencies - it is about dialog, community and collaboration.*

Hence the author has extended the PKM model to better reflect the way in which small groups of students are required to collaborate on their group assignments. This model could be called Interpersonal Knowledge Management (IPKM) as Earl [9] emphasizes the idea that knowledge emerges through inter-personal validation. A term favoured by the author is Small Group Knowledge Management (SGKM) as this directly relates to the way in which students collaborate in groups to produce the final output of an assignment or project. A small group in this context is assumed to comprise 3 or 4 students. The next section puts forward a model for SGKM.

2. SGKM Model for Student Learning

The PKM model of Dorsey [3] with its seven components has been applied to student learning [7] however the collaboration component is considered not to fit well within the model. The author has therefore extended the model to better reflect the nature of small groups and the SGKM is shown in Figure 1. The numbers in the model correspond to the first five components of Dorsey's model.

The figure shows two students, A and B, however the author suggests that the group size the model is aimed at is around four students.

The model assumes that the students are usually carrying out activities that require them to interact with content and produce some form of solution to an activity. An activity is normally in the form of an assignment or project that might require a report to be produced and a presentation to be made to other students.

The students would start an activity by carrying out the first element of Dorsey's components: Retrieving information. This is usually done via search engines and the Internet and includes online library resources. Direct discussions between students may take place dependent upon whether they are in a classroom situation or working remotely. The information gathered is stored in an online repository.
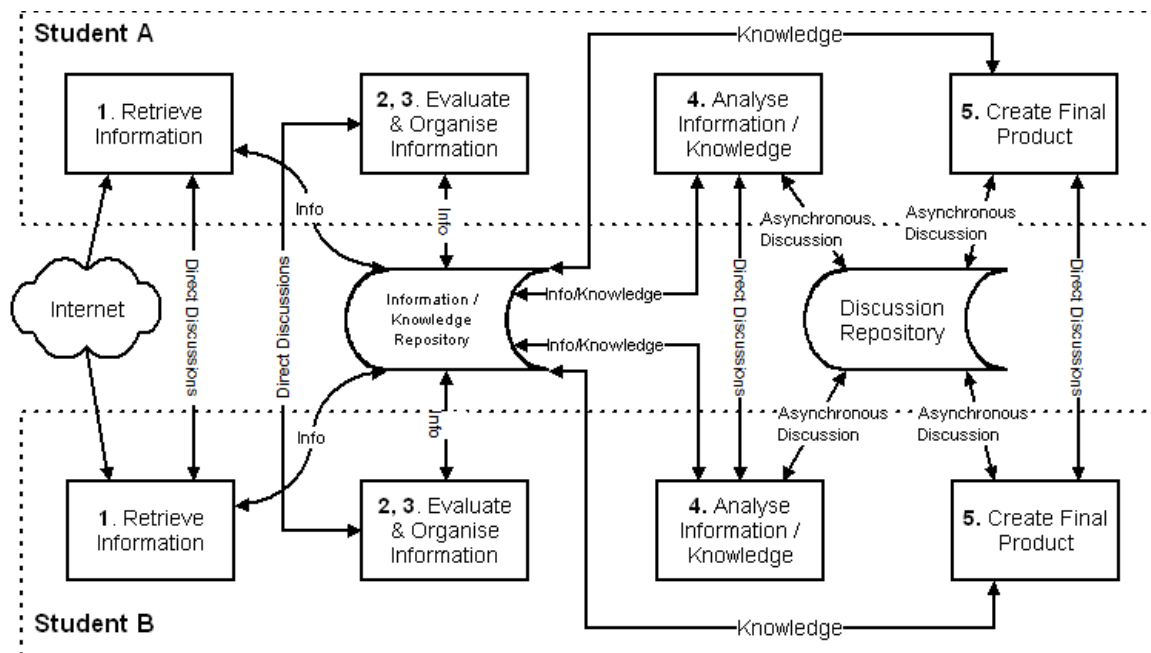
Figure 1: Small Group Knowledge Management Model for Student Learning

Component 2 involves evaluating and assessing the information gathered which involves judging the quality of information and determining its relevance to the activity. Component 3 requires the information gathered to be organized and this would again be stored in the repository.

The fourth component, analysing information, is generally where the "problem" that has been set in the activity is "solved" and entails the challenge of "tweaking" meaning out of data [3]. The levels of student - student interaction increase significantly as the "solution" is constantly changed and knowledge is constructed. The student interactions may still take the form of direct discussions however the model also includes asynchronous discussions that would be stored electronically.

The creation of the final product is the fifth model component and is the presentation of information/knowledge. It could be merged with the fourth component as during that analysis phase the product to be presented is iteratively enhanced. Keeping it separate from the fourth component does emphasise the importance of the "tidying up" of the final product in order to present a professional product.

The sixth component of securing information is implicit in the model and assumes that the model's implementation includes acceptable levels of security. And finally the seventh element of collaboration around information is also implicit as the SGKM model is clearly based around inter-student discussions and interactions.

3. Technology Supported SGKM in an MBA Unit of Study

The implementation of the SGKM model can be done with a variety of tools including search engines that store search results; cloud-based notebooks/word processors, file organizers and presentation tools; and cloud-based screencast production tools [2, 7]. However after further research into possible tools to support the model it was decided to make use of a cloud-based wiki as this appeared to have all the necessary attributes available in order to successfully implement the SGKM model.

The wiki chosen was Google Sites [10] which is a free, cloud-based wiki, that has a

relatively small learning curve. Clearly the SGKM model also requires a search tool for the retrieval of information, the de facto tool being the Google search engine. Other search tools would also be required, especially the proprietary ones that are utilized to search online libraries. The wiki has facilities to store retrieved information; store student discussions; allow stored information to be constantly updated and rearranged whilst keeping older versions; and present a final product that includes formatted text, images, and embedded videos and presentations.

Google Sites was used with an MBA IS Management unit of study in order to implement the SGKM model. The students formed into groups of 3 or 4 and, for their major assignment, were required to attempt six tasks. Each group created its own wiki and answers to the tasks were embedded within their wikis to form a portfolio. An example of one of the tasks is:

1. Search for a resource on the Web that concerns Software as a Service (SaaS) which might also be known as Cloud Computing. This might be a web site, video (eg from YouTube), podcast, online newspaper article, etc
2. Briefly summarise the content of the resource and include the link to the resource.
3. Discuss the importance to business of the information that you have obtained from the resource.

Figure 2 shows the Google Sites interface for one of the groups. At the bottom of each page in the wikis, comments and file attachments can be added.

Figure 2: Google Sites Example for a Student Group

Data were collected from the students to determine the usefulness of using Sites to manage their groups' work. There were 33 responses and an initial analysis of those responses has been undertaken. Google Sites was found either quite or very easy to use by 97% of students. The use of commenting via Sites was extensive with 88% of students utilizing this important function, and 97% found the commenting feature useful when collaborating on a task. Students were also asked if they would have preferred to use the more traditional model of email and Microsoft Word to complete their tasks. Only 15% responded that this would have been better for them.

One final task that the students were required to do was to "swap" wikis and make comments on one of the other groups' tasks. This was done in a very controlled manner such that each group was given access to just one other groups' wiki and they were asked to add to the knowledge by making constructive comments only. This was perceived as very useful by most students with 85% indicating that viewing and commenting on another groups' wiki was very helpful to their learning and the remaining 15% that it was slightly helpful to

their learning. Students also indicated that they found the comments made by other students from another group to be very helpful to their learning. A comment made by one student in the questionnaire suggests that they would have liked to see more of the other students' work:

> All the groups should have collaborated in the end so that we could see the best of the work that had been done on the assignment.

Other comments that students made when asked about the usefulness of Google Sites include:

> It was a new way of learning and we got a new type of socialisation with our assignment so that we had shared that with other groups and also got their comments to improve our learning. So it was really very useful for me.

> Using google was much more helpful than using an e-mail for keeping track of the changes made by the group mates as it was all done by wiki.

> Saving all the work on Google sites and easily retrieving it without necessarily saving it elsewhere. Being able to use built-in word and creating slide presentations all inside the site.

5. Conclusions

This paper has offered a new model for the management of small groups that are required to collaborate in order to produce a "solution" to a given task or problem. The model is based on Dorsey's PKM model with the collaborative nature of a small group having been made explicit. The model has been used by students in an MBA IS Management unit of study, the implementation of the model being made via Google Sites. Data collected from the students suggest that the system has been very useful to their group knowledge management and that it has helped their learning. Students particularly liked the "swapping" of wikis and felt that this should have been expanded. As a result, further work will be done by the author in this area.

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