Reusing Knowledge in the Classroom

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ABSTRACT

This paper investigates how the learning and teaching knowledge created within a course during a course offering can be reused in the future course offering(s). The research adopted a qualitative case study research method. It used survey, observation and documentations as the data collection techniques, as they are best suited to examine and help understand the wider research context of how learning and teaching knowledge generated can be collected and how the stored knowledge can be reused. They also helped examine how knowledge was stored through technology. Knowledge created in a classroom can be effectively reused. The research findings indicate that the instructors (e.g. the course coordinators) will need to be familiar with what technology (like a learning management system) can do and help collect the usable learning and teaching knowledge for reuse. The instructors however have to selectively reuse the appropriate stored knowledge. They also have to plan ahead before a course offering starts what types of stored knowledge are to be reused. Knowledge reuse is made so simple and easy when the instructor/ course coordinator has the 'know-why', 'know-how', 'know-when', 'know-where' and 'know-what' to make successful learning and teaching happen.

Keywords: *knowledge reuse, knowledge management, learning and teaching*

INTRODUCTION

This research reports an investigation about how knowledge created in a course 'System Development A' during two consecutive course offerings with learning and teaching activities can be reused for better use and benefits in the future teaching course offering(s). As knowledge reuse is not easily quantified and knowledge generated in a course cannot be effectively measured, qualitative case study research method was adopted in this research using the data collection techniques survey, observation and documentations. The same course in it two offerings (both offered in Term 2 in each year for two consecutive years) was carefully monitored. The collected data were obtained throughout the two consecutive course offerings. The chosen research method helped understand a wider research context of knowledge reuse in learning and teaching and how the collected knowledge generated in the course was captured, stored and reused. It particularly helped to provide an understanding of how knowledge generated through the course's virtual classroom interaction and communications was stored through the use of technology.

Research findings show that the instructors (e.g. the course coordinators) need to be familiar with how technology (like a learning management system) can help them collect the usable knowledge for better use in future learning and teaching. They also have to plan ahead before a course offering starts knowing what types of knowledge (e.g. from what learning tasks, assignments and storage folder) could be stored for future reuse. The investigation results establish that knowledge created in a classroom can be reused. Knowledge reuse can be particularly made so simple and easy when the instructor like a course coordinator has previously reused knowledge from a past course offering and has the 'know-why', 'know-how', 'know-when', 'know-where' and 'know-what' to make it happen. The knowledge can help the instructor effectively plan and monitor how the useful collected classroom knowledge can be reused for better learning and teaching in future.

This paper is structured as follows. The next section will go through the related issues in the existing literature to identify a knowledge gap to be filled by this research to discuss how knowledge in a course can be captured for knowledge reuse in the future course offerings. In the third section, a research method that is warranted best suited for addressing the research questions will be discussed. Section 4 discusses the research findings and the use of reflective practice in learning and teaching from this research. Section 5 provides a conclusion of this research paper. It also discusses the contribution and limitation of this research.

LITERATURE REVIEW

The widespread adoption of Internet has allowed learning to happen electronically. The learners today can access and use materials, or perform the learning tasks anywhere and anytime with a lot of time convenience, preferences and flexibility. Many higher education institutions have moved on to various types of learning management systems like Web-CT, Moodle, Sakai and Blackboard (Soon & Fraser, 2011). The e-learning technology has allowed student learners to access and use the learning resources, interact with their other course learner or teaching members, and submit their assignments online. Traditionally, the learning management systems enable the sharing of resources like lecture slides, study guides, course outlines, tutorial notes, etc. There are other useful technological tools that help in sending emails to the fellow course members, posting forum messages, calendar. In the recent years, there are more and more advanced tools on the learning management systems (LMS) to facilitate collaborative learning such as blog, wiki, video conference chat room.

Some authors examine the shared course materials in LMS as learning objects (Valderrama, Ocana, & Sheremetov, 2005; Muzio, Heins, & Mundell, 2002). To facilitate learning and teaching Knowledge needs to be captured, stored and made retrievable for future use. In e-Learning, there is a great interest in the exploitation of knowledge technologies (Gaeta, Orciuoli, & Ritrovato, 2009). There are scholars (Gaeta, Orciuoli & Ritrovato, 2009; Gaeta, 2011; Kontopoulos et al., 2008) who examine the ontological knowledge management in e-learning. To support student-centered learning, Dabbagh and Kitsantas (2012) suggest that

computer tools are used to assist in locating, collecting, and manipulating resources in learning and teaching. To discover how knowledge through learning can be effectively managed for learning and teaching purposes, some researchers specifically examine the related knowledge management strategies, processes and infrastructure (Bosua, & Venkitachalam, 2013; Pandey, & Dutta, 2013). There is also research (Lau & Tsui, 2009; Soon & Fraser, 2011; Dabbagh & Kitsantas, 2012; Zhang & Nunamaker, 2003) effort expended on reporting how technology can be used to capture, store, manage and retrieve knowledge in e-learning. Nassuora (2013) evaluates whether the learners can accept the technology that captures the learning and teaching materials and activities about knowledge.

Despite the affluence of e-learning and knowledge management research, there is limited research that examines how knowledge created from a course in the classrooms within a course offering can be reused in the following course offering(s). This research examines how knowledge created for a course in learning and teaching during a course offering can be reused in the future course offerings through reflective practice.

RESEARCH METHOD

Moodle has been what Central Queensland University employed to facilitate learning and teaching since Term 1 2010. Moodle is a learning management system (LMS) also known as technology supporting e-learning. The course COIT11226 Systems Development A was chosen as the researcher was the same course coordinator for the two course offerings over two consecutive years. With these advantages, it helped the researcher to have the chance to observe the course operations on the course Moodle websites over the two consecutive course offerings in Term 2, 2010 and Term 2, 2011. The researcher obtained university research ethics approval to access and use the data by formally sought all course member' permissions through sending a Moodle course website email to all staff and students involved in each course offering. Other than a student who expressed a concerned that the actual name could not be used or made known in any publication, no objection was recorded. The course coordinator directly taught students in Mackay campus and Flexible Learning mode. On all other campuses like Rockhampton, Bundaberg, Brisbane, Sydney, Melbourne and Gold Coast, staff as the lead lecturers, lecturers, tutors taught their local students. Case study data collection methods 'survey', 'observation' and 'documentation' were used. They were chosen as interviews that needed to take the interviewee time away from staff and students would prevent them from focusing on their normal learning and teaching duties/activities. Furthermore, by observing the day-to-day operations and activities in the course, and collecting the course documentations would minimize the interferences to any and all the course members.

Throughout the two offerings, the researcher observed the course member use of course materials and communications particularly on the Moodle online group work tools. The course involved two group assignments. So, group work tools like wiki, chat room and forum were made available on the course Moodle sites to facilitate group members' interaction. The tools could directly captured

externalized knowledge of the course members. Observation also extends to reading all the communication messages or materials generated and sent from the course Moodle websites. In general, observations helped find out:

1. how the students used all general materials to make their group work contributions,
2. how they used their assignment course forums for questions and answers,
3. their individual member or group emails sent from course Moodle website or student email addresses to the course coordinator, and
4. their submitted assignments and project notebooks on the course Moodle website.

With the documentation technique, the researcher went through Moodle website records of student chat room communications, forum messages and their group wikis (assignment report submissions). These tools showed how they collaborated for group assignments. Documentation also included the student submitted group assignment reports. The documentation provided a good basis for the researcher to understand what actual Moodle website materials were used for gaining course knowledge, how the knowledge was obtained, and whether all groups worked happily or with conflicts. It also provided an understanding of the types of interaction amongst the course members, the chosen kinds of communication tools and difficulties or barriers in their collaborative group work on the course Moodle websites.

For the purpose of this research, an end of course offering online survey was made available on each of the course Moodle website. The survey was carried out to monitor how students feel about the course. They were encouraged to give feedback to questions like whether they were satisfied with the quality of this course, how much the resources provided in this course supported their learning, the he assessment tasks in this course helped them learn, etc., so that the feedback can be used to improve the course in its next course offering. They were also urged to comment in respect to the best aspects of the course and those in need of improvement.

Data collected from all the three sources were compiled. Data verification, data consolidation, data comparison and data analysis took place in 2012/2013. The research outcomes were produced and presented for reporting in 2013.

DISCUSSIONS AND FINDINGS

Table 1 below shows the participants as the students and staff who were involved in COIT11226 Systems Development A (SDA) in terms 2 of two consecutive years. There were 126 students enrolled and completed the course in Term 2 2010 and 143 in Term 2 2011.

Table 1: Student Enrolment and Staff Number Per Campus/Flex Mode

Student Enrolment Per Campus				Staff No. Per Campus	
No.	**Campus**	**Term2, 2010**	**Term2, 2011**	**Term2, 2010**	**Term2, 2011**
1	Bundaberg	14	15	1	1
2	Brisbane	11	14	1	1
3	Flexible Learning	11	21	-	-
4	Gold Coast	2	4	1	1
5	Melbourne	19	7	1	1
6	Mackay	5	7	1	1
7	Rockhampton	15	12	1	1
8	Sydney	46	63	2	3
	All Campuses	123	143	8	9

On the Moodle website, there were some standard course materials like lecture, study guide and tutorial notes. There were also materials such as links to external information resources like library databases, external website readings, course related YouTube videos, etc. They were existing established materials that contributed to the course knowledge. In addition, there was knowledge that the course members generated during the two consecutive course offerings. The course involved two group assignments. There were 3 tools (wiki, chat room and forum) activated for use in student group work in each course offering. Through observation, it was found that the on-campus students did not use the group work tools as much as the group members could physically gather and discuss their group work in libraries or anywhere after a class. Some on-campus groups with the members who had part-time work and could not develop work together in the group discussions however made use of the group work tools. For the flexible learning students, it was compulsory to use these specific online group work tools set up for them for their group assignment purposes, since they were geographically apart and subject to the time zone differences.

The knowledge recorded on the group work tools in Moodle was externalized knowledge largely originating from the group members. In other words, it was information recorded on Moodle which was initially tacit knowledge of the course members, but made explicit through the use of these tools, whether from staff or students. For example, the group members discussed how they wanted their group report to be developed through discussion forums, their email correspondences with the course coordinator for help or advice for group work, the student feedback or communications on these Moodle course websites. Documentations that reflected course knowledge were like what students sent as their assignment questions from student email addresses and answers obtained from the immediate teaching staff, and correspondences between the teaching staff members and the course coordinator. Some of this knowledge was new and not known in the past course offering.

The following two email correspondences show the members used group work tool to exchange ideas to perform a task and how they shared collective knowledge to complete their group report:

"There is a shareware program called Convert DOC to TXT which can get the text from the documents between folders in one movement. The txt documents can be appended together using DOS or anything really, and from there everything can be imported as delimited data into Excel. In Excel the specific details can be separated out and thus saved as CSV for the MySQL database to import."

"If you can give a word document version of the Wiki, then yes, that would be good. Don't worry about formatting the document (I can imagine you're quite stressed right now). I'll do that. I've attached the Context diagram (I did actually change it a little"

While the general course materials formed the foundation knowledge in all students, the group work allowed students to use and apply the learnt knowledge in their group assignments. These students as group members shared their collective knowledge and closely worked together in completing their group assignments for submissions.

Collaborative Learning

Cooperative learning (CL) is about students working in groups on an assignment or project under conditions in which certain criteria are satisfied, such as the group members accountable for the complete content of the assignment or project report (Cabrera, 2002; Felder & Brent, 2007). After the groups were form, each group was to have all members to learn the course knowledge. All members in the group collaborated, learned together and progressed on with each group assignment. They had their tasks distributed under the supervisions of lecturers and tutors on all campuses. The course coordinator supervised all flexible student groups and monitor their group work activities and correspondences. The on-campus teaching staff would seek advice from the course coordinator, when there were group work issues such as an unexpected student withdrawal or group dispute.

Table 2 is developed to show the number of on-campus student groups and flexible learning student groups using the group work tools for the group work purposes.

Table 2: The Use of Group Work Tools to Share and Reuse knowledge

Collaborative Learning	Number of Group per Campus or in Flexible Learning Mode	Number of Group with Online Interaction & Communications	Number of Group per Campus or in Flexible Learning Mode	Number of Group with Online Interaction & Communications
	Term2, 2010	**Term2, 2010**	**Term2, 2011**	**Term2, 2011**
Bundaberg	4	1	4	4
Brisbane	3	0	4	3
Flexible Learning	4	2	7	7
Gold Coast	1	0	1	1
Melbourne	5	1	3	2
Mackay	2	2	2	2
Rockhampton	4	2	4	4
Sydney	12	1	17	17
All Campuses	**31**	**9**	**42**	**40**

Table 2 indicates that the number of groups on each campus including those in flexible learning mode for the two consecutive course offerings. In general, on-campus student groups did not need to use the group work tools as they saw and interacted with the group mates physically, except those groups with mutual agreements, preferred and needed to develop work together using the group work tools. In Term 2, 2010, there were only 9 groups out of 30 groups that used the group work tools. Of the 4 flexible learning student groups, 2 groups used the group work tools to the minimum, although they used forum (with email notifications) to communicate in completing their group report for submissions. In Term 2, 2011, as Moodle was no longer new in the university and the teaching staff grasped the group work tools better, they encouraged the on-campus students to use the tools. There was a higher record of 40 groups out of 42 groups in the whole course that used the group work tools.

As the groups consisted of 4 or 3 students for group assignments purposes, Figure 1 shows the collective knowledge that the group members had through the use of group work tools. The collective or group knowledge are indicated as in the mid of the two Venn diagrams where the arrows pointed. The knowledge was left on the tools for the teaching team to access and reuse in the future offering(s).

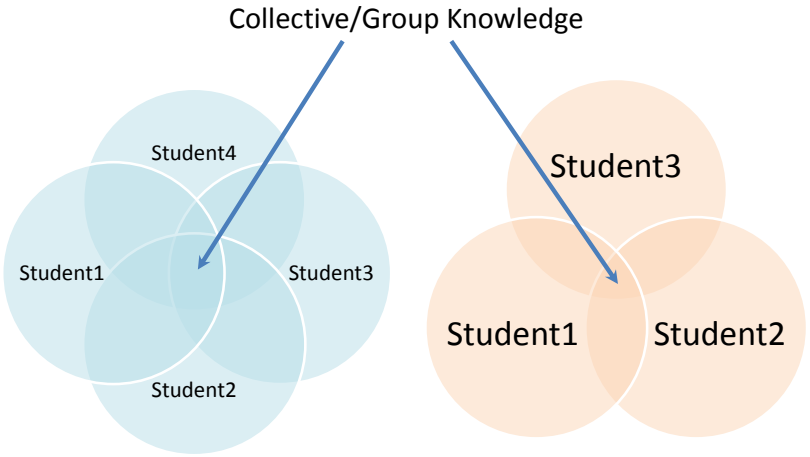

Figure 1: Collective Knowledge through Collaborative Learning

In the course offering Term 2, 2010, the collective knowledge as a result of group work was more obviously left on group wikis. All groups used their wikis as a foundation and prepared group reports in MS Word file for assignment submissions. The use of wikis allowed the staff to understand group work collaborative learning in their campus student groups and compared them with student groups at other campuses or with flexible learning student groups. By the end of the course offering, the staff also understood how all group work tools could be used to enhance student learning.

Reflection and Reflective Learning

In the course offering Term 2, 2011, various resources that were taken from those materials suggested by students in Term 1, 2010 during the student group discussions and through staff recommendations. Some student group assignment samples (used with consents) were made available to all the student members on the Term 2, 2011 course Moodle website. Knowledge generated in Term 1, 2010 was reused in Term 2, 2011.

Reflection is a conscious and deliberate reinvestment of mental energy aimed at exploring and elaborating one's understanding of the problem but not the solution (Leung, et al., 2010). Knowledge reuse needs reflection or is a form of reflective practice. A reflective learning assignment is one where individual learners can critically reflect on their own working practice in the light of newly acquired knowledge and skills (Yeomans, 2000). The evaluation feedback in Term 2, 2010 indicated what could be reused, what was good, acceptable or beneficial for students in reflection.

Reflective learning in the group work tool wikis for assessment for this course in a course offering typically has helped the students gain more valuable learning experiences and was traces of their group knowledge. On reflection, the teaching staff has also gained experience and knowledge on how to prepare the course for better learning and teaching outcomes in the future course offering(s). When the reflective practice undertaken during and at the end of Term 2 2010 helped improve the outcome of Term 2 2011, there should be also a reflective practice applied to work in Term 2 2011 for further improvements of this course in the future offerings. In this vein of reasoning, knowledge gained from the reflective practice on a same course in a course offering would better improve its future related course offerings.

CONCLUSION

In conclusion, this paper has explained how knowledge created in a course 'System Development A' during a course offering with its learning and teaching activities. It explained how knowledge in a course was reused through reflective practice for better course improvements and benefits particularly in the immediate future course offering or possibly in other future offerings. As a form of reflective practice, more improvement and better benefits would be expected in the future course offerings if the same course would ever continue to operate.

It was also discovered that technology such as Moodle, being a kind of learning management system, forms a supportive technological backbone of the knowledge creation, knowledge storage and knowledge reuse. There are different kinds of knowledge stored on a course website. The different types are knowledge obtained from immediate standard course materials that could build course knowledge in the learners, and knowledge originated from and shared amongst the group/course members at the end of the course offering. Specifically, this research discovered that the use of group work tools amongst the students and their teaching staff

could also generate collective knowledge originating from the initial tacit learner knowledge in the virtual classrooms.

This research has provided an insight into how the academics can effectively reuse knowledge in a classroom. However, the case study research investigated knowledge reuse for a course in two consecutive terms only. More future work will be expected. For example, there should also be investigation of the motivation behind the knowledge reuse, e.g. to explore how the knowledge reusers are generally driven by extrinsic motivation leading to outcomes like better course outcomes or intrinsic motivation such as enjoying helping others. There may also be research on the status of knowledge reuse vis-à-vis the contextual scenario as regards to the various campuses viz. Gold Coast, Melbourne, Mackay etc. Such research might help the other course coordinators to improve the knowledge reuse. In general, the future work can be extended to other courses. If different case studies are conducted for different courses of programs in different technology and engineering disciplines in different universities, a stronger body of research will help further strengthen the research findings.

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