Digital Content Creation and Collaborative Learning in a Large Class Setting

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1 INTRODUCTION

Development of technology in the past decade has led to significant changes in online and blended format of learning. For instance, research on collaborative learning and the use of information and communication technologies (ICT) has been integrated in the area called Computer Supported Collaborative Learning (CSCL). A widely used definition of collaboration states that it is “a construction of shared knowledge through activities with others, where the participants are committed to or engaged in shared goals and problem solving” (2). Koschmann defines CSCL as “a field centrally concerned with meaning and practices of meaning-making in the context of joint activity and the ways in which these practices are mediated through designed artifacts” (p.18). Koschmann suggests that technology such as computer can play an important role in mediating interaction among participants in the process of meaning-making through a joint activity. According to Koschmann, collaboration intrinsically requires a mediating tool to foster practices of meaning-making though joint activity, therefore; technology can act as a medium which support collaborative work.

Many studies exist today on CSCL. For instance, online courses with authentic tasks and computer supported collaboration learning have become important in distance education. There are instances in which scripted collaboration and group based learning are applied in higher education in CSCL. For example, in one study, well defined scripts are used to foster collaborative activity to understand the process of collaborative learning in CSCL contexts. Also, there are recent studies that look at patterns in social interaction for effective learning in a CSCL. There are also studies that look at social learning networks which occur in a mobile learning environment. The emphasis of such research is to understand the process of meaning making when computer is used as the mediated artifacts for collaborative activity.

Collaboration, development of higher order skills, and engagement in authentic tasks are some of the important key ideas in constructivist learning theory which bases its philosophy on the idea that knowledge is constructed by the learner through activity. According to this theory, collaboration fosters deep learning by exposing students to different perspectives and allowing opportunity for negotiation to occur. Since it is widely accepted today that learning takes place in social interaction, integrating collaboration in learning contexts is especially important for designing online or blended format of learning. However, pedagogical changes in online learning have been slow. So & Bank contend that many online courses focus on content delivery and tutorial-based instruction, which simply convert lectures into online learning format. Unfortunately, this does not necessarily provide rich opportunity for interactions among learners and engagement in activities which make for a meaningful learning.

This study will show that with careful planning and administration, groupware encourages collaborative learning even in a large lecture type class. It also shows how groupware can be used to support projects in digital content creation. In this study, we used Microsoft Sharepoint in a university lecture course setting to support and manage collaborative work among students. We chose this group software for its flexible framework design which supports collaborative learning. It can be customized to be applied to a large lecture type course in order to manage large number of small student groups.

2 IMPLEMENTATION

The collaboration groupware was used in a lecture
type course called “Computer Modeling” offered at Tokyo University of Technology in Spring Semester of 2011. Total of seventy five students enrolled for this course. The semester consisted of fourteen weeks. Each class period was divided into 60 minutes of lecture and 30 minutes of group work and free discussion time. The class was randomly divided into fifteen small groups. Each week, the groups were given small tasks, such as planning, creating a storyboard of the final project, and making sample 3D models.

At Tokyo University of Technology, instructors are encouraged to redesign all the courses offered including lecture courses so that students become active learners. In order to meet this need, we have decided to integrate group work into the curriculum so that the students are actively involved in discussions. Also, while lecture courses tend to only require students to take midterm and final exams, we redesigned the course so that the students are actively involved in applying what was mentioned in the lectures through group work.

In this course, students learn about the history of computer graphics and recent uses of 3D modeling in society. In the first half of the course, the students learn about the theories of modeling in art history, social use of 3D such as visualization of cultural heritage. For the latter half of the semester, the students are asked to work in groups, and apply what they have learned in class. Final project for each group to accomplish by the end of the semester are assigned. The students were asked to select and research on UNESCO world heritage sites of their choice, design and create a 3D model from scratch. As a final product, the students were asked to create a 3D document with texts and photos of the heritage sites. The students were encouraged to use the collaborative site to communicate among the group members.

For the final project, the students select a theme from the list of UNESCO world heritage site and create a 3D documentation in a group of three or four students. 3D document is a digital documentation with interactive 3D model attached. The students used Microsoft Excel to create the documents. This can easily be done by using Lattice 3D Reporter as add on to Microsoft Excel. Lattice 3D Reporter can be downloaded for free and comes with three months trial period of the product. In this study, we used the full version product. At the end of the semester, each group presented their work to the class, and the ideas and quality of the work were evaluated by the students as the groups gave presentations.

We used UNESCO world heritage site as a theme for the students to create 3D model for number of reasons. First, in the first half of the semester, in the lecture we introduce how 3D is used today to visualize different cultural heritages. Second, UNESCO world heritage site has been popularized in Japan in the last few decades and is a familiar topic. Finally, at Tokyo University of Technology, our research team created 3D models of the churches and Christian sites of Nagasaki, Japan in the past with a help of Goto City in Nagasaki. Today, Churches and Christian sites of Nagasaki are designated in the tentative list of UNESCO World Heritage. The sites tell a story of the period of the suppression of Christianity and show the rebirth of Christianity after the long hiding period in Japan.

So that all students can easily create 3D models using their own computers, we teach students how to use Google Sketch Up. Google Sketch Up is free software that can be downloaded onto computers to create 3D models. This software can be used for beginners with one class period of tutorial.

As a tutorial, 3D models of Churches and Christian Sites of Nagasaki, Japan were introduced as a tutorial data. For the midterm project, sample 3D model data of the Christian churches in Nagasaki were distributed to the students. The students were then asked to create a 3D document using the distributed 3D data, and by using collaborative work space. The students were also asked to research on Churches and Christian Sites of Nagasaki, select the ones they liked and were asked to

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**Fig. 1** 3D documentation created using Microsoft Excel
create 3D document using existing 3D data. The students colored the 3D models, added photos, and texts to create a 3D document. Intellectual properties of the distributed 3D models belong to Tokyo University of Technology (Figure 1).

Figure 1 shows how 3D model is integrated into Microsoft Excel. The user can interactively change the size, rotate, move, and walk through the 3D model using computer mouse. After they were accustomed to handling the 3D model data and were able to integrate it into Microsoft Excel to create 3D documents, they started the final projects.

In this study, we used Microsoft Sharepoint as a collaboration platform. Microsoft Sharepoint, is compatible with recently developed light weight 3D data in XVL format, Microsoft Excel and Lattice 3D Reporter. Using Microsoft Office and Sharepoint, sharing of 3D models among users can fairly easily be done.

In order to collaborate outside the classroom, the students were asked to use Microsoft Sharepoint to communicate asynchronously with their group members, share the 3D documents on-line and to work on the shared project. 3D document can be converted into HTML web page as well. On a web server, we set up Microsoft Sharepoint, which acts as a classroom website. Each student was asked to bring their personal lap-top to the classroom. Each lap-top could be connected online through the network. We chose to use the personal computer as a collaboration device for our study, since it allows better access to the shared class site, which makes it easier for the instructor to profile each student’s learning process including group activities.

The system we used has the following characteristics: 1) a web server with a space for the course as well as the shared collaborative spaces and communication platform; 2) individual accounts for each student to access the shared collaborative spaces; and 3) group work space that can be customized by the group members. By creating individualized accounts on the web server, students are able to access the shared group work spaces using his or her individual account. Each student has his or her personal space in addition to the shared group work spaces designated on the class website. Another benefit of using this system is that the instructor can freely add and create students’ small group sites. The instructor can also assess how well students are communicating in each group site; for example, by checking the shared documents, wiki documents, communication bulletin board, and discussion threads which are uploaded and viewable in group work sites.

3 EVALUATION

After fourteen weeks of class, students’ perception of the course and collaboration activities using the groupware was evaluated. Since the goal of the course was to improve students’ engagement through groupwork and to work collaboratively using groupware, the questionnaire asked these issues. The evaluation was done using five point Likert scale. Each score corresponded as follows; 5 strongly agree, 4 agree, 3 neutral, 2 disagree, 1 strongly disagree. Total of 49 students answered the survey. The questionnaire consisted of ten questions. The questions asked about the students’ perceptions of the curriculum including technological skills taught in class. Perceptions about group work and groupware used in class. Finally, it also asked about students’ motivation. Table 1 shows the question and the mean scores of each question.

Table 1 Mean Likert score or each question (n = 49)

| Q1. I was able to think about the use of computer graphic and its use in society in this course | 3.75 |
| Q2. I felt engaged in conducting research on the topic of the midterm and final project | 4.02 |
| Q3. I acquired skills in 3D computer graphic | 3.77 |
| Q4. I acquired skills in VBA programming | 3.18 |
| Q5. Using the Content Design Storyboard was helpful in designing my content | 3.63 |
| Q6. I worked well collaboratively in my project through group work. | 3.94 |
| Q7. The class groupware was helpful in conducting group work | 3.77 |
| Q8. The class groupware was helpful in participating in class | 3.54 |
| Q9. Evaluating each other’s presentation was effective | 4.08 |
| Q10. I was motivated to participate in the group project | 4.02 |

Q2, Q9, Q10 scored highest out of ten questions. Questions which scored high were those involved with engagement and motivation. Question on collaboration tended to be on the high side as well. However questions regarding programming such as Q 4 scored low.
Most students said that the class groupware was very helpful, helpful or answered neutral. The result shows that while many of the students felt that they were able to do their project collaboratively through group work, acquiring programming skill was not attractive.

4 CONCLUSION

In this study, we used a groupware in a large lecture type classroom at a university setting. The purpose of the course was for the students to learn computer graphics and the history of modeling in design as well as skills to create 3. In this class, the students were asked to work in small groups to create a 3D document of UNESCO world heritage site. The groupware we utilized also supported sharing of light weight 3D data. At the end of the semester, we have administered a questionnaire to evaluate students’ perception on group work using groupware in a large lecture setting. The questionnaire also looked at how students assessed the curriculum. The result showed that relatively large number of students felt that they were able to work well in a collaborative manner. The result also showed that most students evaluate the use of groupware positively. Groupware is effective in supporting collaborative learning even in a large lecture type classroom if the curriculum is designed to encourage small group activities and projects. However, in this study, we were not able to investigate how the groupware was used by each group, and how it contributed in raising the quality of collaborative activity. For future research, detailed accounts on the communication among the group members as well as meaning making process are needed.

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REFERENCES


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