A Case Study of Using Popplet in Online Cooperative Learning

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Abstract

This study is to determine the use of popplet in online cooperative learning among graduate and undergraduate students. There are two groups in this study. One has 8 graduate students from a class at Indiana State University; the other has 24 undergraduate students from a class at Shanghai Normal University in China. The process of diffusion of innovation is employed in this study uses. In knowledge stage, we did literature reviews and introduced the tool to subjects. In persuasion stage, we used questionnaires to gain subjects' attention; provide multiple formats of tutorials, including text-based guide and video-based walkthrough tutorials; and send invitations to subjects. In decision stage, the subjects were interested and wanted to use popplet. In implementation stage, we collect data and analyzing subjects' projects and behaviors in popplets. In confirmation stage, a total of 95% subjects (n = 24) state that they will use popplet for variety of purposes in the future which confirmed the diffusion of innovation. The study found that popplet could be effectively used in group projects, group discussions, visual organizer, and group presentation. However, the study also found that popplet cannot be used as a perfect substitute for discussion tools and platforms. The performance of popplet is also affected by the performance of computer hardware.

Introduction

Cooperative learning is a kind of group work where students aid each other in studying as opposed to a single student working for the rest of the group. Cooperative learning has become especially common in learning institutions due to the multifaceted benefits that accrue both the students and the teaching fraternity. This kind of study mechanism enhances one's memory while improving one's skills of critique and debate. Lectures and other teaching fraternity have also found that there has been an increased class attendance since the adoption of the method in some lessons. Students also acquire teamwork skills that are crucial in any field of expertise (Baars and Gage, 2010). Various techniques are used in the process of sharing information among students. Some like to use visual maps due to the visual aids they offer. These maps have been proven to create a mental picture of the subject matter (Homes, 2005). Therefore, they lead to precise organization of relevant information in an easily retrievable manner in the human brain. Students can also share ideas when it comes to carrying out class projects.

This study is to determine the use of popplet in online cooperative learning among graduate and undergraduate students through the innovation-decision process (Rogers, 2003). A group of graduate students in a class at Indiana State University are working on an online discussion activity for their reading assignments. They find that blocks of content are hard to read and difficult to get the main ideas of each student efficiently. At the same time, another group of undergraduate students are working on their group projects in the instructional design class at Shanghai Normal University in China. Although the class is a face-to-face class, the instructor wants an online cooperative tool for group learning after class. Thus the instructor can follow students' project process and give them feedback online. Based on both situations, the problem of this case study is how to use popplet in online cooperative learning.

Literature Review

Cooperative Learning

Cooperative learning is the art of learning in which classes are structured around groups that enable students to work together in such a manner that the success of each member leads to or is dependent on the success of the whole group (Lord, 2001). The cooperation implied in this case is not having learners sitting side-by-side at the same desk discussing assignments, or one student going through the rigors of a project and having all the rest append their names at the end. It encompasses the structured cooperative interdependence among the learners which enables them to explore, share and discuss academic material among themselves. Three types of cooperative learning groups exist according to Johnson et al (2006). First, informal groups are ad hoc groups that are formed to facilitate easier, better and efficient direct teaching process. Second, formal cooperative learning groups are groups formed for the purpose of cooperative learning and remain intact over a long period of time to facilitate completion of learning projects. Third, cooperative base groups are long-term groups whose members possess different perspectives and aptitudes hence enabling members to benefit not only in academics but also in other aspects of life. According to Johnson et al (2006), all the groups are permeated by five key elements that distinguish them as such. These are: positive interdependence, promoted interaction, personal accountability, group processing and interpersonal and group social skills. Cooperative learning is advantageous over traditional classroom learning process in various ways. It enables students to develop acute critical-thinking capabilities, learn more extensively as well as remember the content for longer (Williamson & Rowe, 2002). It also boosts class attendance due to the trill and joy it brings to the group members. It also equips the learners with

teamwork skills which is not only essential for academic progression but also in the career aspirations and advancement.

Visual maps

Visual maps are concise ways in which information, ideas and knowledge is captured, organized and presented in a visual pattern (Lee, 2011). Visual maps are particularly essential in situations where learners are visual thinkers and thus rely on visual tools for better and meaningful comprehension and memory of ideas and information. As such, the idea of visual maps is informed by the fact that learning should involve bother the left and the right hemisphere. The left hemisphere is predominantly logical, verbal, analytical and sequential while the right hemisphere is intuitive, visual and emotional (Baars & Gage, 2010). Visual maps, therefore capitalizes on the visual capabilities of the right hemisphere to enhance the capacity of the students to understand and remember information. Consequently, some individuals are predominantly visual thinkers which imply that using the traditional verbal modes of learning generally disadvantages them. Visual maps therefore come as a major relief for this group as it sufficiently capitalizes on their strength (Lee, 2005). In this regard, visual maps become an integral part of a student-centric learning environment which is paramount for successful teaching. Apart from mainstreaming student centric pedagogical practices, visual maps are important because they empower students to sort through information and come up with meaningful conclusions by organizing and connecting concepts (Baars & Gage, 2010).

Interaction of wiki

A wiki is a webpage that allows anybody with access to the internet to view and edit the content. It is also a robust and dynamic platform for collaborative communication especially in the contemporary world where internet access is widespread (Leuf & Cunningham, 2001).

Owing to their accessibility, flexibility, elasticity and interactivity, wikis can prove to be useful tools for teaching and learning. This is because wikis provide the users both author and editor privileges which facilitates asynchronous group cooperation and communication during the learning process. Further, it is easy to interact with wiki because it does not require technical users to compose, edit or retrieve information from it. This manner of versatility enables all students to be part of the interactive learning process albeit on an online platform. According to Leuf and Cunningham (2001), students can use wikis to foster objective discussions, collaborative undertaking of academic projects as well as easy sharing of information among themselves. Educators on the other hand can use them in providing guidance, adding value to the learners' inputs as well as passing more content to the learners. Wikis are also important in fostering engagement in group activities even beyond the classroom (Holmes, 2005). This is because the wikis reside online and students can access them remotely through the internet. This is a crucial pedagogical tool as it enables the extension of learning from the traditional brick and mortar classrooms.

Communication theories on structured information

Structuration theory of communication argues that groups formulae structures which determine how information is used and shared. This structure also creates rules that govern the social system within which the communication takes place (Mattelart & Mattelart, 2010). Symbolic interaction theory on the other hand postulates that individuals are motivated by the meanings they assign to things, people and events (Holmes, 2005). Such meanings are incumbent on the social structures available to the communicators. These theories are critical for structured information. Structured information involves the scrutiny and analysis on the information so as to discern the manifest and latent meanings. Such meanings and scrutiny is also dependent on the

structures that are postulated in the theories (Lee, 2011). Such structured information is also important in learning as it provides clarity and order which makes it easy for learners to understand the concepts.

Cognition theories for cognitive load

Cognitive load theory argues that effective instructional materials and processes should be able to facilitate learning through ordering the resources towards activities that are important and relevant to learning instead of the preliminaries to learning (Baars & Gage, 2010). This is premised on the fact that unsynchronized in effective instructional materials and procedures hamper learning by generating a heavy cognitive load on the part of the learners. As such, it is critical, as suggested by the theory, to integrate the separate sources that seek to serve similar purposes in order to minimize the cognitive load thereby enhancing the learning abilities of the learners (Lee, 2011). At the same time, it is important to understand that cognition is pivotal in the learning process. This is because the process enables mental integration of the information before learning is actualized.

Structured discussion and learners' cognitive load

According to Plaas et al (2010), well-structured discussions play a major role in diminishing the cognitive load of students. This is achieved through enhancement of their ability to discover and master the academic content in the learning material. As such, it has become one of the most preferred pedagogical systems over the years due to its efficiency. Research indicates that the benefits for such a pedagogical approach are not only limited to less cognitive loads but also span to higher academic performance, improved positive attitudes towards learning and school in general, better interpersonal relations ad higher self-esteem (Mestre & Ross, 2011). Structured discussions also help in easing the manageability of the content as well as the group

learning procedure which further reduces the cognitive load of the individual learners. The same relief is also replicated in the entire group.

Popplet

Popplet is a collaborative tool that allows teachers and students arrange ideas and see them and create graphic organizers in visual organization. In addition it is an effective tool for presentation (teachinghistory.org, 2013). Popplet is an application that can be used by computers or smart devices.

Methodology

The primary question of this case study is how to use popplet in cooperative learning. In this study, we selected two groups of subjects to use popplet in their cooperative learning activities. Pre-questionnaire and post-questionnaire were distributed to collect data. We also analyzed group activities in popplet to collect user behaviors.

Population and Sample

The target populations of this case study are students at both undergraduate and graduate levels. We use convenient sampling method to select our sample. There are two groups in our study, both of them are pre-exist groups.

Group 1 is a class of graduate students in the course of research design and evaluation of interactive learning at Indiana State University. There are 8 subjects in this group (The two researchers are in this class, and the total number of students is 10 in this class). This class has both face-to-face students and online students. These students include Native American students and international students, who are from Saudi Arabia and China. Subjects in this group are on the educational technology program for master or doctoral degree in the department of curriculum, instruction & media technology. However, their prior educational backgrounds are

different. Subjects have backgrounds in English language, mathematics, art education, elementary education, Arabic language, history, social work, library science, and educational technology.

Group 2 is a class of undergraduate students in a course of instructional design at Shanghai Normal University in China. There are 24 undergraduate students in this class. All of them are senior students in the major of educational technology, and all of them are Chinese students, ages from 21 to 23. This class is a face-to-face class.

Research Methodology

We design two different pre- questionnaires for each group, because the two groups have different situations; and one post-questionnaire for both group, because we want to research the same point, which is their experience in using popplet. Since the two groups are separated in different places and with particular situation and application, we use two parallel processes to conduct this case study.

Students in group 1 cooperatively work on a wiki section to synthesize key points of the reading materials. Every student is required to lead a wiki discussion on assigned papers or chapters on textbooks, summarize the key point of the readings and provide 3 to 5 questions for discussion. Students are not required to use popplet in this activity. Wiki in blackboard is the designated tool in the class. Every week, there are 2 to 6 students who lead the wiki discussion. Each of them focuses on different papers or chapters. The pre- questionnaire was distributed after week 5. Data collection was start from week 6 wiki #4. In week 6, we put one topic on popplet. For this week, we didn't change the approach to summarize the paper as we did in wiki, which is summarize the paper in one block of text and ask some questions. We send invitations from popplet and Blackboard to other students, and also provide a tutorial on how to use popplet

in both written and video format. The video was hosted on YouTube. The second topic was in week 8, wiki #6. This week, we used a structured approach to represent the key points of the reading. We tried to create a visual map for the topic, and let students cooperatively expand the map on any nodes in popplet, including questions and key points. We also sent invitations from popplet and blackboard as we did in the first activity. More students were involved this time. The third topic was in week 11, wiki #7. This week, we continued to use structured map to represent the key points on topic, but this time we didn't send any invitations either from popplet or blackboard. There were students joined in this activity. In week 12, the post- questionnaire was distributed.

Students in group 2 are working on their instructional design project, and popplet is the designate tool for online cooperative activities after class. The instructor introduced popplet and instructed students how to use popplet at the beginning of the course. After that, the pre-questionnaire was distributed. The first online activity is "introducing yourself and your understanding of what learning is". Then, their discussion will focus on their instructional design projects. Because this case study must be finished in the semester, we cannot wait a whole loop of application. After they posted their projects' topics, the post-questionnaire was distributed.

Case Study Analysis

Analysis of Group 1's Pre-Questionnaire and Implementation

The pre-questionnaire of group 1 was distributed at week 6, and got 8 effective responses. Before week 6, students have already used wiki in blackboard for three key points activities. The results of pre-questionnaire of group 1 show that the key points activity is an effective way for cooperative learning. It helps learners learn more through sharing ideas and critical discussing.

Subjects also think that wiki is a good cooperative tool, but not the best for interaction, for example, learners have to put names to indicate who write a block of text. Some subjects also think that it is almost impossible to have a conversation because it is just a big mass of text.

In the pre-questionnaire 75% subjects (n = 6) would like to make the key points wiki discussion be more structured. Within the 75% subjects, 50% students (n=3) would like to use a visual map to organize the key points (figure 1). One student would like to use a visual map to organize the key points, but the student also thinks that wiki is good enough to organize the content. One student would like to do neither. All subjects in group 1 never used popplet as a cooperative learning tool.

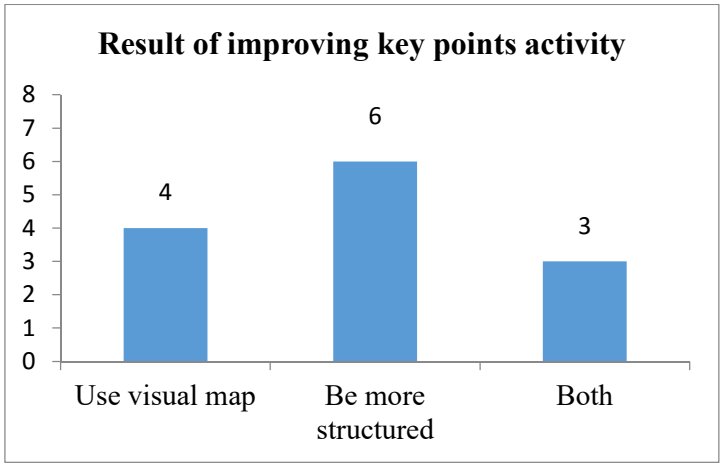

Figure 1. How to improve key points activity

Because wiki is the designated tool, we don't require students to use popplet in their activities. The approach we used to implement is that we (the researchers) use popplet in key points activities and invite other classmates to join in. In week 6, we created a popplet to lead a discussion on the role of media (Reiser, 1994) with a block of text and two questions. With invitations from both popplet and blackboard, we got 2 responses from 1 subject except the researchers'. The 2 responses were to answer the two questions. In week 8, we created a popplet on modeling with technologies (Howland, Jonassen, & Marra, 2012) with a structured way, like

a visual map. With invitations from both popplet and blackboard, we got 12 responses from 4 subjects except the researchers'. Subjects not only answer the questions, they expanded the whole key points map. In addition, we do find conversations from subjects. Four subjects along with the two researchers made a conversation on one question. In week 11, we work on teaching and learning in digital environments (Hill & Hannafin, 2001) with the same way in week 8. We only invited subjects only through popplet. We got two responses from two subjects (figure 2 and 3).

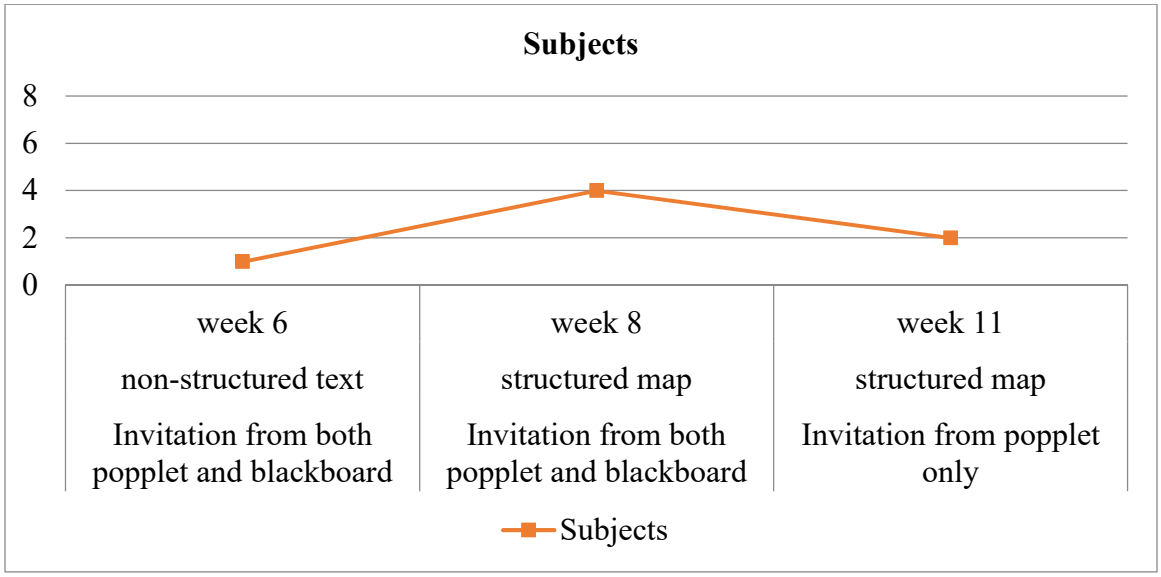

Figure 2. Number of subjects who participated in popplet activity

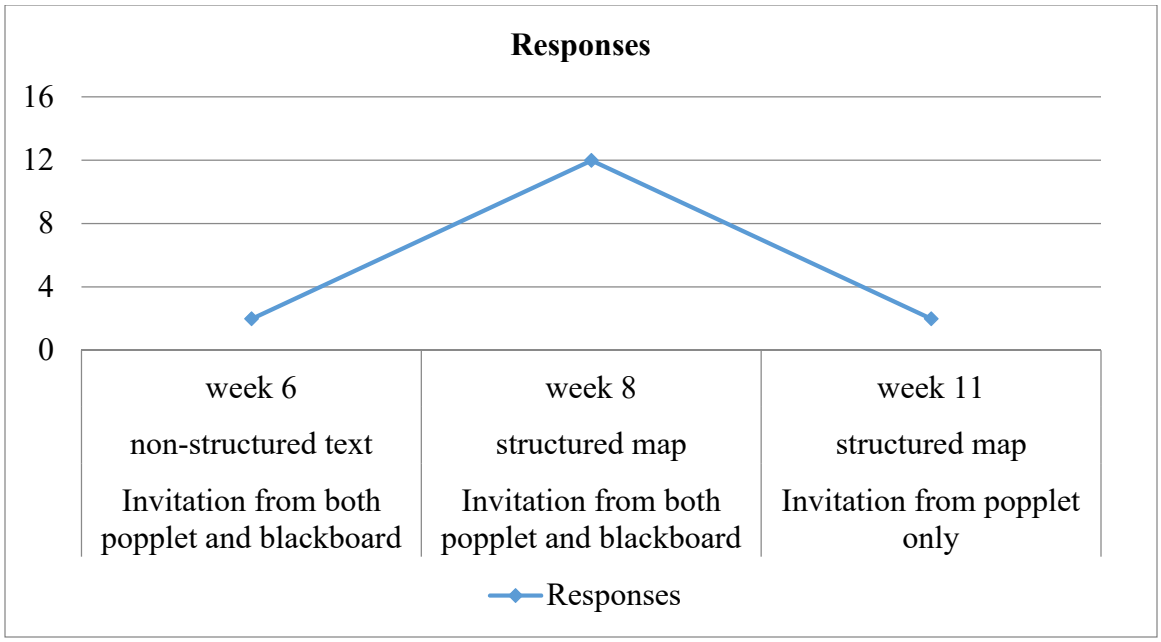

Figure 3. Number of responses

Analysis of Group 2's Pre-Questionnaire and Implementation

In group 2, popplet is the designated tool for cooperative learning after class. The class is a face-to-face class. After we introduced popplet to the instructor and students, they were interested to try some activities on popplet after classes. Because of the time limitation, we didn't have enough time to get more popplet activities on live. The pre-questionnaire was distributed at week1, and got 24 effective responses. We want to check subject's experience in online cooperative learning and how they think about online cooperative tools.

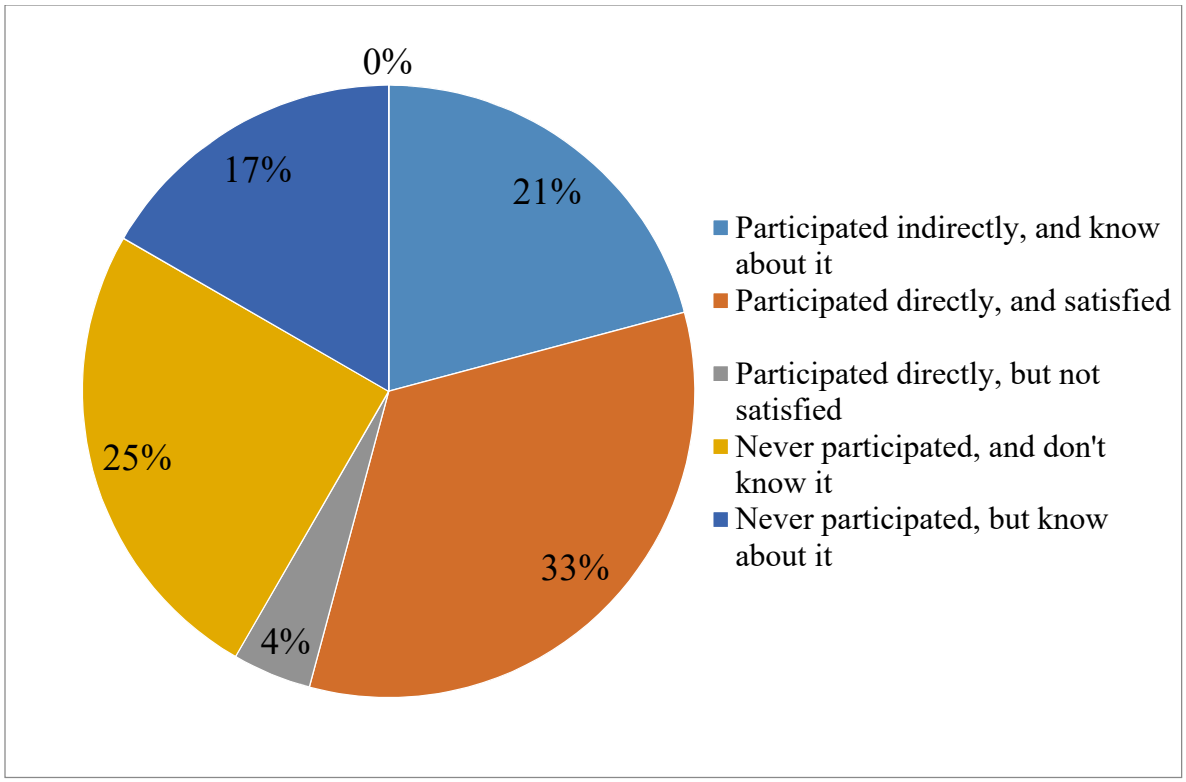

Figure 4. Online cooperative learning experience

Figure 4 is the result of experience in online cooperative learning. There are 33% (n = 8) students have participated online cooperative learning directly, and satisfied with the effectiveness. There is 1 subject who was not satisfied with online cooperative learning. There are one quarter of subjects (n = 6) who never participated in cooperative learning and don't have idea about it. In the university, face to face class is the primary method for undergraduate. There are a few hybrid classes in some departments, like department of educational technology and college of education[1]. No 100% online courses are available for students. However, instructors will use online cooperative learning tools after class, for example, using blog for writing assignments.

[1] The department of educational technology is in the college of mathematics and science at Shanghai Normal University.

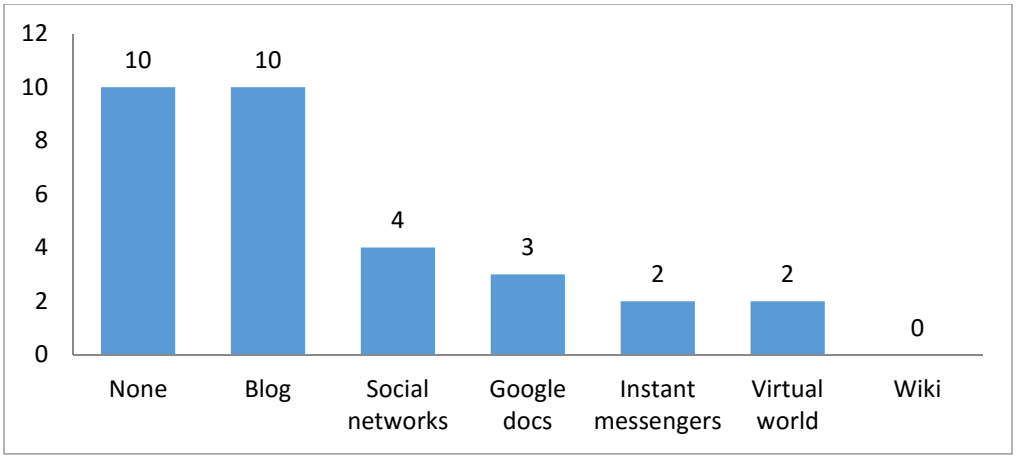

Figure 5. Cooperative learning tools

All the 24 subjects in group 2 are junior undergraduate students. There are 10 of them don't have familiar cooperation tools. And, blog is the most popular tool among subjects (figure 5).

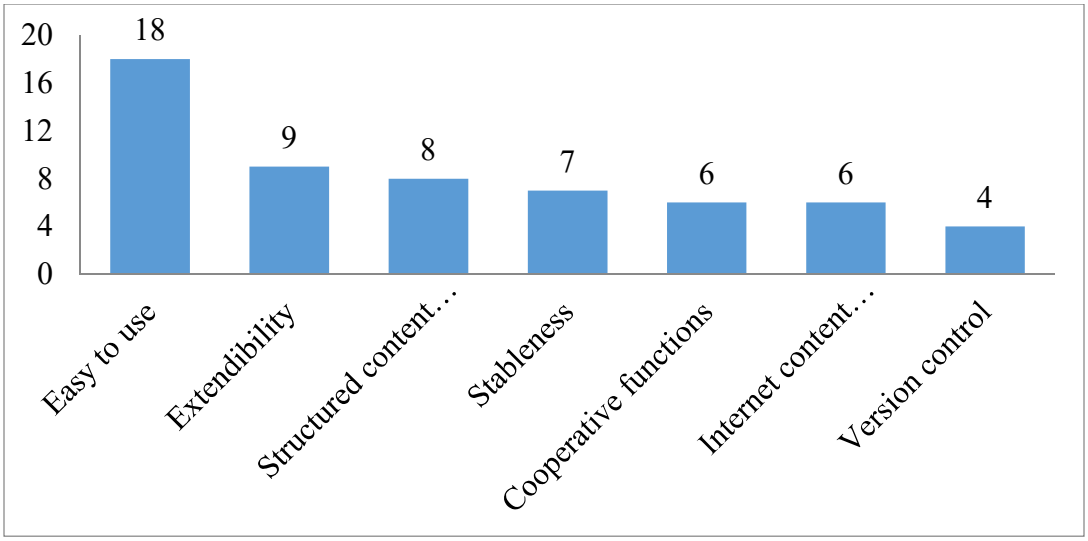

Figure 6. Key characteristics of cooperative learning tools

When asking what the key characteristics of online cooperation tools are, 18 subjects think easy to use is important; 9 students think extendibility, which means importing and exporting content. Only 6 students think cooperative functions are important (figure 6).

In week 2, the instructor created a popplet for students, and the topic is introducing yourself and what do you think learning is. All students participated in the popplet discussion. After some training, the instructor let project groups publish their instructional design projects on popplet for peer evaluation. There are 6 groups published their project topic on popplet, but some groups may still have some problems with using popplet. We provided some training resources for them to get familiar with popplet. Till the date we began to collect data, these two activities are all we have.

Analysis of Post-Questionnaire

The post-questionnaires for both groups are the same, except the item 11 that is specially for group 1 about use popplet in key points activity. We got 6 effective response from group 1 and 19 effective response from group 2.

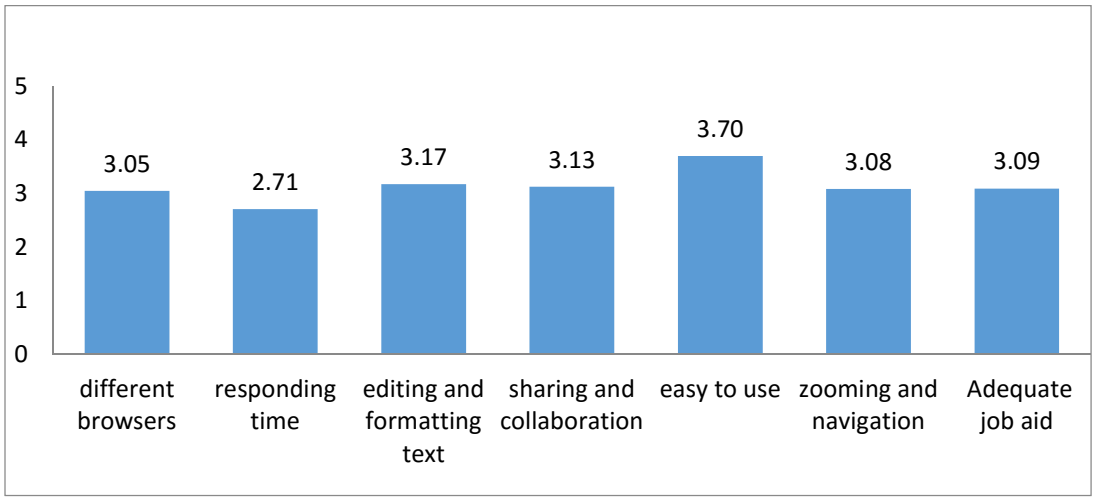

Figure 7. User experience with popplet. The criteria is adapted from Hong and Kim (2004)

As to the user experience with using popplet (figure 7), most scores are above 3 (3 is for satisfactory). The responding time is the lowest one (2.71). Popplet is using Flash player in browser, so computer hardware and browser performance are factors for responding time.

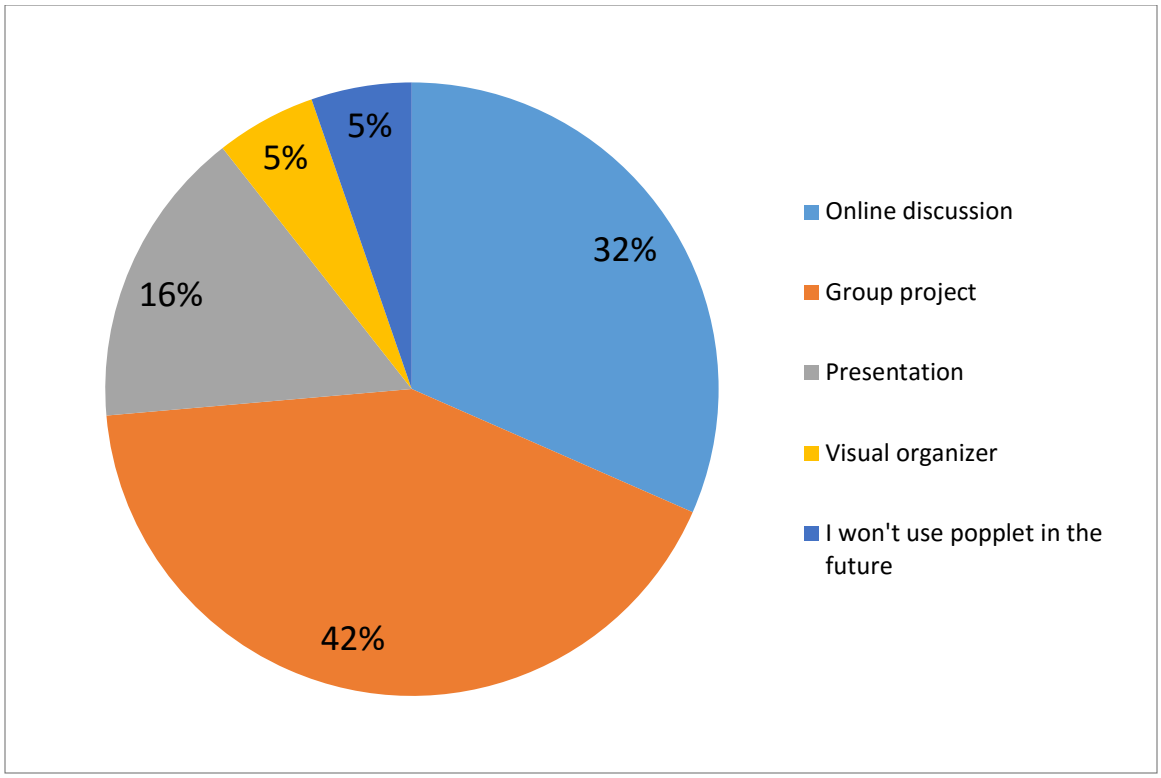

Figure 8. Using popplet in the future

After tried the popplet in different situations, only 5% subjects won't use popplet in the future (figure 8). Most subjects will use popplet for group project (42%) and online discussion (32%).

There two subjects responded that they didn't try popplet because they didn't have enough time. The special question for group 1 on activities for key points got two responses. Both of them indicate that it was easier to read than the wiki, but it was unnecessarily to use an outside program within blackboard as the blackboard has similar tools for discussion. These two responses both will use popplet as a visual organizer.

Innovation-Decision Process

This study is following the process of innovation-decision. The innovation-decision process includes five stages, including knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003).

Knowledge

On February 13th, 2013 and February 28th, 2013, two pre-questionnaires were delivered to group 1 and group 2. All subjects in two groups didn't know popplet before. We provided examples to demonstrate the applications of popplet.

Persuasion

In this stage, we provided multiple formats of tutorials for the subjects, including documents and videos. We also invited the subjects to sample popplet projects to let them have basic experience in popplet.

Decision

In this stage, we got feedback from subjects in both groups. The subjects in group 1 agreed to try use popplet in online key point's activity. The instructor in group 2 decided to use popplet as the online cooperation tool for after class activities, and the students in group 2 were interested and wanted to use popplet in their group projects.

Implementation

This stage, we leaded three key point discussions in both wiki and popplet for group 1. Six subjects participated in the three popplet and made several conversations in each discussion. For group2, two activities were implemented. One was for introduction; the other was for presenting group project topics. A total of 19 students participated in the two activities.

Confirmation

On March 28th, 2013, the post-questionnaire was distributed. The result showed that 95% of subjects would use popplet in the future for group project, visual organizer, online discussion, and visual organizer. The result confirms that the subjects accepted popplet as a tool for online cooperative learning.

Conclusion and Recommendations

This case study tried to explore how to use popplet in cooperative learning. We can conclude that:

- Popplet is appropriate for group project and works as visual organizer.
- Popplet is easy to use for users who don't have lots of experience in cooperative learning.
- It can be used as a visual organizer for group project to generate ideas, or represent information. Cooperators can work on the same project at the same time.
- In popplet, using short text with connections between popples is better than using a block of text in one popple.
- Popplet as a standalone online tool could be used after class for face-to-face classes, which have group projects for assignment.
- Popplet is not a replacement for discussion tools, like discussion board.
- Computer hardware and browser performance could affect users' experience in responding time.

This case study has several limitations. The first one is time limitation. For group 2, we couldn't track the data for the whole semester. The second one is that the application for group 1 was not so appropriate. As we concluded that subjects in group 1 think although it was inventive,

it's not necessary to use popplet as another discussion tool in this class. The third one is that the researchers might lack of inquiry skills, so not all questions in questionnaires are appropriate for the study. Future study can focus on how popplet can be used in group projects and group conversations.

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Appendix A: Pre Survey

Please take a few minutes to answer the following questions:

1. What do you think about our wiki discussion?

_____

_____

_____

_____

2. Would you like to make our key point wiki discussion be more structured?

☐ Yes

☐ No

If the answer is Yes, how? (Optional)

_____

_____

_____

_____

3. Would you like to connect peer discussions in a visual way?

☐ Yes

☐ No

If the answer is Yes, how? (Optional)

_____

_____

_____

_____

4. Would you like to use a visual map to organize our key points?

☐ Yes

☐ No

If the answer is Yes, how? (Optional)

_____

_____

_____

_____

5. Have you ever used Popplet as a collaborative tool?

☐ Yes

☐ No

If the answer is Yes, do you think Popplet will help to make our wiki discussion more structured?

☐ Yes

☐ No

6. Do you have any other suggestions for our wiki discussion?

☐ Yes

☐ No

If the answer is Yes, write down your suggestion?

_____

_____

_____

_____

Thank you for taking the time to complete this survey, we appreciate that. The information from the survey will be used in our case study.

Appendix B: Post Survey

Post Survey for CIMT 630 Case Study

* Required

1. Which browsers do you use to visit Popplet? *

- ☐ Internet Explorer
- ☐ Firefox
- ☐ Chrome
- ☐ Safari
- ☐ N.A.
- ☐ Other: _____

2. What is your experience to use Popplet in different browsers (5 for very satisfied, 1 for not satisfied) *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

3. The responding time in Popplet *

- ○ 5
- ○ 4
- ○ 3
- ○ 2

- ○ 1
- ○ N.A.

4. The functions for editing and formatting text *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

5. The effectiveness of sharing and collaboration *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

6. Easy to create, delete, and update popples; and create connections between popples *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

7. Convenience of zooming and navigation in Popplet *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

8. Adequate job aids, tools, and help resources in Popplet *

- ○ 5
- ○ 4
- ○ 3
- ○ 2
- ○ 1
- ○ N.A.

9. Which applications would you try to use Popplet in the future? *

- ○ Online discussion
- ○ Group project
- ○ Presentation
- ○ Visual organizer
- ○ I won't use Popplet in the future
- ○ Other: _____

10. If you didn't try to use Popplet, please select your primary reasons.

- ○ Don't have enough time

- ○ It's hard to use
- ○ It's too slow
- ○ It's not stable
- ○ It's not suitable in this situation
- ○ Other: _____

11. Any comments for using Popplet in this case study

12. What do you think about the visualized version of key point in this course (comparing with the text version in wiki)?