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A preliminary investigation of the features of the communication software assisted design thinking based learning

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Abstract: The purpose of the present study is to preliminary understand the efficiency of implementing technology (communication software) to foster student's learning of visual identity and branding design in order to cultivate their design thinking implicitly. A total of thirty-six students who major in visual communication design participated in this study. Students who took a corporate identity design course were choose to be the participants. To probe their view of implementing communication software (Line and Facebook group), three open-ended questions about the assistance, advantage, and disadvantage of incorporating the two communication software were asked through an online questionnaire. Moreover, coding frameworks were derived based on students' responses in order to induct their replication and to help researcher grab a clearer picture of students' perspectives towards the application of communication software in the course. Results show that the convenience and the immediacy of communication software are the features that students mostly take advantages of. This is to some extent consistent to the viewpoint about information technology. Meanwhile, students reported most frequently of the disadvantages of the distraction, and provides various defects about incorporating communication software during learning.

Keywords: Design Thinking, Information technology assisted instruction, online open-ended questionnaire, action research.

1. Introduction

The rapid development of information technology today make the integration of information technology into instruction a very important part of current education. The so-called information technology integration teaching is to use information technology in courses, teaching or teaching materials, and to use information technology as an auxiliary tool to help teaching activities to be carried out more efficiently (Dexter, Anderson & Becker, 1999; Dias, 1999). Using the universality and convenience of information technology and mobile vehicles, students can use the Internet to assist in learning and learn more through the Internet at any time and any place, helping students to solve problems more efficiently. At the same time, teachers can also assist in teaching through the convenience of information technology and enhance the immediacy of communication between teachers and students through information technology (Ezziane, 2007). On the other hand, "design thinking" is a thinking skill that is good at planning and perfect for design, with creativity as the center and problem solving as the core goal. Design thinking consists of three parts of thinking skills - "brainstorming method", "level thinking method", and "vertical thinking method". Brainstorming (BS) method, which is a method to stimulate creativity, stimulate association, and strengthen thinking skills. Because it emphasizes the idea of "jumping out" from the subconscious, rather than consciously thinking of a plan, it is considered an effective creative thinking skill (Bowkett, 2005). Vertical Thinking is a traditional way of thinking logically, also known as convergent thinking or logical thinking. It starts with known theories, experience and knowledge. It is believed that through vertical thinking, people can explore in depth and explore the deepest answers. Lateral Thinking, which was proposed by Edward de Bono (1992), which focus on combining perception and logic to solve problems.

To understand student's opinion about the efficiency of technology (i.e. communication software) apply in a design course, two research questions was formed to fulfill the research purpose as follows:

Research question 1: How do communication software (Line and Facebook group) assisted students' learning?

Research question 2: What are the advantages and disadvantage of communication software (Line and Facebook group)?

2. Literature Review

2.1 Information Technology assisted instruction

The integration of information technology into instruction refers to implement technology tool into the course, teaching or learning materials in order to foster teaching efficiency. The focal point of incorporating information technology into instruction is to promote student-centered as well as autonomous learning, and to stimulate the innovation of teaching approaches ((Dexter, Anderson & Becker, 1999; Dias, 1999; Wang, 2010). Moreover, it is argued that the innovation and the diversification of teaching approaches could be nurtured through employing technology to cultivate students' thinking skills, critical ability, creative ability, and problem-solving ability (Wang & Huang, 2001). Wang (2001) further elaborated the superiority of using technology in the learning context could facilitate the diversity and interactivity of learning material, and thus contribute to a more down-to-earth and flexibility of teaching content. In summary, student' learning motivation could be activate through abundant learning content and the way of learning.

Taking the advantage of conveniences, information technology and mobile device allow students to learn from the Internet. Furthermore, the efficiency of solving problems could also be more enhanced since many works can be done without time and space limitation. Simultaneously, teaching could be assisted by technology to promote the immediacy of the communication in teacher-student interaction (Ezziane, 2007). However, the information technology still has its limitation. For example, Ou Yang, Yin & Chang(2007) advocate the information technology should be used appropriately, or the learning achievement can be reduced due to the unsuitable application. To evaluate the suitability of applying information technology into the learning context, Stosic (2015) raise five criterion: whether it quipped with educational significance, whether it allow students to participate the teaching activity, the usability is it easy to use? The degree of interaction between information technology and students, and the allowing to track students' learning progress.

2.2 Design Thinking

Design is a creative act, and planning is a way of doing things with systematic logic. The core goal of "Design thinking" is being able to master the design, and meanwhile focusing on creativity and solving problems (Han, 2012). The so-called thinking includes the application of the strategy, the way the problem is solved, the focus of the goal and the decision of the design (You Shiyi, 2013). There are three parts, namely, "brainstorming method", "lateral thinking method" and "vertical thinking method". The Brainstorming (BS) method is a method designed to stimulate creativity, motivate association, and strengthen thinking skills. It is considered an effective creative thinking skill because it emphasize on the idea of subliminal "jumping out" rather than consciously come up with a plan (Bowkett, 2005). Lateral Thinking, which was proposed by Edward de Bono (1992), he believes that there are many kinds of thinking in the world, which are the combination of perception and logic. Therefore, the perception and creativity developed through horizontal thinking are indispensable. Vertical Thinking is a traditional way of thinking logically, also known as aggregating thinking or logical thinking. It is based on known theories, experience and knowledge (Yu, 2013). Through vertical thinking, people can explore in depth and explore the deeper answers to questions. However, this way of thinking is easy to draw, and sometimes it ignores the possibility of another orientation. It may also hinder the development of new thinking, accept new ideas, and easily lead to inert thinking, that is, unwillingness. Discarding existing ideas and causing stagnation of thinking

3. Methodology

To fulfill the aims of the present study, a purposive sampling method was adopted. Students in a corporate identity design course were choose to be the participants. This course lasts for one semester, and the students filled out a questionnaire in the last class. The details of research design are elaborated in this section.

3.1 Participants

A total of thirty six college students involved in this study. Their major is visual communication design, which training students to visualize messages and ideas with graphic design, packaging design, corporate identity design, environmental visual design, typesetting and related applications.

3.2 Course

The objective of the course is to help students understand the principles and applications of visual identity and branding design. This course is oriented towards design and creation, and focuses on the combination of visual symbols and application media. The course lasts for 18 weeks, once a week for two hours. At the end of the period, there will be a grouping to participate in the competition. Through the classroom application of the Facebook community and the Line group discussion, timely feedback and interaction was realized.

3.3 Tools

For understanding student' view about using communication software in their learning, a questionnaire with three questions were distributed through online Google questionnaire. First, for the assistance of communication software, students were asked a question: "How did find the assistance of using communication software during your learning?" Second, for the advantage of communication software, students were asked a question: "How did find the advantage of using communication software during your learning?" Last, for the disadvantage of communication software, students were asked a question: "How did find the disadvantage of using communication software during your learning?"

On the other hand, two communication software- Facebook and Line group function were used simultaneously in the course. Both of these two communication software quipped with group forming function that allow related members to join in for specific discussion topic or intention. However, there are some different features between Facebook group and Line group. Facebook group provides a platform for users to share multiple representations (e.g. text, video, links, etc.) and allow other members to leave their comments under the post, whereas Line group is more like a message software that provide instant contact although it shares the above-mentioned similar functions with Facebook. Therefore, Facebook was choose to let the students upload their works and comment on each other's work or share ideas, while Line was used to solve problems in a timely manner, or follow students' work progress. The interface of the two communication software and the actual implementation are shown in *Figure1*.

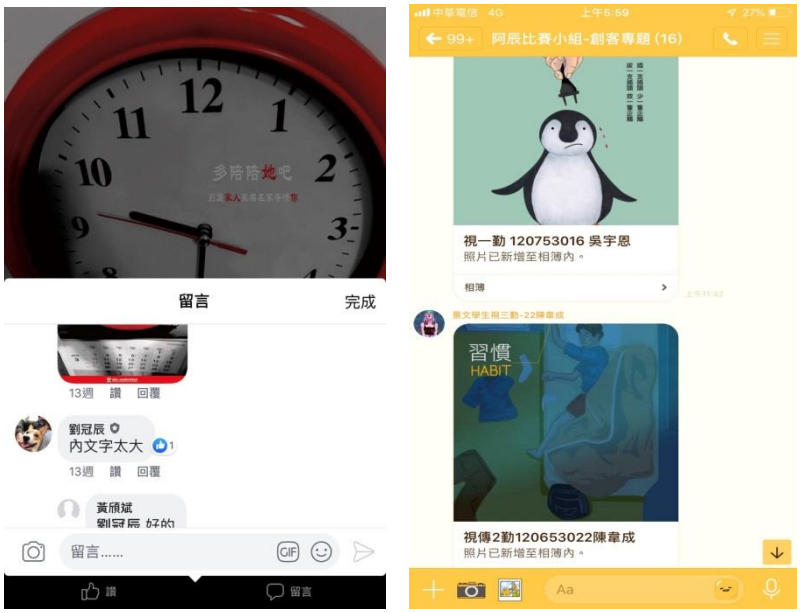

Figure 1. The screenshots of using communication software into instruction. Facebook group (left picture) function was primly adopted for students to post their works on, and leave comments on each other's work or share ideas. Line group (right picture) was used to instant contact to solve problems or track students' progress.

4. Data collection and analysis

4.1 Data Collection

An online Google questionnaire with three open-ended questions was distributed to students at the last class. The students responded to the questions according to their experience and feeling about using Facebook and Line software in the class during the whole semester. After answering each question, they have to click a button to send out their responses. It will not be able to send the questionnaire with missing any of the questions. As soon as they send out the questionnaires, the teacher will immediately receive the responses in an online form.

4.2 Data Coding

To code student's responses, three coding frameworks were formed based on the data. For the assistance of communication software, based on students' responses, four categories were identified: convenience (C), immediacy (I), peer learning (PL), and others (O). Table 1 shows the coding framework of the assistance of communication software.

Table 1

The Coding Framework of Students' Responses to the Assistance and Advantage of Communication Software

Main category	Code	Example
Convenience	C	Assistance: Easy to contact and receive the message. Advantage: It is convenient and clear to communicate clearly what the teacher's requirements are.
Immediacy	I	Assistance: I can know immediately what works should to be handed in and accomplish. Advantage: Get first-hand information quickly, and also prevent paper information from getting lost.

Peer Learning	PL	Assistance: Because you can discuss online. Advantage: I can know how others designs
Other	O	Assistance: Modern trend. Advantage: Could be integrate into daily life.

As for the advantage of communication software, students were asked a question: "How did find the advantage of using communication software during your learning?" In this part, students' response were similar to the previous question about the assistance of communication software. Thus, the coding work of student' responses to the advantage of communication software shared the same framework with the response to the assistance of communication software.

Regarding the disadvantage of communication software, also based on student' responses, four main categories were identified: Distraction (D), Inconsistency (I), None (N), and Other (O). Table 2 shows the coding framework of the disadvantage of communication software.

Table 2

The Coding Framework of Students' Responses to the Disadvantage of Communication Software

Category	Code	Example
Distraction	D	1. It is to be distracted.
None	N	1. None.
Other	O	1. It is not necessarily everyone is online at any time, it may take an hour or even a day to receive a reply. 2. When the signal is unstable and the website is down, the schedule of the progress is affected.
Inconsistency	IC	1. I don't know if I really communicated to each other. 2. If you discuss the work with the teacher, you will have no way to understand the meaning of the teacher.
Missing information	M	1. If I turn off the reminder and I will miss the new information.
Chaos	C	1. Sometimes it's not clear, which information is matched with that file, sometimes it's a bit confusing.

5. Results

To answer the research questions, students' responses were coded based on a framework which derived from the response data. The results of the two research questions are aggregated in Table3. For research question 1, students' report about the assistance of implementing communication software during the course were coding and count. Results show that the most frequently reported assistance of communication software in the class is convenience (count: 14, percentage: 39%), following by Immediacy (count: 14, percentage: 36%), Peer learning (count: 3, percentage: 8%), and other (count: 6, percentage: 17%). This result may indicate that students believe that the most direct help from the communication software is convenience and immediacy.

For research question 2, students responses to the question about the advantage of incorporating communication software are convenience (count: 19, percentage: 45%), following by Immediacy (count: 13, percentage: 31%), Peer learning (count: 6, percentage: 14%), and other (count: 4, percentage: 10%). The revealed result seems to be similar to the results of the previous question, that is, the rank of the code are in the same order. However, a slight difference could be found that the count and percentage are distributed vary from the responses of the first question. In other words, although the rank order are same, the distribution of percentage of each item between assistance and advantage is

distinct. This may attributed to that the provided responses from students can be classified into more than one category.

Table 3

The Results of Students' Responses to the Disadvantage of Communication Software

	Code	Count	Percentage
Assistance	C	14	39%
	I	13	36%
	PL	3	8%
	O	6	17%
Advantage	C	19	45%
	I	13	31%
	PL	6	14%
	O	4	10%
Disadvantage	D	2	5%
	N	11	31%
	O	15	42%
	IC	3	8%
	M	3	8%
	Ch	2	6%

As for the disadvantage of communication software applied in the class, students report the mostly reason is other (count: 15, percentage: 42%), following by none (count: 11, percentage: 31%), inconsistency (count: 3, percentage: 8%), m (count: 3, percentage: 8%), chaos (count: 2, percentage: 6%) and distraction (count: 2, percentage: 6%). These results may imply that students aware more various disadvantages of the communication software than the assistance and the advantages. Nevertheless, most of the students also sense that there is no disadvantage of using the communication software during their learning.

6. Discussion and conclusion

Through the preliminary collection and analysis of students' views on the integration of technology into communication technology (communication software), we can find that the most directly felt benefit is the generally recognized characteristics of information technology—convenience and immediacy. As Ezziane (2007) pointed out, students can break through the limitations of time and space for more efficient learning by using the universalization and convenience of information technology and mobile vehicles. Teachers can also use information technology to enhance the immediacy of communication between teachers and students. On the other hand, the mixed shortcomings of using the communication software also received from students. Future work could be devoted to a larger sample, and compare to different groups.

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