

## Study on Students' Communication and Interaction in Collaborative Learning Processes with Web-based Social Tools

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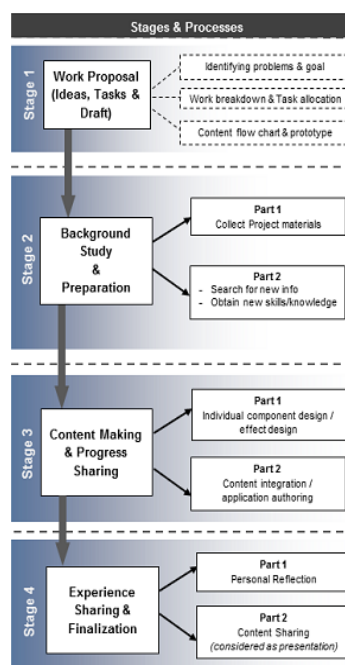
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### Graphical abstract



### Abstract

The rapid progression of ICT has influenced the social change and broadened the horizon of innovative learning which further enabled the web-based collaborative learning. Studies show that the use of web-based social tools is able to expand the social interaction and engagement among the students. In fact, many learning approaches in today's higher education context have embedded collaborative learning activities. Therefore, it is important to investigate the student communicative acts and social interaction in the online communication process for sustaining and better supporting web-based collaborative learning. This study presents students' feedback and their communicative acts in the process of collaborating on a multimedia project. Communicative Model of Collaborative Learning (CMCL) was used to analyze these inputs which obtained from open-ended questions, student interviews and students' posting in social networking sites. The results showed that the CMCL was a useful tool for assessing the students' social interaction and communicative acts in this learning approach. The outcomes of this study show that the use of CMCL is effective to analyze the student communication and interaction in web-based collaborative learning environments with more perspectives and reveal the impacts on student learning experience and attitudes.

**Keywords:** Web-based collaborative learning; interaction and communication process; multimedia; constructivist learning environment; group project; CMCL

### Abstrak

Perkembangan pesat ICT telah mempengaruhi perubahan sosial dan meluaskan ufuk pembelajaran inovatif yang terus membolehkan pembelajaran berasaskan web kerjasama. Kajian menunjukkan bahawa penggunaan alat sosial berasaskan web mampu untuk mengembangkan interaksi sosial dan penglibatan di kalangan pelajar. Sebenarnya, banyak pendekatan pembelajaran dalam konteks pendidikan tinggi hari ini telah tertanam aktiviti pembelajaran kolaboratif. Oleh itu, adalah penting untuk menyiasat pelajar tindakan komunikatif dan interaksi sosial dalam proses komunikasi dalam talian untuk mengekalkan dan lebih baik menyokong pembelajaran kolaboratif berasaskan web. Kajian ini membentangkan maklum balas pelajar dan bertindak komunikatif mereka dalam proses berkolaborasi dalam projek multimedia. Model Komunikasi Kerjasama Pembelajaran (CMCL) telah digunakan untuk menganalisis input ini yang diperolehi daripada soalan terbuka berakhir, temu bual pelajar dan posting pelajar dalam laman rangkaian sosial. Hasil kajian menunjukkan bahawa CMCL adalah alat yang berguna untuk menilai interaksi sosial pelajar dan bertindak berkomunikasi dalam pendekatan pembelajaran ini. Hasil kajian ini menunjukkan bahawa penggunaan CMCL berkesan untuk menganalisis hubungan antara pelajar dan interaksi dalam persekitaran pembelajaran kolaboratif berasaskan web dengan lebih perspektif dan mendedahkan impak kepada pengalaman pembelajaran pelajar dan sikap.

**Kata kunci:** pembelajaran kolaboratif berasaskan web; interaksi dan proses komunikasi; multimedia; persekitaran pembelajaran konstruktivis; projek kumpulan; CMCL

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## ■1.0 INTRODUCTION

The rapid progression of information and communication technology has influenced the social change from various aspects, including in the higher educational context. The evolving digital media, high-tech devices, Internet resources have developed the young learners as the information rich generation, who become more Internet savvy in the way they learn, work and socialize with people. This evolutionary change with technology has eventually taken place in the learning environment and students learning experiences which move the students towards knowledge construction strategies with community-based learning approach through interpersonal discussions and debate (Chisanu, Sumalee, Issara and Charuni, 2012). It has also stimulated the shifts of teacher's role from knowledge transmitter to a facilitator, introducing constructivist learning approach for each individual to contribute knowledge, interpret their experiences, and discourse with others for new meaning making and creating a bond among the students (Dembo and Seli, 2012, Suh, 2011, Jonassen, 1998, Jonassen, Davidson, Collins, Campbell and Haag, 1995). As such, today's learning environments needs to be re-designed to foster active learning and incorporate web-based collaborative tools to encourage more interaction and communication among students in the learning process (Brindley, Walti and Blaschke, 2009, de la Fuente Valentin, Pardo, Kloos, Asensio-Perez and Dimmittiadis, 2008, McLoughlin and Lee, 2010, Suh, 2011). However, studies found that digital learning technologies are not always optimized for facilitating learning effectively due to educators were less familiar with the use of technologies or indecisive in choosing the technologies for respective teaching situations (Laurillard, Charlton, Craft, Dimakopoulos, Ljubojevic, Magoulas, Masterman, Pujadas, Whitley and Whittlestone, 2011). Literature also shows that it is essential to have a framework which is more oriented to web-based collaboration in the curriculum design; so that it can be more effective in evaluating the student communication and interaction during their collaborative learning process (Suh, 2011). It is important to understand the learning process among the students and their academic knowledge before selecting an appropriate technology in enhancing the learning quality (Laurillard *et al.*, 2011).

Based on the study by Cecez-Kecmanovic and Webb (2000) and Treleaven (2003), more research is needed to investigate the communication and interaction processes which are mediated by linguistic and communicative acts that take place between students during their learning process (McLoughlin and Lee, 2010). Therefore, a framework of Communicative Model of Collaborative Learning (CMCL) was developed to analyze the collaborative learning situation (Cecez-Kecmanovic and Webb, 2000). In this model, the analysis is done along two dimensions: knowledge domains and learners' dominant orientation. These orientations show that different students have different levels of emphasis to complete the course whereas the knowledge domains divide how students express in their linguistic acts (see Table 1 for elaboration). In addition, this CMCL can be used to understand if the conditions of ideal learning situations are achieved which could happen when students' focus of communicative acts is moving progressively from the bottom level in CMCL (self-presentation orientation) towards top level in CMCL (learning orientation). In the past, this CMCL was also used by Liu (2004) to elaborate the communicative acts in the learning activities of the theme-based learning system to understand the use of various communicative tools, namely online phone, mailbox, and discussion board. The results showed that the discussion board was the most popular communicative tools to discussion at that time. However, this framework of CMCL was not widely used in analyzing on how web 2.0 and social media, coupled with the widespread adoption of tablets computing and WiFi or cellular network connectivity can diversified and widened students'

learning experiences with web-based interaction in recent years (Revels and Ciampa, 2012, Johnson, Adams Becker, Cummins, Estrada, Freeman and Ludgate, 2013).

In this study, the student learning environment was designed based on Jonassen's model of constructivist learning environments (CLE) which centered at a project-based learning (Jonassen, 1998). It creates meaningful tasks in a form of problem to stimulate students' knowledge building and critical thinking skills (Tiantong and Siksen, 2013).

In such web-based constructivist learning environment, students were grouped to collaboratively develop a multimedia project with authoring software and communicate through web 2.0 tools. The discussion in this paper is based on the collected students' comments and the details from their communicative processes, which then analyzed by using Cecez-Kecmanovic and Webb's Communicative Model of Collaborative Learning (CMCL) to elaborate with different knowledge domains and learners' dominant orientation (Cecez-Kecmanovic and Webb, 2000, Revels and Ciampa, 2012). Specifically, the research questions focus on how students communicate and collaborate in project-based learning process in a constructivist learning environment, and subsequently how this learning environment impacted student learning experience and attitudes.

## ■2.0 RESEARCH DESIGN and METHODOLOGY

### 2.1 Design of Constructivist Learning Environment

The learning environment was designed to involve a class of IT Degree students at INTI International University as the research sample, who were enrolled in a multimedia subject that offered as a common year-one subject in the area of 'Graphic Design and Animation' in the academic year of 2013.

In engaging the students to collaborate and communicate with other students by using web-based approach, the learning environment was designed by employing Jonassen's model of constructivist learning environments (CLE) which arranged with the following setting, include:

- forming a project group of 4 persons and create group identities
- setting a complex and huge group-based multimedia project that needs students to work collaboratively by using multimedia tools
- presenting ill-structured problem which can be solved by multiple solutions and various approaches.
- encouraging students to involve actively in the seeking the information needed based on the areas of focus
- engaging students to share opinions and experiences, maintain good relationship and interaction with others
- exploring the potential use of multimedia elements and features in multimedia software for gaining new understanding and knowledge
- connecting students through web-based social tools for communicating in the project development process

### 2.2 Class Profile and Student Collaboration

The chosen subject had a total of 64 students (82.8% of male, 17.2% of female), comprised of 73.4 % of Chinese, 10.9% of Indians and 15.6% of other. This class of students was in the level 1 of their IT degree study before choosing the specialization; however, they already had some fundamental IT knowledge and experience in developing IT project. At the beginning of the semester, these students were briefed with the project specification

by the lecturers, and then allowed to choose their own members to form a project group of 4 to 5 members. Therefore, this study consists of 18 groups. As for having fair contribution, each group member was required to contribute at least one feature in the multimedia application based on their personal strengths or work according to the assigned task.

### 2.3 Stages in Developing Interactive Multimedia Project

The design of the multimedia group project was made consistent with the constructivist learning approach which centred at an issue which required students to propose new ideas, and develop a multimedia application. The project development starts from the beginning of the semester, and end with the submissions and presentation on last week. The group project works were divided into four stages; the students were required to write report to describe the details in each stage.

In stage 1, each group was required to submit a project proposal to describe the initial works and propose the design ideas. In stage

2, each student needs to do background study individually to extend their knowledge which related to the development process. In stage 3, each student was encouraged to post their development details in the content making process onto the blog site. This allowed the lecturer to post some comments and feedback on the artwork, as well as allowing their group member to exchange the skills and sharing ideas for better improvement. In stage 4, each group member was required to write a report on their personal reflection with regard to their experience of the project development. Overall, in the entire planning and development process, all students collaborated and communicated through the web-based tools, which were shared with their lecturer. Figure 1 below illustrates the workflow diagram of the breakdown and the sequence of the coursework structure, and the approaches of collaboration and communication. Figure 2 shows the screenshots of students reporting the development process which was posted in the Blackboard LMS blog section.

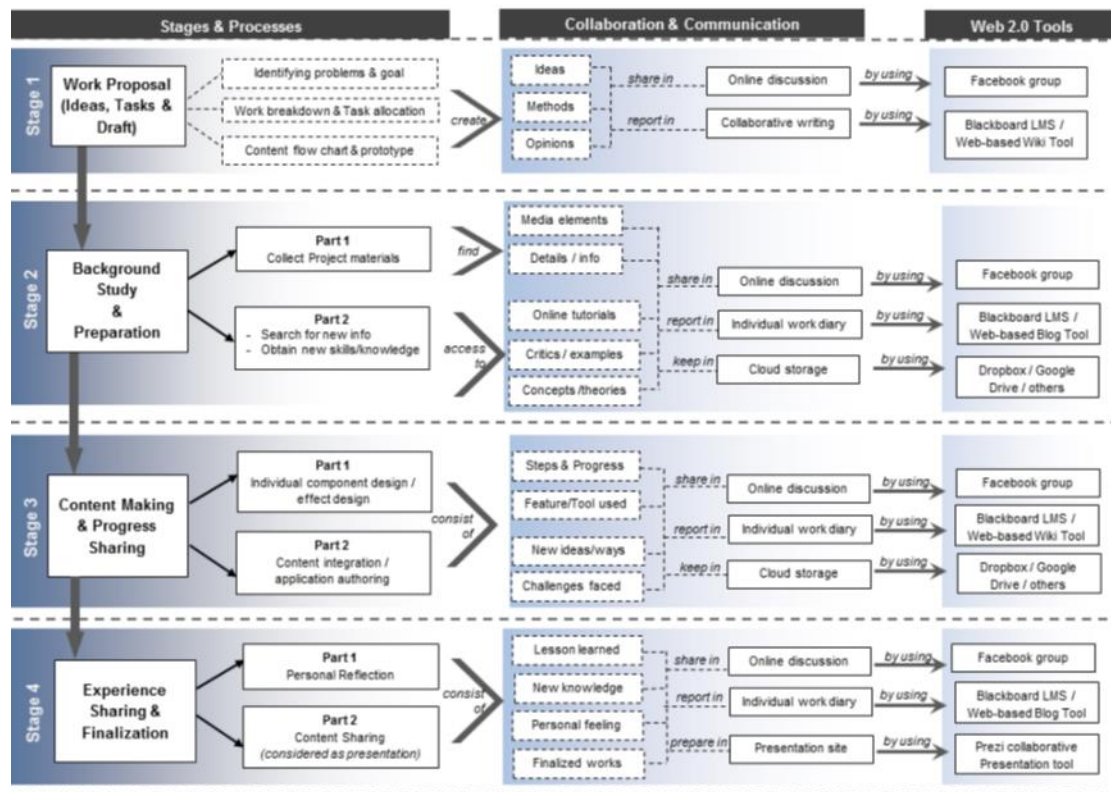


Figure 1 Workflow diagram of the coursework breakdown and the approaches of collaboration and communication

## 3.0 DATA COLLECTION AND ANALYSIS

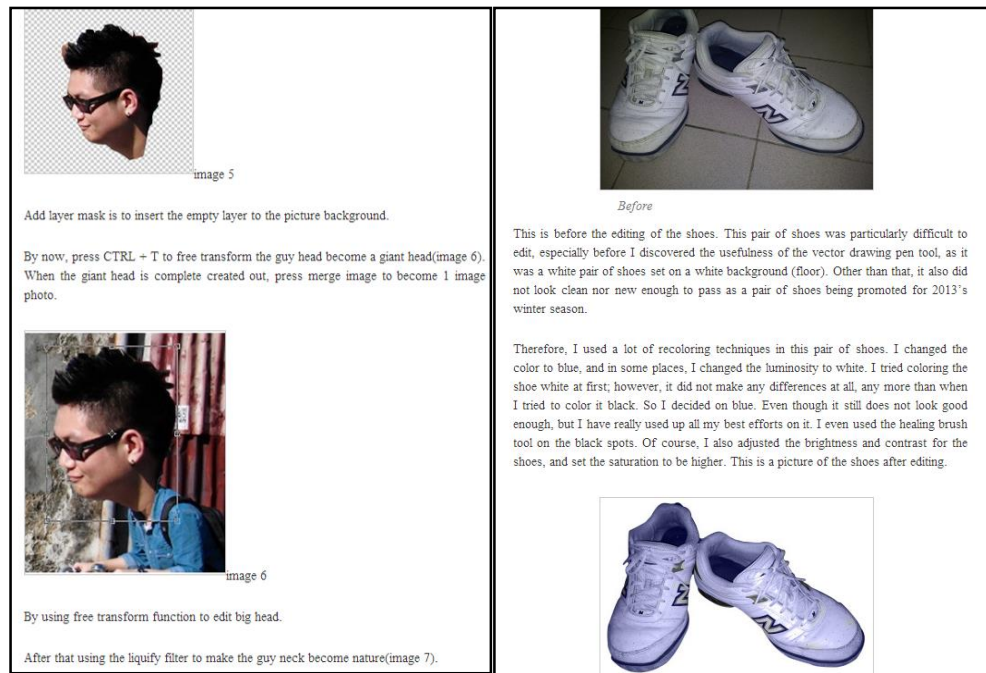
### 3.1 Data Collection

The data collection process consisted of obtaining student feedback and comments. Two data collection instruments were used: Firstly, students were given 14 open-ended questions which were distributed to students after their oral presentations upon completion of the project development. The students were requested to answer without discussing with other students. This was to obtain the written form of personal response toward

students' experience and opinions after working on a multimedia project. Secondly, face-to-face interview was conducted 1 week after the submission and all conversations were recorded in audio form. The interview was done in group mode where student groups were free to talk more about their own opinions and attitude, agree or support each other opinions towards the communication and interaction process while collaborating on their project. Each round of group interview took around 20 to 30 minutes to complete.

**Table 1** Cecez-Kecmanovic and Webb’s framework of Communicative Model of Collaborative Learning (CMCL)

		Knowledge Domain		
		Subject Matter (1)	Norms and Rules (2)	Personal Experiences, Desires and Feeling (3)
<b>Oriations</b>	<b>Learning (A)</b>	<ul style="list-style-type: none"> <li>Acts of discussing, interpreting issues related to subject matter to share more knowledge, create common beliefs or mutual understanding</li> <li>Acts of debating for finding better reasons which related to subject matter</li> </ul>	<ul style="list-style-type: none"> <li>Acts of creating or debating norms and rules to form the interaction or seek for cooperative decision which can be accepted by all</li> <li>Acts of assessing social acceptability and rightness of behavior cooperatively</li> </ul>	<ul style="list-style-type: none"> <li>Acts voicing opinions, ideas in the learning process for having common understanding or creating new knowledge</li> <li>Acts of showing respect for having cooperation with different opinions and values</li> </ul>
	<b>Achieving Ends (B)</b>	<ul style="list-style-type: none"> <li>Acts of discussing about issues related to subject matter for gaining attention, inspiring others for achieving goals</li> <li>Acts of manipulating the meaning to affect and change other’s views</li> </ul>	<ul style="list-style-type: none"> <li>Acts of changing the norms, rules, regulation of the interaction process to suit someone’s interests for achieving the personal goals</li> <li>Acts of sustaining the relationships and connection to serve achieving goals</li> </ul>	<ul style="list-style-type: none"> <li>Acts of showing intention to change other’s minds for achieving an aim</li> <li>Acts of responding to the matters for own success</li> <li>Acts of showing disrespect to matters that irrelevant to aims</li> </ul>
	<b>Self Representation and Promotion (C)</b>	<ul style="list-style-type: none"> <li>Acts of performing tasks related to subject matters to seek personal understanding</li> <li>Acts of less appreciating on other’s opinions for subject matters</li> </ul>	<ul style="list-style-type: none"> <li>Acts of stimulating interaction process for showing one’s leadership skills and capability</li> <li>Acts of commenting based on accepted rules to grab other’s attention</li> </ul>	<ul style="list-style-type: none"> <li>Acts of projecting the impression or showing a self-presentation by controlling others or situation</li> <li>Acts of ignoring others’ opinions or feelings to just promote on himself/herself</li> </ul>



**Figure 2** Screenshots of students reporting their development process which was posted in the Blackboard LMS blog section

**3.2 Data Analysis and Results**

The student feedback was analyzed with Cecez-Kecmanovic and Webb’s Communicative Model of Collaborative Learning (CMCL), which looked at students’ communication and interactions along two dimensions of learning: 1) Knowledge domains of linguistic acts (i.e., whether or not students’ learning was oriented towards content acquisition, procedural or sharing),

and 2) Learners' dominant orientation (i.e., whether or not students’ collaborative intentions were individual-, goal- or learning- oriented). By referring to Table 1 for the arrangement, each knowledge domain is presented in column, including subject matters (noted as 1), norms and rules (noted as 2), and personal experience and feeling (noted as 3). On other hands, each student dominant orientation is presented in rows, including learning



(noted as A); achieving ends (noted as B); and self-representation and promotion (noted as C).

### 3.2.1 In the domain of subject matters, when students were oriented to learning (A-1)...

It showed that the student linguistic acts focused on project topic, discussed the learning contents for mutual understanding and knowledge-creation. The students commented that:

- i. They became more knowledgeable when discussing the difficulties with their team members.  
*"We had difficulties in dealing with flash but we managed to solve the problems under discussion over and over again..."*  
*"We discuss again and again with the same title to enhance the better understanding..."*
- ii. They gained better understanding by sharing and combining their ideas with their team members.  
*"...share my knowledge to my group members and also gather a lot of information from them."*  
*"...we share our ideas and brainstorm together...can learn different skills from each one."*
- iii. They opened mind for mutual understanding when exploring different skills from different team members.  
*"...I have problems with Adobe Flash where I needed me of my group members to explain and guide me..."*  
*"...we will teach each other technique that each of us know so we can learn the feature faster..."*
- iv. They have the solutions from more different perspectives by solving problems together.  
*"...through group members' help...I can solve problems and understand and operate it more proficiently..."*  
*"...on and off there will be mistakes...but we did offer advice for each other and help to fix the mistakes..."*

### 3.2.2 In the domain of subject matters, when students were oriented to achieving goals (B-1)...

It showed the student linguistic acts responded to the ways of achieving goals in the learning process, or influent others to complete the tasks. The students commented that:

- i. Their main concern was about completing the project works as much as possible.  
*"...done the project as proposed in the proposal, having fully function features and high quality..."*  
*"...make sure everything can be work. There is no error for running the flash..."*
- ii. They used alternative approaches in order to complete the project work for submission.  
*"We had problem combining an animation...we redo our layering and separate our album to two scenes."*  
*"...we could not control the music if we jump to the other scene, so we decide to put the sound on the main menu scene..."*
- iii. Their aim was to get more marks to maintain or improve their academic results.  
*"...get a high mark so that i can score an A for this subject..."*  
*"...score as high as possible for this Project and if possible we will also want to score A in this subject."*

### 3.3.3 In the domain of subject matters, when students were oriented to self-representation and promotion (C-1)...

It showed the student linguistic acts raised as a self-performance related to project topic mainly for personal promotion. The students commented that:

- i. He/she had extended the amount of knowledge through performing in the group project.  
*"It was really helpful because i learn how to use flash and Photoshop better."*

*"I can familiar with the editing and animation skills...to enhance my catalog design..."*

- ii. Student claimed that he/she had contributed well to the project development.  
*"...i worked on the animation which was the main backbone of the project."*  
*"...the Photoshop skills – [1 member] is not that good so me as a group leader need to repair most of her works..."*

### 3.2.4 In the domain of norm and rules, when students were oriented to learning (A-2)...

It showed that the linguistic acts focused establishing norms and rules with regard to interaction and collaboration in learning; approaches to acquire the information. The students commented that:

- i. The process of developing the ideas through several rounds of discussions before finalizing the selected ideas  
*"...we all able to discuss...take consideration of all the possible outcome of the result and choosing the best idea..."*  
*"...each of us insisted on our own opinions...we redo and redo again to make sure everyone is satisfied with the outcome..."*
- ii. They used several ways to communicate with their team members, besides face-to-face meeting.  
*"...using facebook the command one for social network to send our part and also we meet once a week to discuss further"*  
*"...all of us have different timetables, thus, meeting up can be quite a problem... we discussed through a Facebook group."*
- iii. They used different learning resources to gain extra knowledge and also tried to find ways to solve the problem.  
*"...we used the internet source such as the YouTube to guide us to overcome this kind of problem..."*  
*"...we also going to bookstore like MPH, popular to read some magazine and some design book to learn..."*

### 3.2.5 In the domain of norm and rules, when students were oriented to achieving goals (B-2)...

It showed the student linguistic acts of interpreting norms and rules about the interaction process among the team members, which included delegating the project task, to suit the interests of each member for achieving the goal. The students commented that:

- i. The approach of delegating the task was based on the ability of each team member.  
*"...[1 member] was a photographer because he know how to the camera well..."*  
*"...I of the member is best in flash, the other member have talent to drawing and I got some knowledge to design photo/editing the photo..."*
- ii. They have different response towards the task delegated to each member.  
*"...was done based on sections. As we started with photos then typography then we could use the Flash..."*  
*"...member trying accept other member's opinion... take responsibility to finish the task within the time range..."*

### 3.2.6 In the domain of norm and rules, when students were oriented to self-representation and promotion (C-2)...

It showed the student linguistic acts about protocols or interpersonal relations to establish himself/herself as an important person. The students commented that:

- i. He/she demonstrated the leadership skills, and responsible for leading the direction.  
*"...i act as the coordinator to the entire group in which i customize the tasks to each other..."*

“... I helped all the members in some of the tasks that they have hard time with... I also did some leading in the group to make sure the discussed plan runs well...”

- ii. Members knew each other prior to forming the group, as they were friends.  
“...we are from course mate then become friends. I believe the communication between friends is better than communication between new members...”  
“...have been working with each other for almost a year...it’s easier to work.”

### 3.2.7 In the domain of personal experiences and feeling, when students were oriented to learning (A-3)...

It showed that the student linguistic acts expressed the personal feeling, and opinions about the managing learning process, focused on sharing learning experience or raised mutual understanding on project topic. The students commented that:

- i. The experiences made them realize and adapt to some new ways of learning and working on artworks.  
“...we always got some new things to learn, like Wordpress, Google Docs, Wiki; keep learning new things...”  
“...it helps us to recall back what we have learned from our lab classes and do more self research regarding those skills and project topic...”
- ii. They felt happy and motivated in the process of making.  
“...at first, I don't like to do the Photoshop...after starting the progress, it looks nice, can do a lot of things, then got interest now...”  
“I am happy to share what I have and gladly to receive what I don't have...”
- iii. It enriched their thoughts when interacting with the team members in the learning process.  
“...learnt to be flexible in my communication and adapt it to different people...”  
“...this project is a good way to allow students to interact more with each other...”

### 3.2.8 In the domain of personal experiences and feeling, when students were oriented to achieving goals (B-3)...

It showed the linguistic acts of student expressed their personal experiences, feeling and thoughts in completing the project tasks, achieving the goals, or heading to success with their team members. The students commented that:

- i. They felt proud and satisfied as their aims or goals were achieved with successful outcomes.  
“...everyone of us have achieved the goal that we have set earlier. I am overall satisfied...”  
“...happy when the application can run although this application still have many part need to improve...”
- ii. They appreciated their team members for achieving the goals together successfully.  
“...i learn something new but hard to do if all the member group do not support each other...”  
“...members of my group are very kind...hope if there's another project coming and we work together again...”
- iii. They found different ways to do work out the task which is more suitable and effective for them.  
“...Before this I don't know what is Wordpress and not interested. But now I use and like it...”  
“...this class is more flex [flexible], everything we submit online, it is good, easy for us...”

### 3.2.9 In the domain of personal experiences and feeling, when students were oriented to self-representation and promotion (C-3)...

It showed the linguistic acts of students revealed their self-representation or the personal experiences and feelings on the group work on overall. The students commented that:

- i. He/she enjoyed and felt motivated throughout the entire process and with the project team.  
“I feel excited doing this project because i got the opportunity to learn many new things and some of those things i would never have learned myself...”  
“...attracting me to doing more than the other projects... do freely with what we wanted to do according to the topic. It increases the rate of interesting...”
- ii. He/she gained the benefits of understanding the strength and weakness of him/her, as well as stimulated more interest in learning new knowledge.  
“...I feel my skills in the photo graphic design still not powerful; I must do more exercises to improve my skill...”  
“...I learn many things that I didn't know before in this project...improve my skill in taking photo and editing photo...”

## 4.0 DISCUSSION

This study presents the student feedback and their communicative acts for the multimedia group project with the web-based collaborative learning approach. As for answering the research question, the use of CMCL in the analysis process has categorized the student linguistic interaction and communication into different domains and orientations, which has evaluated on the way students communicate and collaborate in the project-related learning processes in a constructivist learning environment. It can be seen in the analysis section that all dimensions of CMCL have couples of sub-topics to describe how students interact and communicate with their peers with different attitudes and objectives (see Table I for the description and the arrangement).

In this section, it subsequently discusses how the use of collaborative learning approach and web-based social tools in group project impacted student learning experience and attitudes. The discussions were divided into six sub-topics, each presenting some outcomes and recorded facts as parts of the interpretation.

### 4.1 Design of the Student Group project

Within the duration given, all groups of students were able to complete the multimedia project with proposed solutions. It stimulated the determination and abilities of the students to go through each of development stages, till completed the tasks within the duration, and fulfilled the project requirements. It shows that by redesigning the learning environment, it increased the engagement of the student in the process (Jonassen, 1998, Jonassen *et al.*, 1995, de la Fuente Valentin *et al.*, 2008). In addition, by using social networking site, students uploaded the screenshots to a photo album as a portfolio to share their artworks with the peers. This has also encouraged students to appreciate and be confident in introducing their own multimedia production to others. In Figure 3, it shows the examples of 2 students groups displaying some screens from their developed application.

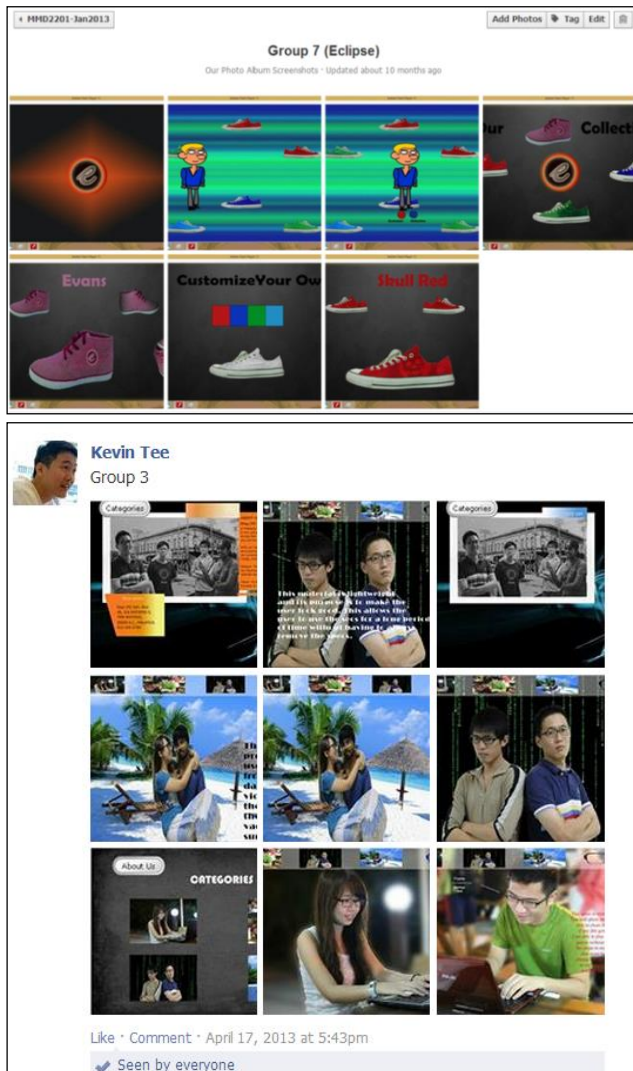


Figure 3 Students shared their screenshots on Facebook closed group after they have completed the development

### 4.2 Student Learning Process

Students were found to be more comfortable when working in group in constructing the shared knowledge for meaning making, resolving difficulties, and searching for resources in a constructivist learning environment. By using the social networking site, students could extend their discussions further onto the web at any time. In the following examples (see Figure 4), students posted their half-done works and seeking for more opinions from the rest of the members, who also actively commented and gave suggestions to improve the artworks. From their conversation, it can also be seen that other members were interested to know the making process and some file details. This reflected that with the use of Jonassen’s model, it guides the learning process in a constructivist learning environments, so that the learning goals can be achieved effectively and meaningfully (Jonassen, 1998).

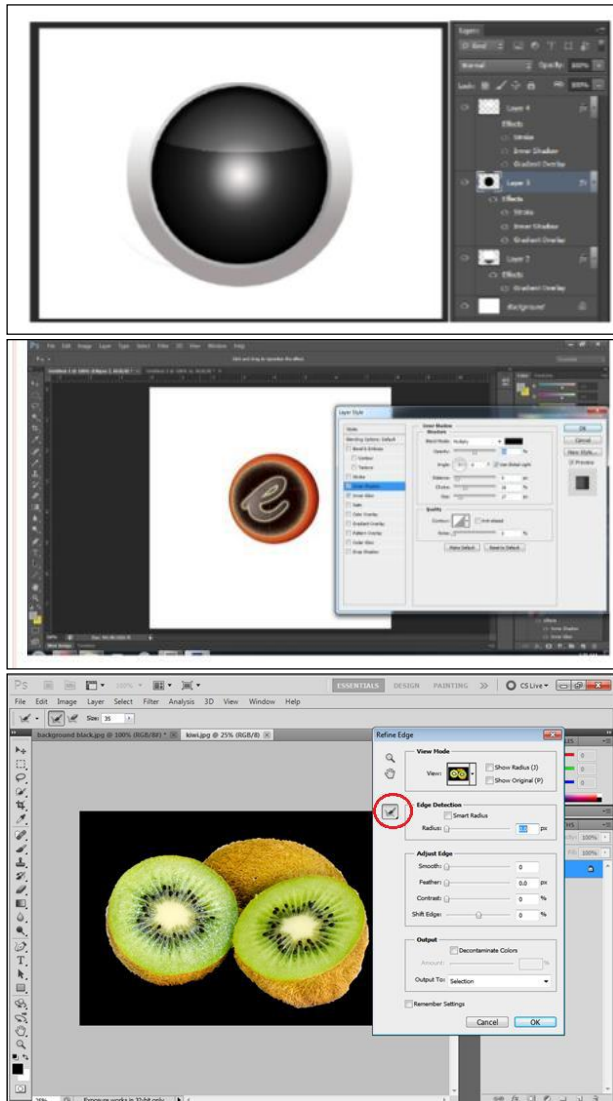


Figure 4 Students shared and discussed about the artworks during the development process



### 4.3 Use of Multimedia Elements and Software

The use of multimedia elements and software in solving the problem has become the driving force to engage the students to process the information, to master the skills and generate the contents needed. Hence it can be used as an approach to evaluate the student performance and identify their levels of achievement based on their software skills. In Figure 5, students prepared the screenshots to show the setting and details used in making the effects and visuals. It was found that most of the students captured their work progress in this way and added the explanation later, which had stimulated others to pay more attention to each other's work progress, hence eventually exchanging their skills needed in the development process. This has explained that with the use of multimedia elements and software program, it can enrich the students' collaborative process and engage them more reasonably.



**Figure 5** Students shared the details and setting used in the multimedia software while designing the artworks

### 4.4 Motivation and Attitude Change

The students found the project was interesting as they were allowed to integrate various ideas based on their discussion outcomes. With the peer encouragement and group effort, it made

the students to be more motivated and dedicated to participate and contribute to the project development and meaning making. This can be seen from the following conversation in Figure 6, students were actively discussing the contents used in the proposal. It can be noticed that students were quite responsive in the communication, and able to work directly on the Wiki site for collaborative writing in Wiki site. This explained that the use of web-based social tools is usable to motivate the students and change their attitude in learning. Besides, some students even make use of the social networking tools to share some information which related to knowledge in multimedia application development with their classmates (see Figure 7). Therefore this is consistent with other research study where the use of social software supports the needs in innovative learning and software brings positive impact in students' learning attitude (Suh, 2011, Revels and Ciampa, 2012).



**Figure 6** Students participated in the discussion in a comfortable way



**CY Lim**  
For going to another scene in Flash,

First create another scene by open scene panel(SHIRT + F2) and click lower left 'new scene' button(you are welcome to rename the scene to any name).

then use ActionScript3.0,

```
BUTTONNAME.addEventListener(MouseEvent.CLICK,FUNCTIONNAME);

function FUNCTIONNAME(event:MouseEvent):void
{
gotoAndPlay(FRAME, 'SCENE NAME');
}
//BUTTONNAME = name of the button you want to have the function
//CLICK = when you click on the button, apply the function
//FUNCTIONNAME = the name of function
//FRAME = frame number, e.g. 3 stands for the third frame
//'SCENE NAME' = the name of the scene, e.g. 'scene 2'
```

Unlike · Comment · November 21, 2013 at 9:48pm

You and 2 others like this. Seen by everyone

**Leow Fui Theng** correct! you just need to add the scene name as they are linked, and this is fast!! good sharing 😊  
November 21, 2013 at 10:01pm · Like · 1

**CY Lim** if the script not working and need any help, please provide me the script in the scene and the scene you want to go to, message me say the scene doesn't work without any details, is way too hard for me to help.

**Figure 7** Students posted some related information to share with classmates

#### 4.5 Student Collaboration and Interaction Process

With the use of the web-based communication tools, students were attracted to have collaboration among members. These tools have expanded their communities, be more socialized in developing shared information and work closely to solve problems. In Figure 8, the conversation of students revealed that this web-based interaction could be used in a series of communicative steps; include collecting feedback from others, making decisions by someone, and informing the decided matters pertaining to content development. This finding has provided the confidence and widened the perspectives from other research studies, to explore more aspects relevant to student collaboration in the next phase of this research project.

**Isaac Chay**  
how many colours u all want for the guitar??  
Like · Comment · April 8, 2013 at 9:51pm

Jason Chan likes this. Seen by everyone

**Zhou Han Hui** 3-4 few color oso can liao  
April 8, 2013 at 9:57pm · Like

**Isaac Chay** ok. but some colour might not available for some guitar  
April 8, 2013 at 9:58pm · Like

**Zhou Han Hui** hmm then use some colors that u can apply to it  
April 8, 2013 at 9:58pm · Like

**Isaac Chay** ok lets say, guitar 1 got yellow colour and red but guitar 2 mix with yellow not nice..but i use other colour  
April 8, 2013 at 9:59pm · Like

**Isaac Chay** ok??  
April 8, 2013 at 9:59pm · Like

**Tommy Lim** it's ok  
April 8, 2013 at 10:00pm · Like

**Zhou Han Hui** same as Tommy Lim use any color that u can apply to the guitar  
April 8, 2013 at 10:01pm · Like

**Isaac Chay** okok...good good  
April 8, 2013 at 10:01pm · Like

**Jason Chan** Some acoustic guitar only suitable to have the natural wood colour.. But electric body is made of metal, so it can have many colours..  
April 9, 2013 at 2:45am · Like

**WenChao Leong**  
When you all are free on Monday ?? We need go together, because i think lecturer will ask something about us proposal again...  
Like · Comment · March 3, 2013 at 11:24pm near Shah Alam

Seen by everyone

**Jeeven Sethu** I have class from 8-12  
March 3, 2013 at 11:58pm · Like

**WenChao Leong** after lunch we meet at cafeteria and go together can ?  
March 3, 2013 at 11:59pm · Like

**Jeeven Sethu** I'll have my lunch at 12. so meet at cafe at 12 sharp ok?  
March 4, 2013 at 12:00am · Like

**WenChao Leong** i think over 1pm is better, because met the lecturer lunch time(12pm-2pm) @@  
March 4, 2013 at 12:05am · Like

**Jeeven Sethu** oh yeah. then after 2pm ok? anybody got class? X  
March 4, 2013 at 12:09am · Like

**Hong Zhang** tmr only 4 pm class  
March 4, 2013 at 12:11am · Like

**WenChao Leong** i and Hongzhang got class at 4-6pm only...  
March 4, 2013 at 12:11am · Like

**Jeeven Sethu** so we go at 2  
March 4, 2013 at 12:11am · Like

**Hong Zhang** Member Sejati Di Hati wat time your class?  
March 4, 2013 at 12:12am · Like

**David Lee Teck Yao** 10 to 12  
March 4, 2013 at 12:45am · Like

**WenChao Leong** okok , 2 pm meet at cafeteria !!!  
March 4, 2013 at 12:45am · Like

**Figure 8** Students communicated for making decision

#### 4.6 Use of CMCL in Evaluation

In this study, the results and analysis of student response have showed that it is feasible to use CMCL to evaluate the activities and communicative practice in a web-based collaborative learning. As mentioned, the study on students' collaborative learning process can be understood from three different perspectives: what it refers to, how it contributes, what it does. Basically, in this paper, the analysis of student comment has presented the first perspective: what category could each act or thought belong to. Next, in the discussion section, several sub-topics were presented to describe how the web-based social tools, project setting, collaborative approach contribute to the change of student learning attitude and experiences, the second perspective. Besides, the conversation among the students and posted messages were captured to reveal more details about what students have communicated, done or shared with other students in order to achieve an aims in the project development process. In fact, these perspectives can be further elaborated based on each domain and orientation, and this can lead to more in-depth details of discussion. Therefore, it is believed that the CMCL has more room for additional details based on the student responses from the web-based communication and collaboration tools.

#### 5.0 CONCLUSION

This study presents results and student feedback on the implementation of a group-based multimedia project in a University classroom through designing a constructivist learning environment, and added the use of web-based collaborative tools to support collaboration and communication. The focus of this study was to investigate the feasibility of using CMCL in evaluating web-based collaborative learning in this constructivist learning setting. It was found that this CMCL was not only able to categorize the student responses, but also able to provide more perspectives, as in how different components contribute the student communication, and what it does on student communication and collaborative approaches. The CMCL was also effective in enhancing the understanding towards students' orientations in knowledge domains and personal learning. As such, it can be a useful guide for educators to gauge the level of communication and interactions present among their learners when collaborating on a group task, and in enhancing the communication and interaction processes in a classroom setting.

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