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Students' Perceptions towards Constructivist-Collaborative Learning Environment: New Skills and Knowledge

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ABSTRACT

With the emergence of technologies, the revolution in the digital age, and the increase of digital native students in universities, the teaching and learning approaches need to be redesigned, to enhance students' learning experience and develop new skills and knowledge. Studies show that having collaborative learning in constructivist environment enhances students' skillset and learning experience through the process of knowledge construction, peer interactions and problem-solving. However, students do not entirely experience effective collaborative learning by just having technologies, well-planned instructions, or highly interacted situations; instead it requires active interaction and communication by working in a small group.Through analyzing students' perception and their feedback, this paper discussed one of the identified components - 'new skills and knowledge', and the five aspects of new knowledge and skills**.** The discussion shows that effective collaborative learning can be achieved more meaningfully as the students are able to develop new knowledge and skills through the experiential activities, and apply to another project or similar situations, for solving the real-world case or enhancing the learning outcomes**.**

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INTRODUCTION

With the widespread emergence of the Internet and social networks, the generation Z, who were born between mid-1990's to the early 2000's, also known as digital natives, is dominating the generation Y as the majority population in universities. The gen-Z has been characterized as tech-savvy who are globally connected, innovative, well-experienced in computer environment (Anjali, 2014;Biber, Czech, Harris & Melton, 2013). Studies show that the rapid progression of ICT has also influenced the way how they learn, work, and socialize. This evolution in the digital age has enabled the integration of technology and media in learning environment, hence introducing different learning approach and experience to the students, as well as strengthening their skills and knowledge (Gagne, 1985; Chisanu, Sumalee, Issara&Charuni, 2012).

Constructivists believed that social interaction is fundamental to learning, to connect the personal experience with new knowledge (Vygotsky, 1978). With technologies and social media, more emphasis on knowledge construction, interactions and collaboration can be placed in designing the constructivist environment (Jonassen, 1999). As research studies have acknowledged that collaborative learning was evolved from Piaget's constructivism and Vygotsky's sociocultural approaches, the constructivist learning environment enables students to learn in an interactive and collaborative rather than competitive context in constructing new knowledge (Jonassen, 1999; Cecez-Kecmanovic &Webb, 2000; Garcia, 2012). Studies show that when students play different roles or apply different strategies in the collaborative learning, their critical thinking skills, problem solving skills, and leadership skills can be improved throughout the collaborative learning process (Chiong&Jovanovic, 2012; Garcia, 2012).

Recent studies show that with the use of technologies and well-planned instructions in the learning environment do not necessarily promise the success in collaborative learning. Instead, the procedures and strategies for enhancing the interaction are more important to engage students in socializing with people

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throughout the collaborative learning activities (Chiong&Jovanovic, 2012; Laal, Naseri, Laal&Khattami-Kermanshahi; 2013). However, recent studies also highlighted that given with highly interacted and communicated situations; students do not entirely experience effective collaborative learning as it requires active interaction and democratic communication by working in a small group (Jahng, Chan& Nielsen, 2010). Literatures explained that as student learning is derived from thecommunity of learners (Vygotsky, 1978), effective collaborative learning should be reflected in students' competency in adapting to different situations and valuing each other abilities, as well as embracing the teamwork (Chiong&Jovanovic, 2012; Laal et. al 2013; Jahng et al. 2010).

National Graduate Employability Blueprint 2012-2017 reported that lack of communication ability and in-depth knowledge are the main causes of the mismatch in the employability of IHL graduates as the problem solving skills and communication skills are the most sought-after attributes in the graduates' skillset. Therefore, in the Employability Attributes Framework (EAF), connectivity (communication and team-working skills) has been identified an important attribute to be embedded in student learning(Ministry of Higher Education Malaysia, 2012; Educational Technology Division Ministry of Education; 2006).

This study investigates students' collaborative learning when Gagne's events of instruction (Gagne, 1985) and Jonassen's model (1999) were mapped with the inclusion of multimedia contents and web 2.0 tools in redesigning the learning environment (Biber et al. 2013; Cecez-Kecmanovic & Webb, 2000). Several components have been identified in analyzing students' perception and interaction. However, this paper discussed only the sub-component of 'new skills and knowledge', and answered the research question of 'what is the impact of CCLE on student learning process?

Research Methodology:

Participants:

The participants in research study consist of 226 undergraduate students who enrolled in IT course at INTI International University. The data was accumulated from five semesters from year 2012 to 2014, and was collected when these students studied the module of "*Graphic Design and Animation*". The simple random sampling technique was used to select the samples which represented the entire student population in this module. Overall, there were 71.7% of Malaysian students, and 28.3% of international students, 81% of male students, and 19% of female students.

Design of Constructivist-Collaborative Learning Environment (CCLE):

In this study, Gagne's nine events of instruction (Gagne, 1985) were used as the theoretical framework to be incorporated into Jonassen's model (1999) which consists of six components, for designing a constructivist-collaborative learning environment (CCLE). As illustrated in Figure 2, besides the mapping of Gagne's events and Jonassen's model, the multimedia contents and web 2.0 tools were also incorporated in presenting the CCLE which centers at multimedia project development, for engaging students to the learning environment, empowering their learning experience, and enhancing their knowledge and skills.

Data Collection Instruments:

The research data was collected from the student feedback in the questionnaire, open-ended questions and students' interaction in web 2.0 tools. Firstly, the questionnaire consists of 40 survey items with 5-point Likert scale. These survey items include various focuses to assess students' perception and attitude. The statistical test used for analysing the survey result are Cronbach's alpha for assessing the internal consistency, frequency and mean scores count, and factor analysis. Secondly, the open-ended questions consist of 14 questions to assess students' experience and opinions on developing a multimedia group project. Hence, more aspects of expression were extracted to complement and extend survey data. Thirdly, the content analysis was used to investigate the communicative consents in the web 2.0 tools used by students, including Facebook group, some chatting or messenger apps. The data can be further identified to assess students' action and the processes in collaborative learning.

Data Analysis and Results:

In this study, both quantitative data and qualitative data were triangulated for analyzing and interpreting the results. As the main components were identified by factor analyzing the survey results, the interpretations on each component were supported and expanded by the content analysis on students' comments, peer interaction and communicative content during the project development process.

Factor Analysis of Questionnaire:

Based on the survey result, the factor analysis has identified 2 main components (component A and component B), each with 17 items, and a special component (component C) from group leaders' responses. In addition, 2 rounds of factor analysis were conducted subsequently to sub-divide the component A and

component B as each consists of large number of survey items. Hence the sub-components consist of component A1, A2, B1, B2, and B3.

Based on the analyzed outcomes from 3 rounds of factor analysis, it can be reported that all survey items correlate reasonably well and factorable as Kaiser-Mayer Olkin indicated that the data and sample size are appropriate, and Bartlett test of sphericity indicated that the correlations between items were sufficiently large for principal component analysis (PCA) (George&Mallery, 2011). With the results of the Varimax (orthogonal) rotation and the retaining factors justified by the scree plot, when excluding the items with loadings less than 0.50 (Brown, 2009), a total of 34 out of 40 survey items (for all students) and 5 survey items (for group leaders), have presented 3 components and 5 sub-components. Figure 3 below presents the flow diagram of the identified components from the factor analysis, and the highlighted sub-components were discussed in this study.

New Skills and Knowledge:

The sub-component of 'New Skills and Knowledge' consists of 5 survey items with the factor loadings ranged between .507 to .810. The Cronbach's Alpha test shows the statistics output of 0.811 which can be considered as a reliable survey (George&Mallery, 2011). Table 1 presents 5 survey items that loaded onto this sub-component, and were arranged from the highest to lowest mean scores in descending order.

Table 1: Response of survey items that loaded onto the sub-component of 'new skills and knowledge'

Survey Items	Mean (m)	Agree (%)
1. The project increased my understanding on how to manage and develop an interactive application	4.21	85.40
2. The project enhanced my learning of interactive multimedia	4.15	84.96
3. I am now able to apply my skills in a more effective manner on future projects	4.04	80.53
4. This project allows me to develop skills needed in the real-world	4.02	82.30
5. I am now able to think critically about developing interactive web applications	3.86	72.57

In Item 1, it can be interpreted that 85.40% of students agreed that the project has helped to increase their understanding on how to manage and develop an interactive application (m = 4.21). It shows that by participating in project-based learning, most of the students realized that the understanding on project management and development has been increased. According to student feedback, it can be elaborated that students were able to organize the tasks, set the schedules for works, and monitor the work progress and performance. The feedback include *"I learn to manage time properly as well as dividing task equally based on the member's strength", "…distributing work…people who does not master some of the skills should be helped but not done by others", "I learned that nothing can be finalise as changes is inevitable due to hurdle faced in every stage"*

In item 2, it can be interpreted that 84.96% of students agreed that the learning of interactive multimedia was enhanced through working on the project (m = 4.13). It shows that the project tasks provided the opportunities for students to explore and develop the multimedia contents. Based on the student feedback, it can be elaborated that students were able to enhance their software skills for producing some outcomes, and apply the design theory. Students commented that *"I have chance to sharpen my Photoshop and Flash skills which I did not expect that…", "I learned how to work on some typography effects and also how to apply the principles of design…"*

In Item 3, it can be interpreted that 80.53% of students agreed that they were able to apply their skills in a more effective manner on future project (m = 4.04). It shows that students were confident and interested in extending their new skills and knowledge into projects. According to student feedback, it can be elaborated that students were able to apply new skills in another project, and assist their peers to gain abilities. The feedback include *"It's the basic that I need to learn to go advance level of my course", "I can do better graphic design on further project", "…teach my member how to trace a photo to his poster", "they learned shooting techniques from me since I did the shooting".*

In Item 4, it can be interpreted that 82.30% of students agreed that the project allows them to develop skills which are needed in the real world. It shows that students were aware of skills needed in the real world and found that the experience gained from working on the project can be applied to the real-world working environment. It can be elaborated from the student feedback that students were able to gain new insights on the real working environment and recognize the actual work situation. Some students said that *"This project makes me acquire useful skills of design which could be applied in the future working place", "project led us to think as designer…", "I found this project inclined to the real working environment in the multimedia industry".*

In Item 5, it can be interpreted that 72.57% of students agreed that they can think critically about developing interactive web applications. This shows that about 3 quarters of students agreed that they were able to apply critical thinking skills in developing an interactive application. According to student feedback, it can be elaborated that their critical thinking was applied in sourcing for alternative solutions. The feedback include *"I learn how to solve problem by discuss with member and search the solution from the Internet", "they search*

new ideas and info to design the poster…", "my skills on Photoshop increased when I thinking in various perspectives…"

Discussion:

By mapping Jonassen's model and Gagne's events of instruction, as well as including web 2.0 tools and multimedia contents in developing a CCLE, gaining 'new knowledge and skills' has been identified as one of the main components. In further analyzing the student perception and feedback, gaining 'new knowledge and skills' can be discussed from five perspectives:

Perspective 1 - New knowledge and skills can be obtained as the students experienced the process of project management and development in project-based learning:

Analysis revealed that the project management and development skills were highly perceived as the new knowledge and skills. It can be noticed that students have practiced and devoted a lot of effort in organizing and delegating the tasks and resources, to align with the project requirements, timeline and restrictions. These outcomes have reflected that the collaboration in project-based learning can strengthen students' interaction and responsibility as it promoted the chances of seeking attention, determining the goal, negotiating for the strategies. These processes are important in enhancing the student quality in processing the knowledge and making the decision, as well as reducing the potential mistakes (Jonassen, 1999; Laal et al., 2013).

Perspective 2 - New knowledge and skills can be obtained as the students explored and developed the multimedia contents into project context:

It can be found from the analysis that the project context plays an important role as the conditions or situations to motivate students in learning the multimedia contents and producing creative outcomes. Literature shows that while multimedia contents have made a difference in demonstrating the lessons to supplement textbook content, it can be more stimulating when the students are encouraged to explore and produce their own multimedia design for presenting the concept (Nyirenda, 2013). Hence, students can practice by applying the design principles, color theory, interface design and anticipating various outcomes and effects.

Perspective 3 - New knowledge and skills can be obtained as the students improved their technical skills, and extended to other project or situations:

By analysing the student feedback, it can be interpreted that students were able to see the connections and opportunities to apply their new skills and knowledge into other similar situations. It also reflected that students have deeper understanding and more confidence as they are able to manipulate and extend the knowledge and skills into similar situations, and willing to share the details with their peers. Studies show that the best learning occurs when a person has the duty to teach others instead of just receiving the information throughout the learning process. This is because when explaining to others, or extend to another situations, the student needs to re-organize and re-process the understanding with more elaboration and clarification, to be understood by others, or be used more meaningfully (Vygotsky, 1978; Chisanu et al., 2012).

Perspective 4 - New knowledge and skills can be obtained as the students were able to relate and generalize their experience to solve real-world problems:

In this study, the analysis revealed that by engaging students with problem-solving approach, the experiences have enabled the students to imagine and visualize the real-world working environment, as well as motivated them to develop the knowledge and skills which will be needed in the relevant industries. Literature described that students with problem solving skills can become independent thinkers as the problem solving is like continuous episodes. The new episode of problem-solving can be created by modifying the solutions from previous episode. Therefore, the refreshed memory with the new solutions can be more meaningful and remembered by the students for future use (Gagne, 1985; Vygotsky, 1978; Garcia, 2012). Besides, building the relationships in the process of problem-solving can also increase student's sense of belonging, and possibly reduce the potential feeling of being isolated in the learning process(Jonassen, 1999; Cecez-Kecmanovic & Webb, 2000; Garcia, 2012).

Perspective 5 - New knowledge and skills can be obtained from as the students use the critical thinking in enhancing the work quality and performance:

The analysis in this study shows that the design of this learning environment has positively stimulated the students' abilities in thinking critically with various perspectives, especially in finding suitable resources and searching for creative ideas, and upgrading practical skills while constructing the content or solving the problems. As the literature highlights that the ability of collaborative learning is included as one of the 21st century competencies, it is essential to incorporate the shared exploratory activities, such developing a multimedia project in collaborative learning. This is because it strengthens students' self-esteem and confidence

which encourage them to apply critical thinking skills and reflection skills through the process of interacting with the peers in collaborative learning (Garcia, 2012; Chiong&Jovanovic, 2012).

In extending the literature, this study has found that besides requiring active interaction and communication during small group work, effective collaborative learning can be achieved more meaningfully as the students are able to develop and demonstrate the new skills, as well as apply their new knowledge in various situations to enhance the learning outcomes. In can be concluded that new knowledge and skills can be developed through new discoveries or insights gained in experiential activities, such as managing a project, creating multimedia content, or completing the tasks that required students to perform critical thinking. In addition, developing new knowledge and skills can be more effective when these are related to the students or to an environment, applied to solve the real-world case, or be extended to another project or similar situations.

As summary, Figure 1 presents the 5 aspects of students' new knowledge and skills gained in CCLE.

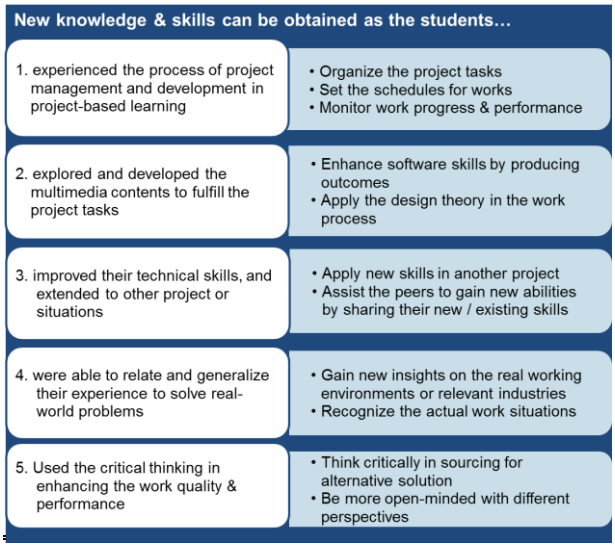

Fig 1: Summary of Students' new knowledge and skills gained in constructivist-collborative learning environment

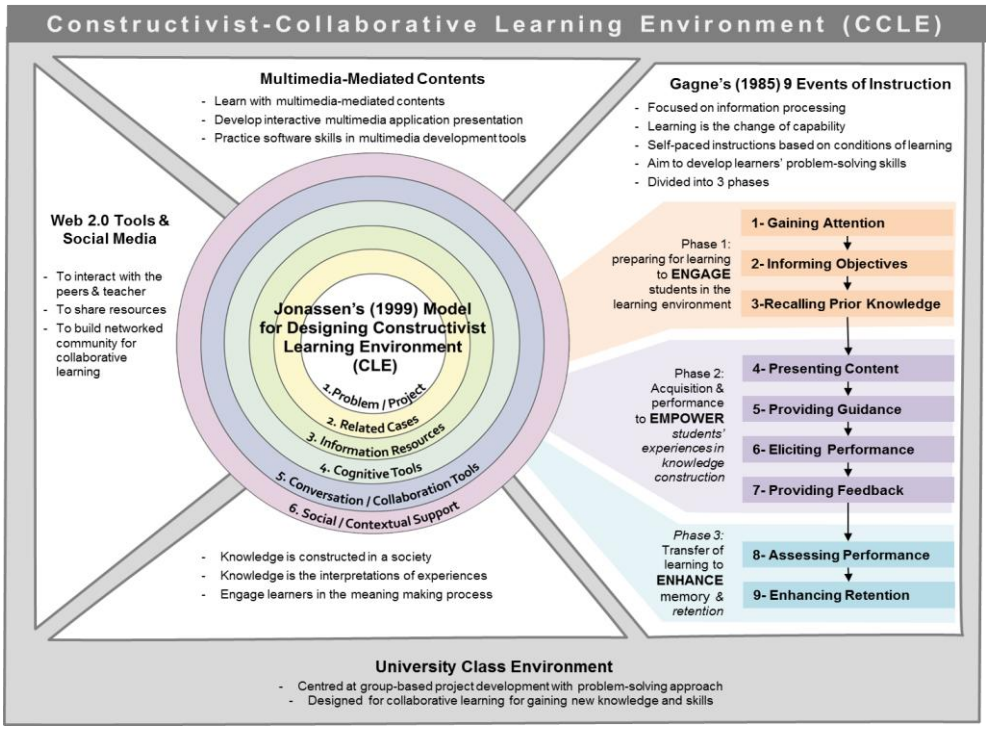

Fig. 2: Conceptual design of Constructivist-CollaborativeLearning Environment (CCLE)

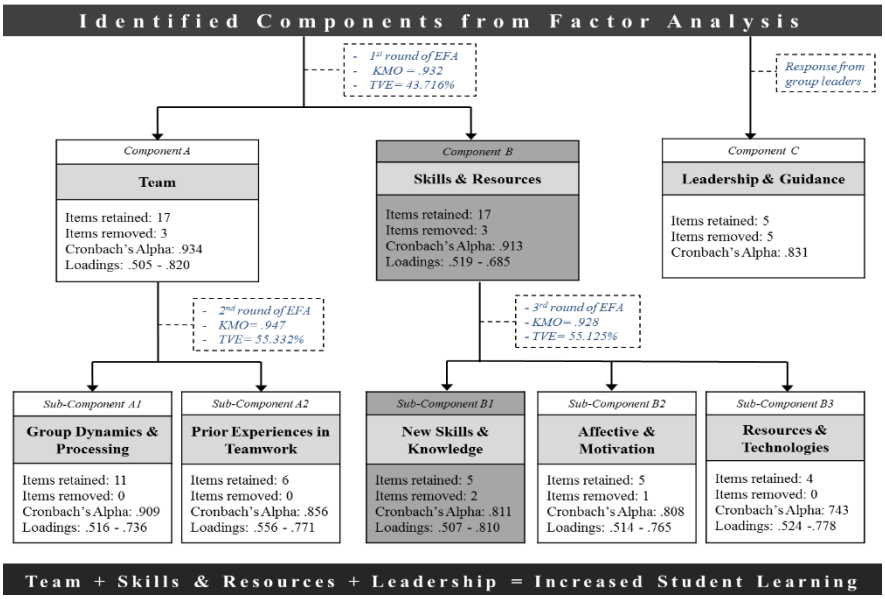

Fig. 3: Conceptual design of Constructivist-Collaborative Learning Environment (CCLE)

Conclusion:

In this research studies, it was found that the student learning can be enhanced when the learning environment is effective in stimulating and developing students' critical thinking skills and enriching their learning experience. This includes allowing them to share ideas, negotiate for solutions, and receive constructive feedback (Gagne, 1985; Jonassen, 1999; Chiong&Jovanovic, 2012). The five perspectives of describing the factors in gaining new knowledge and skills have shown that theintegration of technology and media matches with the way how students learn, work, and socializein the learning environment. Therefore, acquiring the positive influences in empowering student learning and enriching their learning experience (Chisanu et at., 2012). This finding is believed to be a meaningful guideline for educators in higher education institutions in helping their students to gain new knowledge and skills through connecting to their personal experience, proactive in play different roles, or applying strategies, rather thanlearning in a competitive context or having to memorize the facts (Jonassen, 1999; Chiong&Jovanovic, 2012; Garcia, 2012).

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