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Design of Collaborative Ubiquitous Learning in Promoting Digital Education: Integrating History, Science, Technology in Reflection Class

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Abstract: This paper attempted to present the Design of Collaborative Ubiquitous learning approach in promoting Digital Education in the integrated study called "Reflection Class". The concept of this integrated History, Science, and Technology content used in this study was called "Story-based learning". Besides, the learning activities were designed to support learner's collaborative ubiquitous learning. This process required learner's effort to work in group through the virtual online platform in order to inquire the Concept, Collaboration, and Content from class within 1 month. The learners received and responded to this CULD approach the high level of learning achievement in the context of 3C; Concept, Collaboration, and Content. Furthermore, the finding of this study could bring more digital education approach supporting the variety of learning approach during Covid-19 outbreak and Life-long learning.

Keywords: Collaborative Ubiquitous learning, digital Education, story-based learning, Reflection

1. Introduction

Nowadays, the concept of Collaborative Ubiquitous Learning in the field of Education can be expressed to a particular vantage point and with certain positions. Specifically, it tries to examine two different lenses of perspectives: the social studies in learning, and another one is, the digital science and technology. Story- based Learning has been an approach in the recent years, because of its impacts on learning experiences and outcomes (McQuiggan et al., 2008). This concept, obviously, is narrative-centered learning in which combines historical contexts and pedagogical strategies. According to McQuiggan et al, their research makes it clear that Contextualizing learning within storytelling significantly affects students' learning outcomes by plots and settings. Not only the ability to understand any lessons, but also claimed to reflect the natural way people understand and remember stories, data, and information, revealing in a close correspondence with the familiar experiences of daily life (Graesser et al., n.d.).

Science and Technology was an essential part of students' learning in the 21st century (Raja & Nagasubramani, 2018). In this path-breaking critique of the relationship between Social Studies, Science and Technology, Crowe (2004) argues that Science and Technology had been gradually recognized in the field of Education together with Social Studies (Alicia R. Crowe, 2014). To make this point clearly, there are some discussions about its positive effects in the field of Social Studies (Kafadar & Kafadar, 2020). According to Kafadar 's result, he mentioned that the majority of students stated Science and Technology helps them to improve their communication to interacting easier with teachers and colleagues in class. Another tremendously outstanding effect of its advantage relation between Science & Technology and Social Studies is to extend student' s motivation and eagerness to

learn this course by encouraging them with the use of computing and digital devices to enhance their self-efficacy and self-worth.

There are many different explanations of this approach, such as “Web-based training, Online learning, Network learning, Distance learning (Cross & Dublin, n.d.). Lin defined the digital learning as delivery with digital forms of media through the Internet (Lin et al., 2017). In this present, it rapidly develops as the virtual learning. In particularly after the epidemic of Covid-19, virtual learning replaced the traditional learning wholly. Schack examined the advantage of online learning; Increased inclusivity, Improved accessibility, Community, and relationship building, and Greater flexibility and comfort (Schack Noesgaard & Ørngreen, n.d.). In addition, the software supporting Virtual learning approach rapidly grow. For instance, Zoom, Microsoft Teams, Padlet, Mentimeter, Canva, etc. Which allow learner to collaborate and work in group conveniently.

According to the phenomena of Integrated digital learning under the concept of Story-based learning, therefore the collaborative ubiquitous learning is adopted as an efficient learning promoting the Digital education in Reflection class, the integrated learning’s activity supported Teamwork, and Ubiquitous learning called CULD. The concept of CULD encouraged learners to learn and work collaboratively through the Virtual platform. Moreover, these developed activities promoted Historical, Scientific, Technological knowledge content, and context.

2. Related Study

2.1 Collaborative Ubiquitous learning and Integrated Studies

Collaborative Learning (CL) is one of the most ubiquitous educational concepts in the twentieth century, thanks to its shifting from individual learning to group work (Laal & Laal, 2012; Leonard & Leonard, 2001). In this sense, meaning is an educational approach in which is relevant to groups of student’s activity so as to solve an issue, complete a task, and generate some ideas or tangible basis products in the class (Macgregor, 1990). There can be no doubt that Collaborative Learning will involve students directly, especially CL activities that allow students to talk, work, and join closely together in small group.

It is possible that the effect of the complex and advanced technology is the differentiate of education. This does not only allow students and teachers to access a number of resources available online (Zhang et al., 2005), but it also makes a huge impact on the learning and interaction of educational approaches (Raja & Nagasubramani, 2018). According to Mottus et al, their definition of Ubiquitous Learning (U-learning) is the learning supported by mobile, computers, or wireless networks to provide students with content and interaction anytime or anywhere (Mottus et al., 2018). However, its significant features was a rise in the numbers of the omnipresent learnings both in virtual and electronic resources that assist students deal with the real world (Peng et al., 2008).

There are some particularly large advantages of Collaborative Ubiquitous Learning. For example, it facilitates access to students by the number of information and data online using mobile devices (Debora Barbosa, 2016). Moreover, Guozhen Zhang and Qun Jin, had also revealed that this technique led to the increase of the availability of mutual and friendly help in the learning process (Zhang et al., 2005). Although Collaborative Ubiquitous Learning had many benefits to students in recent years, we cannot deny that this approach has some disadvantages, such as scalability concerns (Debora Barbosa, 2016).

Due to its advantages mentioned above, we are not surprised that the increasing trend of Collaborative Ubiquitous Learning has been widespread in recent years. This sign revealed some data that many educational institutions implied this technique in their classes. However, In Thai context, according to Panjaburee and Srisawasdi, they indicated that the studies about Collaborative Ubiquitous Learning have been frequent in the last-two decades at all levels (Panjaburee & Srisawasdi, 2018).

2.2 Digital Education

Digital education or E-learning is always considered as the innovative use of digital tools and technologies during teaching and learning called Technology Enhanced Learning (TEL)(Camilleri & Camilleri, n.d.).In addition, Digital learning involves the communication technologies to support the learner interaction with digital materials in order to help learners reach specific learning outcomes (Mayende et al., 2017).

Nevertheless, according to the digital learning's definition, they recognized as an overview of various learning pedagogy that replaced traditional method by combining technology as follow: Blend learning, Online learning, Differentiated learning, etc.

After the epidemic of Covid-19, teaching and learning pedagogy continuously develop. Digital learning replaced traditional learning inevitably. In addition to various learning approach mentioned, Virtual World greatly assimilate throughout many platform (Baker, n.d.). There are emerging online learning platform supported the Virtual learning such as, Zoom, Microsoft Team, Miro, etc. in ordered to learn in fully-virtual world. Takacs & Pogatsnik opined that this great increasing online learning platform change education perspective wholly (Takacs & Pogatsnik, 2021). In the other hand, there are some effects of digital learning, in particular learners. Phalitnonkiat founded that digital learning has a positive impact on student learning motivation. In the context of communication skill, and digital learning effected negatively to student's communication's performance (Phalitnonkiat et al., 2020).

The concept of Digital education have continuously developed. In particular after the epidemic of Covid-19, there are many learning platforms supporting the integrated studies. For instance, Project-based learning, STEM, etc. According to Sumarmi, designed the Project-based learning through digital platform (Sumarmi et al., 2021). Similar to Chang, studied the STEM student's performance between Vietnam and Taiwan in order to design the curriculum for STEM (Chang et al., n.d.). Nevertheless, there are many online learning platforms popularized to work collaboratively, such as, Padlet, Miro, Mentimeter, Google slide, Jamboard, Canvas, etc. Saudra opined that these platform support in the context of Group communication. In the other hand, Linda opined that the learning platform strengthen the student concept knowledge (Linda et al., 2021).

3. Description of Collaborative Ubiquitous learning in Promoting Digital Education

3.1 Background and Overall Structure

Reflection class were designed to reflect the student's learning performance in Grades 10^{th}-12^{th}. Each semester was set for which students were required to study predetermined period. Based on the concept of story-based learning as follow. In each semester content and skills that students would learn were be consorted with the historical timeline in order to integrate knowledge content in many disciplines such as Mathematics, Physics, Chemistry, Biology, Engineering, and History, etc. Student's learning was divided into 4 modules. Each module, students would summarized in Reflection activity. Instructor designed the learning activity using the expected learning outcome, Key concept, and the context that learners could gain in 1 month. Every Reflection class were designed into Group Work that learners could collaboratively work.

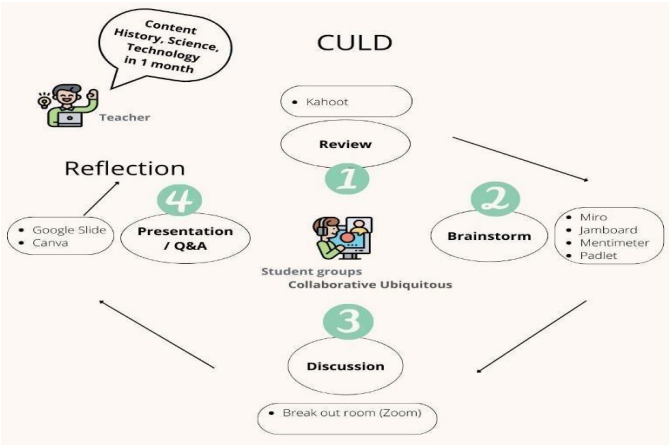

Figure 1. The Overall Structure of collaborative ubiquitous learning in promoting digital education (CULD).

According to Collaborative Ubiquitous learning process in Reflection class, Digital education were used as the channel and platform in this class. Owing to learning collaboratively through the virtual platform, Digital education is an essential tool supporting Ubiquitous learning integrating knowledge's content from student, and credible online database through online learning platform. For instance, Zoom, Kahoot, Miro, Jamboard, Mentimeter and Canva, etc.

3.2 Design of Learning Process

According to the overall structure of CULD, the learning activity are designed by taking Learning Outcome, Key Concept, and Context as main criteria to design learning process in each month within 2 hours.

Table 1. *Learning Process in Reflection class*

Time (Minutes)	Activity	Particular	Digital Platforms
10-15	Introduction /Review/Check in	An Introduction was encouraged learner's attendance with some online clips on YouTube. Review section, Mentimeter was utilized to recheck what lessons they had recently learnt in last 1 month by sending some texts or messages.	YouTube, Kahoot, Miro, Padlet, Mentimeter
60	Main activities (Give assignment)	In the Main Activity, purpose to check students' comprehension, teachers' s role gave some questions related to the topic in each class. Due to the number of students in the class, instructor divided them into a Breakout room approximately 6-7 people for students and 1 teacher in each group in order to allow them to ask, answer, and participate effectively. Some example questions in the class For 12th Grade, the 1st Module, the question is how technology affected the development of scientific knowledge in late 20th Century - Physis, Chemistry, Biology, and Engineering (select one subject on above), and the last asked what its effect on humans was. Skill acquired are Collaboration, Teamwork.	Miro, Canva, Google Slide
20	Group Presentation	Skills acquired are Collaborative Skill and Presentation.	Miro,Canva, Google Slide
10	Q&A, Discussion	Presentation and Q&A section between teachers and students.	

4. Research Design

4.1 Participant

There were 120 Grade 10-12th students who participated in this research study. All student joined the Reflection Class as the supplementary course to integrating every subject in each month within 2 hours for active learning through the virtual learning platform.

4.2 Procedure

The procedure of CULD in Reflection class comprised of four learning process which are presented in Figure 2-3.

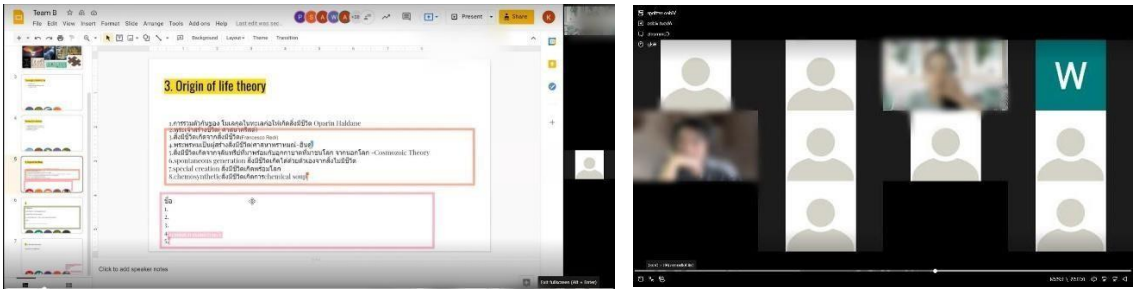

Figure 2. Main Activity, learners developed CULD during brainstorm and discussion in Breakout Room.

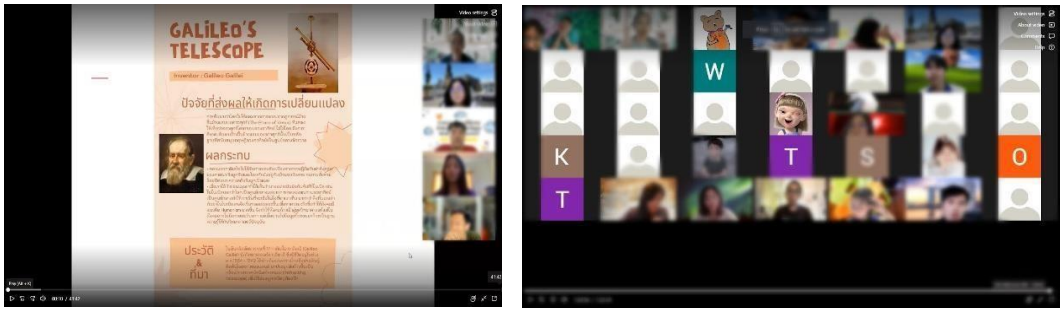

Figure 3. Group Presentation and Q&A and discussion / Teacher and students summarizes the lesson.

4.3 Data analysis

Story-based learning skill performance was conducted from 120 students who attended reflection class. Questionnaires were designed into 6 items that include the concept, collaboration, and content variables. All quantitative data were analyzed using mean and standard deviation while qualitative data were analyzed using percentage evaluation and present in pine chart using excel. For example, of question, Is Reflection help nurthering student's ability to connect knowledge's content? Is Reflection help student's comprehend the key concept of knowledge's content?

5. Result

5.1 Learning Achievement

Table 2. *Self-evaluation about the advantages of reflection activity; 3C* (*Concept, Collaboration, Content*)

Items	Mean±SD
1. Concept; The students thought the reflection activity was "very important" which help students' understanding the concept of all content that they learn each month.	3.74±0.77
2. Collaboration Skill: The students thought the reflection activity was "very important" which help nurturing the students' ability to connect their knowledge of different subjects.	3.91±0.88
3. Content; The students thought they have gained knowledge, ideas or experiences from the reflection activity.	3.78±0.83

Based on the Self-evaluation about the advantages of reflection activity, it founded that most learners have a good attitude toward CULD activity at high level in various context as shown in Table 4 (M = 3.91, SD = 0.88 in Collaboration skill) because most of learning activities developed and increase the collaborative performance integrating Historical context with Science and Technology's content. However, in others context also still performed at level (M = 3.78, SD = 0.83 in Knowledge Content and M = 3.74, SD = 0.77 in Concept).

6. Conclusion

In this context, there can be no doubt that the Reflection Activity Class puts in a relatively advantageous position student who were in need of work together as a group. One of the consequences was an increase in the number of students' capabilities acquiring both in an academic and in experiential soft skills. As a result of such a learning atmosphere. Firstly, in this Reflection Activity Class provided students with unlimited questioning to some situations, events, and issues by the utilization of a number of disciples and fields to enquire. Next, due to its importance of learning in the 21st century, the intention of applying technology in this activity also allowed them to generate and create boundless conversation with colleges, teachers, and others both in class and after that. Finally, the Reflection Activity Class with using the online technology can be defined in the new ways following Cope and Kalantzis (2007) concept as "to blur temporal boundaries of education". Its meaning is learning, and education can happen anywhere, anytime, and anybody.

References

Alicia R. Crowe. (2014). EJ876868. *Journal of Computing in Teacher Education*.

Camilleri, M. A., & Camilleri, A. C. (n.d.). *The Technology Acceptance Of Mobile Applications In Education*.

Debora Barbosa, S. R. (2016). Screenshot (12). *International Journal on E-Learning.*

Graesser, A. C., Olde, B., Klettke, B., & Graesser, A. (n.d.). *How does the mind construct and represent stories?*

Laal, M., & Laal, M. (2012). Collaborative learning: What is it? *Procedia - Social and Behavioral Sciences*, *31*, *491*

Lin, M. H., Chen, H. C., & Liu, K. S. (2017). A study of the effects of digital learning on learning motivation and learning outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 3553–3564.

Linda, R., Mas'Ud, Zulfarina, & Putra, T. P. (2021). Interactive E-module of integrated science with connected type as learning supplement on energy topic. *Journal of Physics: Conference Series*, *2049*(1).

McQuiggan, S. W., Rowe, J. P., Lee, S., & Lester, J. C. (2008). Story-based learning: The impact of narrative on learning experiences and outcomes. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *5091 LNCS*, 530–539.

Mottus, A., Kinshuk, Chen, N. S., Graf, S., Alturki, U., & Aldraiweesh, A. (2018). Teacher facilitation support in ubiquitous learning environments. *Technology, Pedagogy and Education*, *27*(5), 549–570.

Panjaburee, P., & Srisawasdi, N. (2018). The opportunities and challenges of mobile and ubiquitous learning for future schools: A context of Thailand. *Knowledge Management & E-Learning: An International Journal (KM&EL) Knowledge Management & E-Learning*, *10*(4), 485–506.