

Factors That Affecting The Effective Online Collaborative Learning Environment

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Abstract. Interest in collaboration is a natural outgrowth of the trend in education toward active learning. Many researchers have found advantages of collaborative learning; it improves academic performance, promotes soft skills development (communication, collaboration, problem solving and critical thinking skills) and increases satisfaction in the learning experience. However, several studies have reported the opposite. Therefore, this paper aims to determine the factors to be considered in creating an effective online collaborative learning environment. In order to achieve the aims, this study was conducted qualitatively in the form of a document review. The results indicate three main factors that affect the effectiveness of Online Collaborative Learning Environments as Learning Environment, Learning Design, and Learning Interaction. An Online Learning Interaction model is also proposed according to the results. This study will continue to determine the elements that can clarify all the factors which have been identified in this study.

Keywords: Collaborative Learning, Online Collaborative Learning, Learning Interaction.

1 Introduction

The benefits of collaboration in learning have been proven by Social Constructivism [1]. According to [2], learning tends to be most effective when students are in the position to work collaboratively in expressing their thoughts, discussing and challenging ideas with others, and working together towards a group solution to the given problem. Zhu [3] defines Collaborative Learning as a social interaction involving the acquisition and sharing of experience or knowledge amongst learners and teachers. Collaborative learning, which in an online environment is typically referred to as online teams or online groups, refers to instructional activities for getting students to work together online to achieve common educational goals.

Interest in collaboration is a natural outgrowth of the trend in education toward active learning, whereby students become involved in constructing their own knowledge through discovery, discussion, and expert guidance. Many published reports have outlined the advantages of collaborative learning, suggesting that it improves academic performance, promotes soft skills development (communication, collaboration, problem solving, and critical thinking skills) and increases satisfaction in the learning experience (refer Table 1).

Ada [4] tried to identify the interaction patterns and discourse quality of a CSCL environment. She found a positive relationship between the quality of the collaborative process and the quality of cognitive skills fostered. Besides that, she also found that effective collaborative learning can contribute to the establishment of a learning community and that it fosters high order thinking through knowledge processes. Because of the tedious and time-consuming coding process, she suggested other researchers to computerize the coding process.

Research done by [5] reported on pre-service teachers' meaningful experiences in collaborative projects and how they had enriched their professional development. The results showed their professional development engagements were enriched by envisioning professional development, gaining and enhancing in five skills (planning and researching, problem-solving, the fundamental notion of learning, language skills and computing skills), sharing and exchanging information, knowledge ideas, views and opinions related to the tasks given and also teachers socializing within and between groups. For future research, they suggested that other researchers should also focus on additional popular online platforms such as Facebook, Academia.edu and LinkedIn as tools for their online professional development projects.

With the growth of web 2.0 technology, [6] investigated the differences between students' learning outcomes and satisfaction in a class using an online social networking tool (Facebook) among different learning styles. There were four learning styles: Diverger, Assimilator, Converger and Accommodator. He found that the Converger group performed better and showed a more positive attitude toward Facebook compared to other learning style groups. In the Converger group's perception, Facebook facilitated their interaction with others and improved content understanding in the class. For the future, he suggested examining the effects on different levels of learners to link the relationship of learning styles and the online social networking tool (Facebook).

Lee and Lim [7] investigated the important issues when it comes to students evaluating their peers in team project-based learning by analysing each message and comparing them with peer evaluation results. They classified the messages into four types: managerial, procedural, social and academic messages. The findings showed that all message types, except academic messages, predicted peer evaluation results. They concluded that students find social contribution to be more important compared to cognitive contribution when they evaluate peers. They suggested other research be done to compare the relationship between learning outcome by instructor's evaluation, peer evaluation, and interaction message types.

Zhu [3] found that online collaborative learning can enhance students' knowledge construction. He examined satisfaction with the online learning environment, their online performance, and knowledge construction via online group discussions of students in two different cultural contexts (Flemish and Chinese). The results showed there was a relationship between student satisfaction and academic achievement in an innovative e-learning environment. It also showed that online learning systems can enrich students' collaborative learning activities as well as their knowledge

construction via group interaction. However, it was found that instructors evaluate the quality of the final product without knowledge of the teamwork process. Therefore, it was suggested that, in the future, researchers may want to not only study cognitive learning outcomes, but also social skills in collaborative learning outcomes.

The benefits of Collaborative Learning have been summarized in Table 1.

Table 1. Summarized of Collaborative Learning Benefits.

<i>Author / Year</i>	<i>Soft Skills</i>					<i>Satisfaction</i>
	<i>Performance</i>	<i>Communication</i>	<i>Collaboration</i>	<i>Problem Solving</i>	<i>Critical Thinking</i>	
Ada / 2009	X	X	X		X	
Kabilan et al / 2011		X	X	X		
Chen / 2011	X					X
Lee and Lim / 2012	X	X				
Zhu / 2012	X					X

Contrary to this, other research has shown evidence that online learning can pose an even greater challenge for collaborative work than face-to-face (F2F) learning. According to [8], establishing and maintaining an active collaboration is a challenging task due to the lack of active participation by group members in their group work. Results from the interview session on Collaborative Learning experience in the research by [9] showed that there exists group tension towards the fairness of being given the same mark. Educators are not able to assume that every student makes an equal contribution to the group work and then allocate the same marks to all members [10]. Therefore, educators must allocate marks based on a student's contribution to encourage students to participate actively in their group work activity [11].

Lee and Lim [7] found that instructors may not observe all the processes occurring within student groups and the evaluation are done only on the quality of the final product, ignoring the teamwork process. They suggested, instructors should closely monitor group interaction messages and do peer evaluations. Wang [12] also suggested that educators, including teachers and lecturers, should closely monitor how their students work together in a collaborative learning process for effective learning to take place. By monitoring the collaborative learning process, it can help educators keep track of students' on-going performance. Therefore, this study aims to determine the factors to be considered in creating an effective Online Collaborative Learning environment.

2 Materials and Methods

In order to achieve the aim, the study was conducted qualitatively in the form of a document review. According to [13] and [14], the document review method is the most appropriate tool to collect information in a qualitative study. Stewart [15] defines materials and resources that can be used as documents to carry out the analysis and interpretation of which are (i) journals and books, (ii) research literature, and (iii) reports from scholarly research papers and materials. Several previous studies including reports, conference proceedings and journals were referred to as a literature review. The collected data was then analysed using a matrix table [16].

3 Results and Discussion

Based on a review of documents, those factors affecting the effectiveness of Online Collaborative Learning environments are summarized in Table 2.

Table 2. Factors that affect the effectiveness of online collaborative learning environments.

Author(s)	Factors
Vygotsky (1978)	<ul style="list-style-type: none"> • Tenor / Personal (learners' relationships) • Mode / Behaviour (language/textual) • Fields / Environment (social activity)
Tu and Corry, (2002)	<ul style="list-style-type: none"> • Social context / constructed from the CMC users' characteristics and their perception of the CMC environment (social form, informal and casual communication, personal and sensitive means of communication, the recipients, social relationships, access/location, and perceptions on media) • Online communication / attributes of the language used online and the applications of online language (stimulating, expressive, conveying feelings and emotions, meaningful, easily understood keyboarding skills, expressiveness, characteristics of discussion and language skills) • Interactivity / activities in which CMC users engage and the communication styles they use (CMC as pleasant, immediate, responsive and comfortable with familiar topics, response time, communication styles/skills and the size of discussion groups)
Gerbic (2006)	<ul style="list-style-type: none"> • CMC Environment (easy access, familiarity, group size, technical problems, lack of participation, spontaneous exchanges, a lot of information, express thoughts in text rather than speech, written messages, posting message anxiety). • Curriculum (interesting discussion topic, link online discussions with assessment, voluntary, integrates online discussions into a course, interaction satisfaction, course workload and program culture). • Student (subject familiarity, confidence level, reading preferences, lack of time, motivation, time management, extra workload, commitment to online discussion and online discussion role and value.)

Author(s)	Factors
Sun, Tsai, Finger, Chen, and Yeh (2008)	<ul style="list-style-type: none"> • Learner (computer attitude, computer anxiety, Internet competence) • Instructor (response time, e-learning attitude) • Course (flexibility, quality) • Technology (technology quality, internet quality) • Design (Perceived usefulness, perceived ease of use) • Environment (Assessment, interaction)
Ali (2011)	<ul style="list-style-type: none"> • Learner • Learning process • Content (subject matter) • Learning environment • Time constraints for learning • Lecturer
Kaur, Shriram and Ravichandran (2011)	<ul style="list-style-type: none"> • People (dynamic, patience, subject knowledge, clear instruction, fellow students and support staff) • Structure (clear delineation and comprehensive activities) • Environment (accessibility, navigation and support) • Resources (varied, well selected and learning style)
Filigree (2012)	<ul style="list-style-type: none"> • Technology (integrates learning spaces and flexible learning environment) • People (training, guidance and support) • Process (high quality content, content relevance to subject and adapt pedagogical tools and models)

A matrix table has been drawn to determine the main factors affecting the effectiveness of Online Collaborative Learning environments using Straus and Corbin's model. The results are illustrated in Table 3 below.

Table 3. Matrix Table.

Construct	Construct		
	Learning Interaction	Learning Design	Learning Environment
Vygotsky, 1978			
Personal Factors (Tenor)	√		
Behaviour (Mode)		√	
Environment (Field)			√
Tu and Corry, 2002			
Social Context	√		
Interactivity		√	
Online Communication			√
Gerbic, 2006			
CMC environment			√
Curriculum		√	
Student	√		
Sun et al, 2008			
Learner	√		
Instructor	√		
Course		√	
Technology			√
Design		√	
Environment			√
Hatim, 2011			
Interaction	√		
Process		√	
Learning Environment			√
Abtar Kaur, 2011			
People	√		
Structure		√	
Resource		√	
Environment			√
Filgree, 2012			
People	√		
Process		√	
Technology			√

Based on the analysis shown in Table 3, the researchers determined three factors that affect the effectiveness of Online Collaborative Learning: Learning Interaction, Learning Design and Learning Environment.

In previous research done by [23], he proposed three types of interaction in his interaction theory using the three constructs of instructor-student-content (refer Fig. 1). In the model, the three types of interaction are identified as Learner-Content Interaction, Learner-Instructor Interaction and Learner-Learner Interaction.

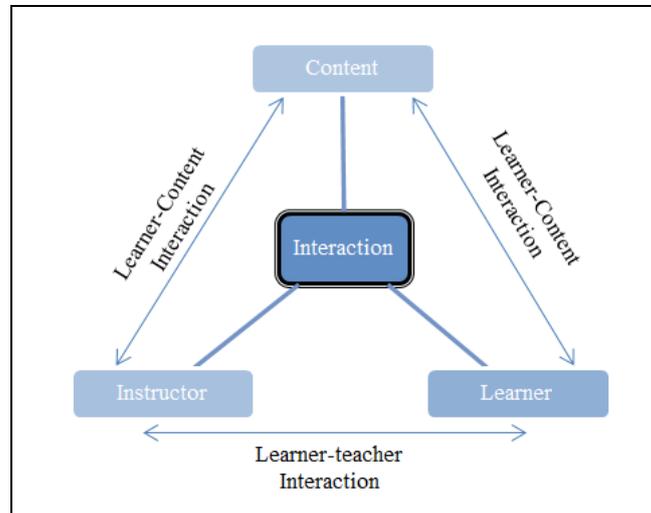


Fig. 1. Moore (1989) Interaction Model.

In the early stages of a collaborative learning environment, a number of studies to define the relationship between learner interaction involves only [1], [17], [18]. However, recent studies define interactivity not only involves learners with learners, but also involves the relationship between learners and teachers [19–22]. Previous researchers used different terms to define the relationship learner-learner and learner-teacher relationship such as Tenor, Social Context, Student, Learner and Instructor, Learner and Teacher and People. Therefore, in this study learning interactivity term will be used to define the interaction between learner-learner relationship and learner-teacher relationship.

In learner–teacher interaction, teacher has to encourage students actively participate in online discussion using provided platform. Providing a suitable platform can facilitate and increase interaction and collaboration between learners. It also helps teachers monitor student engagement. Previous study, [24] suggested to integrated current LMS with Facebook to enable students and lecturers communicate on Moodle through Facebook and also to facilitate Online Collaborative Learning [25]. Yeo and Quek [26] found technology mediation has supported interaction. Previous researchers using different term to define the learning platform such as: technology, field, CMC Environment, environment and Online environment but this study will use the term learning environment to define the platform using in learning.

Teacher has responsible to provide guidelines for all tasks. To promote interaction between learner and task, teacher also needs to develop strategies and technique. In this study, learning design term will be used to define the activity or process or structure of learning. There were a few different terms using by previous researchers such as resources, content, curriculum and mode. Therefore, in this study, the model will be developed using the following three constructs: Interaction, Design and Environment. All the construct will be used to develop proposed prototype in order to enhance student soft skills: communication, collaboration, problem solving and critical thinking skills[27].

The researchers proposed four interactions, which are: Learner-learner Interaction, Learner-teacher Interaction, Design Interaction and Environment Interaction (refer Fig. 2). There are two types of interactions in Learner interaction: Learner-learner Interaction and Learner-teacher interaction. In an Online environment, the Learner interaction can happen in either a synchronous or an asynchronous way. In a synchronous way, learners interact at the same time, while in an asynchronous way; the learners are not required to interact at the same time. Design Interaction is an interaction between learners and a given task. The task has the ability to enrich learners' behaviour. The interaction between learners and the environment is called Environment Interaction.

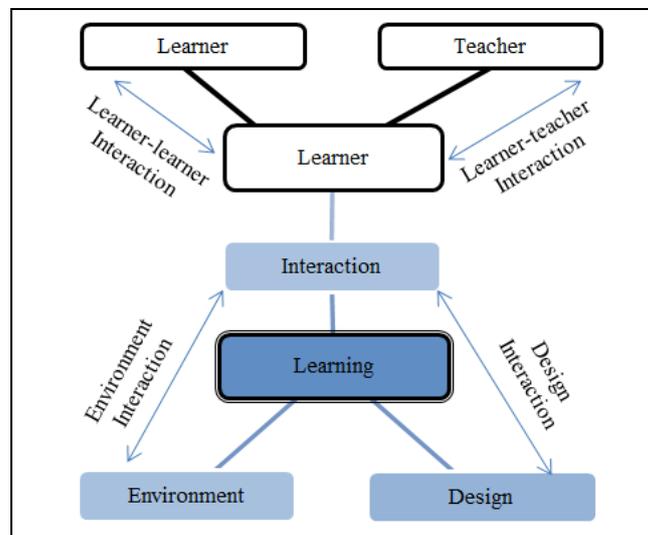


Fig. 2. Proposed Online Learning Interaction Model

4 Conclusion

Technology can be used to encourage learning process, support communication setting, assess learning activities, manage resources and create learning materials[28]. Technology is also seen as an important enabler for improving student-learning outcomes, but to get the greatest value from technology, best practices are required. There are five levels of collaboration maturity proposed by [22]. Basic, Partially Implemented, Integrated, Collaborative and Transformative. The report emphasized that collaborative learning is heavily rooted in the idea that learning is inherently social and can be facilitated with technology and proper practices. Collaborative learning not only promotes social skills, but also facilitates retention, improves the experience and enhances creativity. With higher levels of collaboration, greater results will be delivered.

Previous section have determined factor that affecting the effective Online Collaborative Learning. In the next stage, this research will determine the elements

that can clarify all the factors which have been identified in the previous section. Currently the model is only in a conceptual phase and requires significant development before it could be used to gather data.

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