



Effect of Technology-Supported Collaborative Learning Techniques on Prospective Teachers' Sense of Learning Community Through the use of Moodle

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Abstract: *Technology-supported collaborative learning can help educators develop twenty-first-century workforce skills among students. The study aimed to assess the effect of technology-supported collaborative learning techniques on prospective teachers' sense of learning community through the use of MOODLE and Google Docs. In this study, a "pre-test post-test non-equivalent control group(Quasi-experimental) design" was applied. A sense of learning community questionnaire was prepared for prospective teachers. Effect of intervention was measured through independent samples t-test: paired sample t-test and effect size. The finding of the study showed a statistically significant effect of the intervention on prospective teachers' sense of learning community scores. The study concluded that a sense of learning community is an integral and important element of technology-supported collaborative learning strategy and it helps to accept any new technology integration in classroom practices and decrease the dropout rate of the students in higher education online learning classes.*

Key Words: Google Docs, MOODLE, Learning Management System, Online Learning, Sense of Learning Community, Technology Supported Collaborative Learning

Introduction

The 21st century is an era of technology and students are considered natives of new technologies which leads them to choose a fast and efficient method to access information related to their life, academics, and workplace; they need easy and immediate access to information and prompt feedback and enjoy social connections (Black,2010); students involved in engaging activities; needs socially connected with their friends and peers (Wenger et al., 2009); needs friendship stability and social skills (Cillessen & Bellmore 2011); such learning choices developed among students are because of technology inclusion in higher education (Black,2010). Higher educational

institutions are nowadays facing the challenges of producing such graduates who fulfill the requirements of the 21st-century workplace and have communicative and interactive soft and hard skills (Razali, 2017).In this scenario, technology integration along with student-centred learning strategies in the classroom practices will help the educators not only to develop 21st-century skills needed for the workplace but help to increase the quality of education as well. Research data on collaborative learning found that it is a widely used student-centered strategy to work in small groups of students (Laal & Laal, 2020) and develop collaboration, cooperation and communication skills by interacting with peers

Citation: Siraj, D., & Kirmani, N. S. (2022). Effect of Technology-Supported Collaborative Learning Techniques on Prospective Teachers' Sense of Learning Community Through the use of Moodle. *Global Educational Studies Review*, VII(II), 107-115. [https://doi.org/10.31703/gesr.2022\(VII-II\).10](https://doi.org/10.31703/gesr.2022(VII-II).10)

([Asterhan & Schwarz 2016](#)); students take responsibility of their own actions and contribute towards the success of group goals and tasks ([Laal & Ghodsi,2012](#)); to promote academic achievement([Johnson et al.,2000](#)): develop an attitude towards learning process ([Yang & Chang 2012](#)): leads to critical thinking, higher academic achievement and more transfer of learning([Johnson & Johnson 2002](#)); helps to achieve learning goals, higher rate of success and increase student's motivation([Saleh., Lazonder & Jong,2007](#)). It is an instructional practice that helps educators to fulfill the needs of the diverse student population with vast kinds of experiences ([Miller& Benz,2008](#)); promotes engagement in learning ([Treagust,2007](#)); helps to develop communication skills to share their ideas with peers, promotes active learning and helps in knowledge building ([Stump et al., 2011](#)); better interpersonal relation for students ([Jarvela et al.,2010](#)) thus help students to be the part of the class and develop sense of learning community.

Research data further reveals that technology integration with collaborative learning and the use of online collaborative tools such as wikis, discussion forums, Google Docs, Online web-based platforms such as Blackboard, MOODLE, Edmodo etc. ([Ishtaiwa & Aburezeq, 2015](#)), help educators to develop collaboration and cooperation among students (Revere & Kovach, 2011) and attitude of students plays an important role in it ([Edmunds et al., 2012](#)). [Phirangee \(2016\)](#) investigated CSCL and examined the feeling of connectedness or a sense of learning community affects the use and implementation of collaborative learning strategy or not. He found that most students in large class sizes feel isolated or disconnected due to the large student-to-teacher ratio. This feeling of belongingness is called the sense of learning community and if the student do not develop this belongingness, this may lead to a high dropout rate of the student in online learning.

Almost all higher educational institutions implemented different strategies to minimize their institutional expenditure by increasing the

class sizes which creates the issues of insecurities for students with respect to belongingness and class affiliations and students feel isolated (Allais,2014); loses their personal contact with the teacher and lacked motivation which leads to ineffective engagement in their learning and students did not consider themselves as a part of learning community ([Snowball, 2014](#)). This feeling of a sense of learning community is very crucial in a learning process because students develop a strong and positive shared learning experience in their classrooms, which help the students to improve academic achievements

According to [Tinto\(1993\)](#), it is very significant for students to have a feeling of belongingness and a sense of learning community because the accomplishment of students' satisfaction with class help to reduce the dropout rate. Students interact with peers and develop relationships with their class fellows as a part of the learning process. Similarly, [Phirangee \(2016\)](#), in a study, revealed that a low sense of learning community leads to the isolation of the students from class activities and leads to high dropouts; and is directly associated with the increased student burnout in open and distance learning ([Berge & Huang, 2004](#)). Classroom interaction is considered a very important factor in the learning process for both modes of education (Law et al., 2011) and leads to students' engagement and profound learning in successful online learning practice ([Hrastinski, 2009](#)).

Today's 21st-century society is a digital society and there is a dire need to actively involve the students in the learning process and their engagement can be facilitated by technology or computer-mediated instructions ([Abakumova et al., 2016](#)). A study conducted by [Johnson, Johnson and Stanne, \(2000\)](#) find out that collaborative learning can be a better option to deal with the issues of the large size of the class and the diverse needs of the students by its socializing and interactive nature to make students involved in a productive learning community and active engagement of the students. Furthermore,

technology support for collaborative learning will help the teacher to give immediate feedback on their collaborative tasks and projects along with monitoring students' individual performance ([Kelly & Rutherford, 2017](#)).

[Zhu \(2012\)](#) conducted a study to examine the collaborative learning activities in computer-mediated or online learning platforms. He found that in collaborative learning, overall students' individual and team performance-enhanced because of peer interactions. It helps students to generate new ideas through interactive activities in online discussions and tasks and it helps in knowledge construction. The online learning platforms enhance the collaborative learning activities in class and online discussion helps the students in knowledge construction. This classroom interaction helps the students to consider themselves the part of the course activities.

According to [Blanchard \(2007\)](#), in online learning, this sense of learning community is a very important factor and it can be defined as "a feeling of membership, attachment, or belongingness with their peers who interact through electronic means of communication for learning and it often called as a sense of virtual community. A study conducted by [Baker and Moyer \(2018\)](#) find out that the students who feel more sense of learning community in their courses and are intrinsically motivated have more constructive feelings about online learning. According to [Economides \(2008\)](#) the self-concept learned through communication and interaction with peers from diverse backgrounds is transferred to their life situations which help them to understand the nature of different behaviours that will surround them in their life on a daily basis; hence they develop a sense of learning community with their class fellows. Research literature clearly indicates technology-supported collaborative learning provides a vast range of experiences to the students to interact not only with peers but with the course instructors too and helps students to feel connected and develop a sense of learning community. In the light of the above literature

available, the author of the paper intended to assess the effect of technology-supported collaborative learning techniques on the sense of learning community scores of prospective teachers and formulated the following null hypotheses

- H₀₁:** "There is no statistically significant difference between pre-test scores of experimental and control groups" on SoLC.
- H₀₂:** "There is no statistically significant difference between post-test scores of experimental and control groups" on SoLC.
- H₀₃:** "There is no effect of the intervention on SoLC pre-test and post-test scores of the experimental group."

Methodology

This study applied a pre-test, post-test non-equivalent control group (Quasi-experimental) design. According to the research design, random selection was not possible; therefore, two intact groups of prospective teachers from available undergraduate students' of session 2018-2022 at the Institute of Education and Research, University of Lahore were selected and then the researcher randomly assigned the labels as the control group and experimental group. A collaborative learning intervention plan was designed on MOODLE for the experimental group along with Google Docs as a collaborative writing tool. MOODLE is a widely used open-access learning management system (LMS). The intervention plan was comprised of 32 lectures of 1.5 hours of two sessions per week with technical support as a mandatory part of the course, while the control group was taught through the traditional online learning method.

The effect of technology-supported collaborative learning on both groups was measured through a pre-test conducted prior to the classroom activities and the same questionnaire was administered as a post-test in the last week of the semester. Total of 87 prospective teachers participated in the study but three students did not provide the complete

data and finally, 84 prospective teachers were included in the study. To measure the effect of the intervention on SoLC of the prospective teachers, a survey method was used and a Sense of learning community scale (SoLCS) was developed comprises of 60 items based on eight factors; trust, spirit, belongingness, interaction, learners' satisfaction, engagement, rich, productive milieu, and feedback. Research literature was thoroughly reviewed to develop the scale and its face validity was checked under the suggestions of three experts. The reliability of the instrument was measured through pilot testing and it was found to be 0.95 which is considered an acceptable value and shows the internal consistency between the scale items. Generally, a commonly used threshold value of Cronbach's value is 0.70 and is considered an acceptable reliability value (Park, 2009).

The questionnaire was prepared on Google forms and was administered on the MOODLE site of prospective teachers (<https://moodle.pcsm.edu.pk/>) under the

course "School, Community, and Teacher," and all prospective teachers were briefed about the questionnaire and detailed instructions were given about how to fill. For data analysis, Independent samples t-test, paired sample t-test and Cohen's effect size statistics were used. About 87 respondents initially participated in the study but 84 respondents sent back the questionnaire to the researcher with complete data which were further used for data analysis. About 90% of the respondents were females and most were unemployed. This study was delimited to prospective teachers of the undergraduate programs at the Institute of Education and Research, Punjab University Lahore.

Results

The data of the study collected through a questionnaire were analysed through independent samples t-test, paired sample t-test and effect size for both groups. The data was analysed and shown in the following tables.

Table 1. Pre-test Scores of both Groups on Sense of Learning Community Scale (SoLCS)

Variable	Exp. Group		Cont. Group		Independent Samples t-Test	
	Mean	SD	Mean	SD	t-value	p-value
SoLC	235.71	16.29	230.37	15.02	1.562	p=.122

Table 2. Post-test Scores of both Groups on Sense of Learning Community Scale (SoLCS)

Variable	Exp. Group		Cont. Group		Independent Samples t-Test	
	Mean	SD	Mean	SD	t-value	p-value
SoLC	267.12	18.16	242.40	18.15	6.23	p<.000

Table 3. Gain Scores Post-test Scores of both Groups on the Sense of Learning Community Scale (SoLCS)

Variable	Exp. Group		Cont. Group		Independent Samples t-Test		Effect Size
	Mean	SD	Mean	SD	t-value	p-value	Cohen's d
SoLC	30.00	20.58	11.98	21.88	3.88	p<.000	0.82

Table 4. Effect of intervention on Pre-test and Post-test Scores of Experimental Group on Sense of Learning Community Scale (SoLC)

Exp. Group	N	Mean	S.D	Df	t-value	p-value	Effect size
Pre-test	41	234	16.29	40	-11.22	.000	0.8

Post-test	267	18.16
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Discussion and Conclusions

The present study was designed to examine the influence of Technology supported collaborative learning on the Sense of learning community of the prospective teachers who participated in the course "School Community and Teacher." A feeling of belongingness and common learning targets among students creates a sense of learning community in online learning platforms and environments among students (Rovai,2002a; 2002b). Therefore a sense of learning community is a fundamental component of any online learning environment and indicates the accomplishment of online learning environments. The study data was collected by online questionnaires (SoLC) posted on the MOODLE site of the course. The collected questionnaires were analysed and the results were prepared in tabular form. Table 1 of the study showed that before the intervention, scores on SoLC questionnaire of both groups were significantly the same ($p=.122$). Hence, our null hypothesis was accepted that there is no statically significant difference between pre-test scores of the experimental and control groups. However, after the intervention, when the same test was given as post-test to both groups, the score of the experimental group increased which were found to be statistically significant for than the control group ($p < .000$). Hence our null hypothesis was rejected (Table 2).

Technology-supported collaborative learning provides communicative opportunities to students like live chat, discussion forums and real-time collaboration which help students to feel connected to their class and course contents and have a sense of learning community. These findings of the study are consistent with the previous research data which conclude that sense of learning community is a crucial need in online learning environments (Liu et al., 2007) and a key element for the success of any online learning platform (Baker & Moyer, 2019). A feeling of connectedness or learning community help students to develop collaboration, cooperation

and a sense of responsivity to complete the class or course target. The results of this study are also consistent with the study conducted by Chatterjee and Correia (2020) which found a moderate positive relationship between the two variables; CSCL and SoLC and concluded that a higher sense of learning community felt by the students increases the attitude of students towards collaborative learning experiences. It further reveals that the flow of information in a collaborative learning environment is steady when students do not feel isolated in the classroom activities. Another finding of this study affirms that the magnitude of the correlation between CL and SoLC was much higher among graduate students than undergraduate students and gives us an insight into the interplay of these two variables of the study. This finding broadens the ways to design such online learning environments for higher education students.

Results of the study showed a substantial difference between the two groups. Therefore the author of the study calculated the Cohen's effect size to know the magnitude of the effect of the intervention on both groups' post-test scores. Table 3 shows that the gain scores of the experimental group were found to be significantly higher than the control group ($p < .000$). The effect size on the scores of the Sense of learning community was found to be 0.82 which is considered a a high effect size of the intervention.

Furthermore, Table 4 shows that a paired-sample t-test was applied to evaluate the effect of the intervention on prospective teachers' test scores of the experimental group on SoLC questionnaire. The results of the study showed a significant increase in the scores of the experimental group before intervention ($M=234$, $SD=16.29$) to after intervention ($M=267$, $SD=18.16$) and $t(40) = -11.22$ at $p < .05$ (2-tailed) hence rejected the null hypothesis (H_{03}) as the mean increase in the test scores was 33. Cohen's statistics calculated was 0.8 which indicates a large Effect size. These findings of the study are consistent with

the findings of [Dawson\(2006\)](#) which conclude that greater communicative interaction opportunities in computer-supported collaborative learning develop a solid sense of learning community among students in online learning.

Recommendations

In the era of technology explosion, all higher education institutions are now made bound to have technology integration in the existing classroom practice to produce the 21st-century workforce fully equipped with new hard and soft skills required for a digitally connected global society. The government of Pakistan has taken many initiatives for the inclusion of digital technologies in all fields of life and especially in higher education curricula

(Government of Pakistan,2018). Keeping in view the findings of the study, it is strongly recommended that a learning management systems like MOODLE may be made an integral component of the teaching-learning process in the education system, especially at the higher education level. It was found that it is not only a user-friendly web-based platform but environment and distance friendly also. Students can securely and confidently communicate in a collaborative learning environment, even at a distance. This may help them to decrease the feeling of isolation and develop a sense of learning community with peers and with their teachers more effectively, leading to low dropout and burnout of students which is the main challenge of large class sizes in virtual learning environments of higher education.

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