The Feedback System Based on Computer-Supported Collaborative Learning (CSCL) on the Case of Covid-19

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1 Introduction

CSCL computer e-learning provided technical means and tools that played a major role in the development of teaching and learning methods and the opportunity to improve learning methods that would provide a suitable environment for learners. e Learning seeks to hold the student responsible for the educational process by developing their ability to learn and explore. However, there is a need to adopt the student-centered approach by changing the role of the student to be a sender and not only recipient of the knowledge (Allaymoun, 2020, 2014).

CSCL is an interactive system of collaborative education that provides learners with information technologies and depends on an integrated digital environment that displays courses through electronic networks and provides technical tools for teaching, guidance, and organizing tests. As well, it provides a collaborative learning environment, creating virtual groups that are very similar to traditional educational groups and providing these groups with tools to help exchange information and review educational materials via multimedia (Miyake, 2007). CSCL focuses on learning to transfer knowledge and manage educational groups, become a supervisory teacher, and intervene when needed (Stahl & Hakkarainen, 2020). CSCL and its tools seek to develop the conceptual and learning skills of students and

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encourage them to explore and manage dialogues to achieve greater self-reliance in the knowledge exchange (Wise & Schwarz, 2017; Allaymoun & Trausan-Matu, 2016a).

CSCL chat is the most important tool used to exchange knowledge between students. The students are the focus of the educational process. Therefore, CSCL chat allows students to express their opinions and ideas (Allaymoun & Trausan-Matu, 2016b; Stahl et al., 2006). Nevertheless, there are some obstacles to face in their communication, including the difficulty of conducting self-assessment by students to recognize their level of understanding and the absence of the serious attraction of students' attention to ensure their interaction to the discussions of their colleagues. Therefore, this paper seeks to find a solution to overcome such obstacles by developing the model of a feedback system, which enables students to be updated about their understanding of particular topics. They receive feedback, and based on it, they enhance their performance to reach successful educational methods. Hence, each student seeks to be a successful educator, as well as all listeners pay more attention to educational dialogues. The reason behind is that the listening students are subjected to random inquiries that keep them alert to answer and interact with their peers. Moreover, such an approach holds the student to act as a responsible educator to exchange knowledge with others.

The instant feedback results during the chat help determine the level of understanding of the educator and the level of achievement of learners. It seeks to develop and review performance and then develop plans to improve such performance. The system creates a reference point at every discussion, links it to the results of the feedback, and provides it to teachers through which it assesses the performance of groups and intervenes when necessary to improve educational groups' performance.

This study is organized as follows: the current section is the introduction. The second section is the literature review. Section 3 contains the materials and methods. Section 4 is the results and discussion. Finally the last section is the conclusion.

2 Literature Review

CSCL is one of the most promising innovations to improve teaching and learning with the help of modern ICT tools. Likewise, it is considered as one of the most important areas of computer-supported education, which aims to improve the learning process, as well as employing group work so that learners can discuss their ideas and express their views, allowing a process of exchange of ideas and information. It is also interested in multiple and different perspectives on the subject of learning (Trausan-Matu et al., 2014).

In general, CSCL contributes to activating student-centered learning; student is the focus of the learning process, by providing them with the opportunity to use multiple learning methods, training them in communication skills, and working in educational groups (Allaymoun, 2018).

In addition to developing methods of participation and exchange of ideas, it helps students search for information and explore many new and difficult fields with the help of educational groups (Cress et al., 2015). On the other hand, it improves and develops student skills in using supportive technical tools effectively, such as evaluation, communication, and analysis (Ludvigsen et al., 2016).

CSCL environment contains many different technical applications that aim to facilitate the collaborative and distributive teaching and learning, such as multimedia, experimental simulation, and educational application programs, all of which are involved in supporting cooperation between students (Stahl, 2017).

One of the most important tools of CSCL environment is the chat option, which works to create virtual synchronous groups that resemble traditional classrooms, which allow students to exist virtually simultaneously and in different places and provide a flexible environment that allows for the conduct of educational dialogues with ease and effectiveness (Allaymoun & Trausan-Matu, 2015). In addition, the chat effectively helps develop the individual skills of students in exchanging views and providing a collaborative learning environment, which guarantees independence in the discussion of academic subjects (Allaymoun, 2020). On the other hand, the cooperative in educational dialogues is to involve all students in a concerted effort to discuss a study topic or solve a problem together.

Most educational institutions use chat as an effective tool among the e-learning tools they provide to their students (Zoom, MS Teams, and Moodle Chat), for ease of achieving an educational cooperative for its students. Online peer feedback is one of the most promising educational strategies for improving student-learning outcomes. For example, researchers have shown that peer feedback can improve students' educational levels (Jacques et al., 2021; Jacques et al., 2020; Huisman et al., 2018; Noroozi & Hatami, 2018).

Feedback is considered as one of the most important methods used in the education process, as it depends on the speed and ease of student learning. It has a vital role in motivating students to learn and contributes to modifying behavior, as well as the development of their positive attributes (Noroozi & Mulder, 2017; Noroozi et al., 2016).

On the other hand, the student's knowledge of his performance level motivates him to achieve the best by correcting the mistakes that he makes; feedback is not an advice; it is information about what is being done to reach the desired goal of the educational process, and accordingly, feedback is a basic process to improve learning for the students (Valero Haro et al., 2018).

Scientific research has focused on studying the impact of peer feedback used in e-learning, including research, which studies the effect of feedback in raising the quality of education, in addition to improving educational methods for students' users EduTech, and this research proved the superiority of students academically through receiving feedback (Latifi et al., 2019; Kanetaki et al., 2022).

A digital learning module also supported the peer feedback process to engage students in an intensified learning process and write about a controversial topic. The use of peer feedback support guided the student's in appropriate ways to analyze learning partners' arguments about the topic, express agreements/disagreements,

and, when possible, integrate various points of view in their reflection report. Exchanging diverse and multiple conflicting opinions, analyzing one another arguments, and expressing agreements/disagreements supported with scientific facts, arguments, logical evidence, and examples were then reflected in the attitudinal change of students towards the controversial topic of the GMOs from pre-test to post-test (Noroozi et al., 2019).

There is a lot of research that has created feedback tools that support e-learning, for instance, Synergy. Synergy comprises tools to support learning activities during dialogic feedback. These tools incorporate scripting and learning analytics support to guide learners. Using Synergy as an example, we discuss its importance (Er et al., 2019).

Feedback on student performance in explaining their topics in a chat, not assessing students about the knowledge obtained. In general, the proposed feedback in this research is based on a scenario that the student discusses specific information during the CSCL chat, so he would like to know the opinions of his colleagues about the way he explained and discussed the topic and get their views, and in addition to that, he would like to know the level of his performance if it is good or not. Accordingly, the feedback aims to assess the performance of the students themselves to obtain results that help in modifying their way of explaining topics and improving performance and ensuring that students are attentive and attracted to the explanation during the conversation (Allaymoun & Shorman, 2022).

The feedback system added to the CSCL chat avoids being critical, judging, or evaluating, but rather seeks to improve, develop, and review students' educational performance in order to increase student satisfaction with their performance and to build confidence in their educational roles effectively, to reach cooperative learning groups.

On the other hand, the feedback system helps to introduce the student to his position in the educational dialogues. Developing the cooperative spirit and attention in educational groups, through students knowing in advance that they are exposed to questions during the dialogue, as well as the evaluation mechanism from the students themselves, increases the student's focus in the chat. Each participant seeks to communicate knowledge to all participants clearly and finally create a reference point for each feedback—for the teacher to evaluate the performance of the educational groups later. Feedback is information related to performance and reflects the extent of cooperation and students' understanding of the educational content presented during a chat (Allaymoun & Shorman, 2022; Al-Shoqran & Shorman, 2021).

The following are three questions that this research seeks to discuss:

- What is the effect of students' feedback on their performance in educational discussions?
- What are the effects of feedback from students with increased attention and focus on cooperative education?
- What are the indirect effects of teachers and e-learning?

3 Materials and Methods

A study was conducted at GUI, and the number of participants was 20 (sampling + population) students, first-year students in HR, who study human resources (BUSS 131), and the students were divided randomly into 5 groups; each group contains four students, and the topics that the students will discuss in advance are software, hardware, network, and computer. In general, the implementation of the study took about 5 h and was distributed as follows:

- 10 min to distribute students to groups
- 60 min for each student to study and prepare the topic that has been identified
- 10 min of explanations of the feedback system's mechanism for all groups (ask a question, analyze results, and determine tasks)
- 30 min of chat time per group
- 10 min to analyze the results by the teacher, evaluate, and give feedback, 10 min in some groups that need points of disagreement that the teacher re-explains

The study consists of several phases:

The first phase: Randomly distribute students to educational groups, each group containing four students, and then each student selects a subject to explain it.

The second phase: Clarify the mechanism and elements of the work of the feedback system in the chat, how to know the results, and what options will be decided, such as whether to continue if it is a satisfactory result or replay if it is an unsatisfactory result, or request for a system point to give a signal to the teacher in order to re-explain or clarify the point of disagreement.

The third phase: After completing a chat, the teacher gets a report showing the results, through which the teacher can evaluate the educational groups, in addition to clarifying and re-explaining the points of disagreement that the student could not explain.

The chat tool on the Moodle website (https://moodle.gulfuniversity.org) allows simultaneous text-based conversations in real time and allows saving chat sessions and allows everyone to view the dialogue records for all groups; the screen shows the names of the students within the group and the timing of the dialogues. The feedback system button during the conversation consists of one question (Did you understand what I explained?). The answers include multiple options (strongly understood, understood, I do not understand, point system) and be in the form of the chat screen; in the end, the chat tool shows results in the form of statistical tables, as well as results for a chat group, for the results of all dialogues.

This Moodle is an educational platform offered by Gulf University for e-learning, which contains a chat tool, and the chat tool has been modified to suit our research by adding a feedback system. The new addition is a button that appears in a chat, through which the student clicks on it if he wants to ask for feedback from his colleagues regarding the part that he explained during the chat. A screen appears that contains a question (Did you understand what I explained?), and a message appears

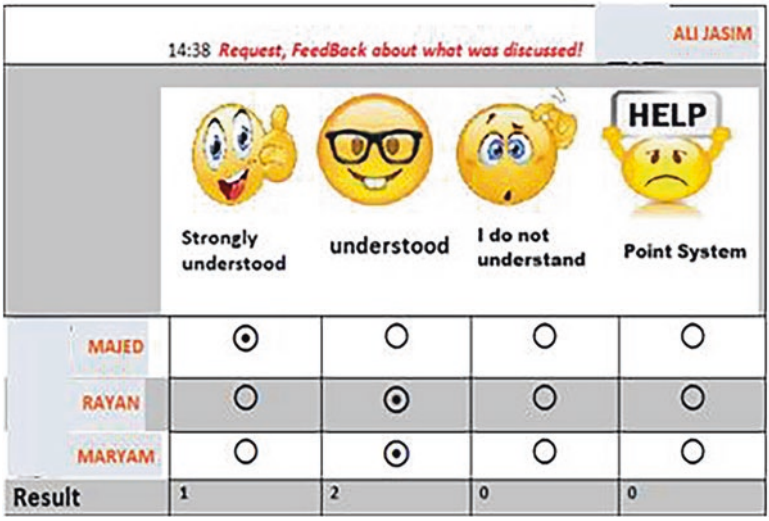

Fig. 1 Feedback question screen

in front of students, and the answer is in the form of emoji (strongly understood, understood, I do not understand, point system) (Sun et al., 2019). Emoji is a more enjoyable feedback (studies indicate that emoji increases students' awareness of the emotional state and it is used to distinguish simple cognitive notes attractively and is more interactive than the option of the check box) (Using and Perceiving Emoji in Design Peer Feedback) (Noroozi et al., 2019; Er et al., 2019). In addition, the answer time is limited to 5 s, which is enough time for students to answer a question. Then, it shows the feedback results in front of the student to decide whether to continue the chat or repeat what was explained in a better way (Fig. 1).

As it is noted a simple question reflects the extent to which students understand the explanation of their colleague and determines whether the educational method of knowledge delivery is successful. A series of meetings were held with experts in educational sciences to determine a question and answer in order to fit the objectives of the research. In conclusion, each student seeks to be active and effective to prove its ability to deliver knowledge. Moreover, students bear the responsibility for their understanding of the topics at hand, and the teacher's role is supervisory and he/she only intervenes when needed. This is what the CSCL environment seeks in creating effective educational groups in which the student is the main focus of knowledge transfer (Allaymoun, 2020; Shorman, 2019).

Reports in the form of statistical tables and graphics make it easy for teachers to track student dialogues, as well as self-assessment of student performance in educational groups. On the other hand, the point system is any points that the student could not explain or be understood by the rest of the students, which need direct intervention by the teacher to re-explain it. Through these results, the teacher can infer and evaluate students' behavior within the chat.

4 Results and Discussion

1. What are the effects of students' feedback on their performance in educational discussions?

   Through studying the level of students' focus and attention in the dialogue sessions, students are exposed to questions during their dialogue, reflecting on their performance and providing the best possible way to explain and deliver knowledge to their colleagues. Hence, the data is analyzed, and the student's behavior is monitored within the chat groups that use the feedback system. Feedback is a reference point for measuring students' self-performance. It has become a qualitative addition to learning conversations to stimulate students' educational behavior within groups so that an increase in cooperative and interactive behavior has been observed.

   Figure 2 shows the steps of the student's request to provide feedback on his performance inside the chat. By obtaining the results that reflect the students' performance, every student tries to transfer knowledge to his colleagues in an appropriate manner. The reason for this is that the student is exposed to evaluating his performance, in addition to knowing the opinions of his colleagues on his performance. The feedback system allows us to obtain answers with three options; the first option is that the result is positive, which indicates that all students understood the method of explanation and the knowledge delivered. The second option is for when the result is negative, meaning that most of the students did not understand the point that the student requested feedback, so here it is an option for a student to try to communicate knowledge in another way and in a better way. The last option is a point system, meaning that the student tries to convey knowledge more than once, but most students cannot understand it; hence, the teacher is asked later to intervene and re-explain it.
2. What are the effects of feedback from students with increased attention and focus on cooperative education?

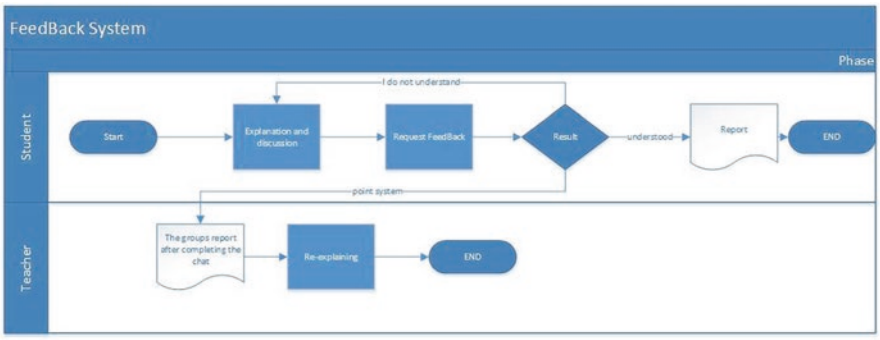

Fig. 2 The steps of the student's request to provide feedback

Accordingly, each student becomes responsible for delivering knowledge that suits his abilities, so he is responsible for his performance. Also, the recipient students are responsible for understanding the topic being discussed. It has been observed that students have increased attention in chat groups because they are more likely to evaluate their performance within the group. As a result, the feedback system in the CSCL chat achieved the goal of raising students' level of attention within groups.

On the other hand, the feedback results help students feel included in the dialogues, increase their sense of satisfaction with themselves, and motivate them to persevere and develop their performance. The main goal of instant feedback is to constantly check students' understanding while maintaining their attention and participation in the chat.

3. What are the indirect effects of teachers and e-learning?

The feedback system provides results that can be analyzed and knowledgeable of students' behavior within CSCL chat groups and provides these results to the teachers to evaluate the performance of groups, review students' behavior during their conversations, as well as intervene in the event of point system, to re-explain or develop plans to improve students' performance. We will try to discuss the results in two cases, firstly by reviewing the results for students within the group and secondly by reviewing the results for all groups.

Table 1 and Fig. 3 show the results of group 3, which shows some data on student dialogues, such as how many feedback requests, their results, how much re-explanation, and points of the system. The teacher can evaluate the behavior of the students, provide feedback, and redirect students regarding the improvement of teaching methods.

The table indicates that the third student was the student with highest results, and this indicated that his method and method of delivering knowledge were excellent, unlike Student 1 who showed low results and how much he re-explained. Hence, the

Table 1 The results of group 3

	Chat		Result					
Group 3	Chat no.	Feedback no.	Strongly understood (4)	Understood (3)	I do not understand (2)	Point system (1)	Feedback no./chat no.	Rating
Hussain (participant 1)	52	12	1	1	3	7	0.23	20
Bader (participant 2)	66	32	6	19	2	5	0.48	90
Mohamed (participant 3)	87	48	22	17	8	1	0.55	156
Suhair (participant 4)	72	37	10	20	6	1	0.51	113
Total	277	129	39	57	19	14		
Result/feedback no.			0.30	0.44	0.15	0.11		
Feedback no./chat no.	0.47							

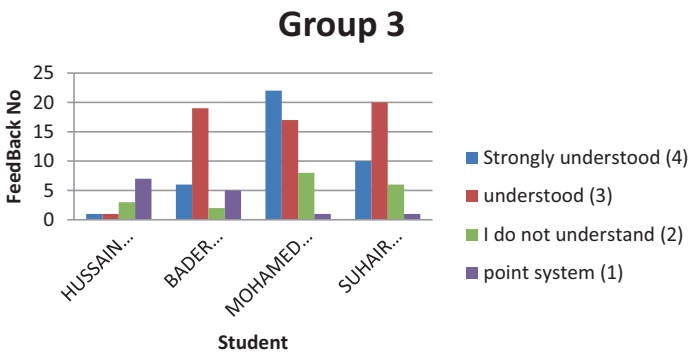

Fig. 3 The results of group 3

Table 2 The results of all groups

	Chat		Result				
	Chat no.	Feedback no.	Strongly understood (4)	Understood (3)	I do not understand (2)	Point system (1)	Feedback no./chat no.
Group 1	240	137	20	80	25	12	0.57
Group 2	189	32	4	19	2	7	0.17
Group 3	277	129	39	57	19	14	0.47
Group 4	120	71	0	11	20	40	0.59
Group 5	221	118	18	58	23	19	0.53
Total	1047	487	81	225	89	92	
Feedback no./chat no.	0.47						
Result/feedback no.			0.17	0.46	0.18	0.19	

teacher can focus on that student, and re-explain what he explained because it shows his inability to communicate knowledge to his colleagues. There are several possibilities that Student 1 did not understand the topic or did not have an educational method to present his ideas. As well the table also inferred points of the system and their location in a chat, which makes it easier for the teacher to follow the students' conversations and to know the places of lack of understanding and maybe the defect of the way of delivery of knowledge or lack of absorption of the recipients. Accordingly, the teacher after obtaining a report re-explains the points of the system, for example, there are six points of contention, and the teacher later re-explains it.

Table 2 and Fig. 4 show all groups' results after the chat is over, such as how much feedback, answers, and points of the system. Also, through the table, the teacher can evaluate the performance of the groups. For example, in group no. 1, most of the students got high results for feedback and fewer points of the system, and through this result, it is inferred that this group is more effective and cooperative

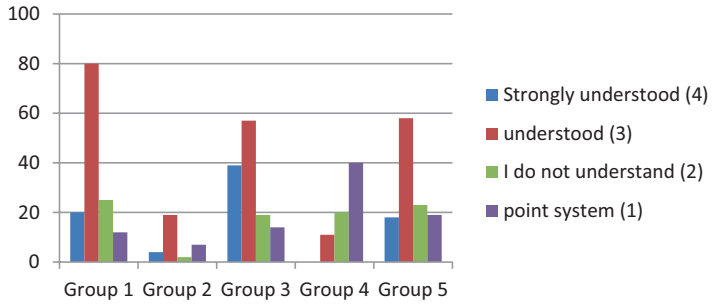

Fig. 4 The results of all groups

in the delivery of knowledge—unlike group 4, which as observed from the results, a request for re-explanation and points of the system is more than the rest of the groups. This indicates that the group is not homogeneous and that there is a weakness the teacher must intervene to improve their performance. As for groups of 4 and 2, their results are close, and that this is the normal rate for educational groups, and the results are average, and points of the system are acceptable.

On the other hand, the teacher can evaluate all educational groups easily and effectively, by analyzing the results of the feedback system, which helps to motivate students to cooperate and express their opinions on the topics for discussion, in addition to enhancing their confidence in managing the educational dialogues with high skill and enhancing their self-confidence to manage educational dialogues with high skill. As well, the teacher re-manages the educational groups to reach effective and cooperative groups.

It is important to have a clear mechanism for the development of chat to serve e-learning; the results of the analysis of the chat of educational groups at the end of the sessions provide feedback to the teacher.

5 Conclusions

This paper reviews a new method to develop and evaluate conversations effectively, which may change the course of e-learning in the CSCL environment and make the e-learning more enjoyable and cooperative, as it helps guide learners towards optimal methods of communicating and receiving information. CSCL chat is the most important and most popular tools used to transfer and exchange knowledge between students. The student is the main focus of the educational process. Among the features of the CSCL is allowing conversation among students to express their opinions and ideas. However, the problems faced in the chat include the difficulty of students knowing their performance and the lack of a mechanism capable of ensuring that students interact and pay attention to their colleagues' conversations. Therefore, this paper seeks to solve these problems by creating an immediate feedback mechanism

that allows students to inquire about their performance in explaining their topics immediately, and obtaining results through which they infer their performance, and then try to modify and develop their performance, in order to reach successful educational groups. Hence, each student seeks to be a successful recruiter for educational topics, as well as that all recipients increase their attention and focus in the educational groups. This is because they are exposed to questions during the chat, which the student seeks to vacate his responsibility for the delivery of information. The student is responsible for his understanding of the topics presented. The feedback system is done by asking the students about their understanding of the topic that was discussed. Results in instant feedback during chat help determine students' level of performance and understanding, in addition to seeking to develop and review performance and then develop plans to improve and develop teaching methods. The system aims to develop cooperative education in educational groups and to reach an effective learning environment.

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