



Undergraduate students' views about peer mentoring as a tool to enhance computer-supported collaborative learning

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ABSTRACT

Computer-supported collaborative learning (CSCL) pedagogies, platforms, and tools are prevalent in higher education due to their pervasive capabilities to enhance students' engagement, communication, and learning. However, it is reported that CSCL tools, media, and platforms may not yield the desired results if not planned, utilized, and managed strategically. Facilitating students' learning through CSCL may require a non-hierarchical approach, such as peer mentoring, for sustainably valuable outcomes. Using this approach successfully will also require contextual diagnostic analysis and exploration. This study was, therefore, conducted to explore the means to effectively deploy peer mentoring to enhance CSCL involving 227 undergraduate students in an Emirati university. Data were collected using a questionnaire with quantitative and qualitative elements. Data analyses were done using descriptive statistics and thematic coding. Findings show that students are well-disposed to peer mentoring as a measure for enhancing CSCL regardless of their demographic characteristics, as they could learn from each other and develop transferrable skills. However, students indicated that the process could be challenging with language barriers, technological issues, and distractions. Even so, the findings show that peer mentoring in CSCL could be enhanced with students' participation in the exercise made voluntary and the availability of different CSCL platforms, among others.

Keywords: peer mentoring, CSCL, undergraduate students, collaborative learning, United Arab Emirates

INTRODUCTION

Pedagogical approaches involving active learning, open innovation, and technologies strengthen students' collaborative engagement and learning activities synchronously and asynchronously on various platforms, including the classroom and online contexts (Hrastinski, 2019; Topping et al., 2022). Besides, computer-enabled collaborative learning, also known as computer-supported collaborative learning (CSCL) platforms, such as discussion forums, wikis, and blogs, complementarily with face-to-face engagements, offer students the opportunity to collaboratively reflect on class activities and make connections to real-life situations (Aderibigbe et al., 2022, 2023). With its open innovation feature fostering strategic collaboration, networking,

and feedback (Grosse et al., 2018; Sumi & Kabir, 2021), CSCL could reduce challenges hindering students' learning and boost the quality of teaching and learning (Oke & Fernandes, 2020; Yang et al., 2018). In doing this, it promotes self-study skills (Alameri et al., 2020) and knowledge-sharing opportunities regardless of contexts (real-time and asynchronous) due to its editable and dynamic media functionalities (Aderibigbe et al., 2022, 2023; Sumarmi et al., 2021). Unsurprisingly, Khan and Markauskaite (2017) found the need for a continuum in technology-enabled pedagogies from teacher-focused to student-focused, allowing them to lead personal and industry-focused learning activities.

Despite the growing interest in the application of CSCL due to its benefits, the pedagogical approach is susceptible to some individual beneficiaries and contextual challenges. For instance, all students in an educational setting will not find the use of computing tools beneficial due to their learning preferences and styles (Balakrishnan & Lay, 2016) and disciplinary orientations (Aderibigbe et al., 2022). Not surprisingly, the literature indicates that students search for credible online resources as new technology-enabled pedagogies emerged during COVID-19 (Sumi & Kabir, 2021), and the resources' quality impacts students' learning (Stecula & Wolniak, 2022).

As reported by Ashour (2019) in a study conducted in the Middle East, there was a high use of technology in daily activities by students but not in innovative ways to enhance their learning. Hong et al. (2019) also indicated that ideas generation and integration requiring significant online engagement and performance were challenging, and efforts must be directed at scaffolding opportunities for learners. In reducing these challenges, recent studies propose the need for more CSCL research to take advantage of its potential and strengthen it comprehensively and its enabling pedagogical strategies (Schnaubert & Vogel, 2022). The associated and enabling pedagogies include technology-enabled active learning endeavors and peer mentoring. These sentiments informed the need to consider and determine how peer mentoring as a non-hierarchical enterprise for scaffolding collaborative learning (Aderibigbe et al., 2015) and institutional belongingness (Collings et al., 2014) can be tapped to enhance CSCL in higher education within the United Arab Emirates (UAE).

In UAE and the Middle East, scholars have studied peer mentoring and CSCL among university students separately, but to date, they have yet to focus on the application of peer mentoring in CSCL. In their study, Hayman et al. (2022) argued that students might feel discouraged from their studies regardless of the pedagogical approaches when their expectations are not met due to inadequate knowledge of what a learning method involves. Chengzheng et al. (2023) also emphasized the need to evaluate interventions for better deployment of strategies to enhance learning. It is, therefore, essential to undertake studies in the region on how peer mentoring as a pedagogical approach and intervention can enhance students' CSCL. Doing this helps examine and determine students' preparedness level to engage in learning activities supported with a blend of pedagogical approaches (Shakeel et al., 2023) and interventionist support mechanisms, such as peer mentoring.

Consequently, this study explored undergraduate students' views on the place of peer mentoring in improving CSCL within the context of a semi-public university in the UAE. The study provides baseline information to the decision-makers and stakeholders in higher education in the region concerning the use of peer mentoring to support students' learning in CSCL contexts. The literature review is presented in the next section, after which the methods section is presented. The remaining three sections featured findings, discussion, and conclusion.

RELATED LITERATURE

Collaborative Learning and Computer-Supported Collaborative Learning

Collaborative learning shares some features with cooperative learning but has some unique characteristics. As Dillenbourg (1999) argued, it is characterized by a process through which tasks are completed collaboratively *rather than* cooperatively. Explaining this conception further, Dillenbourg (1999) notes that cooperative learning entails splitting the work, working individually, and then reassembling the work. Conversely, collaboration entails working *together* without such a distinct and hard-and-fast division of labor. Therefore, collaborative learning is a social enterprise allowing learners to co-construct knowledge. It

also features a situation, where two or more individuals complete tasks in real-time and engaging practices (MacLeod et al., 2017), leading to mutually beneficial co-construction knowledge outcomes (Chengzheng et al., 2023). As reported, collaborative learning may not be seamlessly facilitated without technology-enabled platforms and software (Chengzheng et al., 2023). Thus, when collaborative learning is supported and facilitated using technology, it is described as CSCL. As explained, CSCL features participants' collaboration, knowledge sharing, social engagement, and collective knowledge construction using technological and social computing software (Topping et al., 2022; Yoon & Brice, 2011).

As a learning pedagogy, CSCL can be deployed in a synchronous real-time classroom or asynchronous online contexts (Topping et al., 2022; Yoon & Brice, 2011). Correspondingly, Asino and Pulay (2019) reported that the physical class environment and space are essential for CSCL, suggesting that "while educators promote a learner-centered education that incorporates technology, the change to the physical environment that is to support pedagogy is lagging behind" (Asino & Pulay, 2019, p. 179). This contention reinforced the essential role of hybrid and blended learning in educational processes, including CSCL and other technology-enhanced pedagogies. Schnaubert and Vogel (2022) also contended that different strategies could be used to explain the application, design, and benefits of CSCL in the educational process.

CSCL approaches often draw on constructivism. Stahl et al. (2005) note that the CSCL efforts in bringing students to learn collaboratively with the help of computers were "motivated by social constructivist and dialogical theories" to have students "learn together by directed discourse that would construct shared knowledge." (2005, p. 485). Through CSCL, students develop learning communities for engaging in debates, reflection, and new ideas generation to strengthen their learning (Yoon & Brice, 2011).

Additionally, collaborative learning strategies share the same principles as the knowledge-building approach and Wenger's concept of communities of practice (CoP). Instead of solely considering either individual or group learning, the knowledge-building approach focuses on the student's knowledge *contribution* to a community (the community of their peers), thereby enhancing the state of knowledge in that community (Scardamalia & Bereiter, 2005). On the other hand, CoP is conceptualized as a group of individuals with shared interests and a desire to learn how to improve (Wenger, 2011). The critical relation to collaborative learning here is the group involvement described in the concept. Through this group involvement and peer collaboration, students develop academic and life-long skills, including communication and discipline-related feedback, which are essential skills for students' personal, academic, and professional development (Winstone et al., 2022).

Brouwer et al. (2018) found the need for institutions to assist students in building good relationships, networks, and friendships to enhance collaborative engagement among them. However, they found that higher achievers among students tend to establish more relationships with colleagues but prefer fellow higher achievers. Not surprisingly, customizing collaborative engagement based on peculiar needs and preference leads to personalized learning grounded in the student-centered pedagogical philosophy (Lee et al., 2022).

Peer Mentoring in Computer-Supported Collaborative Learning

Peer mentoring is conceptualized as a "collaborative learning process through which students share knowledge and support each other for their academic, socio-psychological and professional development." (Aderibigbe, 2015, p. 66). This conception aligns with the constructivist principle recognizing the learning process as reciprocal and two-way engagements for mutual benefits (Aderibigbe, 2014). As a learning tool and approach, peer mentoring has frequently occurred in face-to-face contexts successfully. Walker et al. (2021) explained that it involves individuals' dedication to small group flexibly learning engagement drawing on their knowledge and experience apart from the support led by institutionally recognized subject matter experts.

In their study, Smailes and Gannon-Leary (2011) reported that no rigid barrier prevents the workability of online peer mentoring. However, these scholars argued that there is variability in feasibility depending on the platform, as some may be exciting while others may not, depending on the functionalities. In another study, Fayram et al. (2018) sought to improve students' motivation and confidence through an online peer-mentoring initiative. Overall, the program successfully increased retention, motivation, and confidence.

In Gunn, Lee and Steed's (2017) study about a peer mentoring program of fourth-year mentors and first-year mentees for a Bachelor of Commerce degree in Canada, one of the findings was, as follows:

[mentees] mentioned that, given that their mentors knew their teams better than their instructors did, they appreciated their mentors' input whenever there were issues with teamwork contributions (Gunn et al., 2017, p. 22).

This finding has a clear implication for the possible role of peer mentoring in CSCL. Undoubtedly, peer mentors could act as facilitators of the CSCL process, aided by their social proximity to the mentees, as friends and members of the same networks, such as the high academic achievers' caucus (Brouwer et al., 2018). In their CSCL-focused study, Su et al. (2018) found that high-performing teams showed more regulatory behaviors and a higher proportion of evaluation than their low-performing counterparts. Although the intuition from the limited previous studies on an international scale is transferrable, verifying its applicability with further contextual research is essential before it can be confidently adopted. Within this study context, this study, therefore, seeks to answer the following research questions:

1. How do students think peer mentoring can assist them in CSCL?
2. How do students describe challenges that may hinder the effective use of peer mentoring in CSCL?
3. How do students think peer mentoring can be planned and implemented to strengthen CSCL?
4. Are there differences in students' usage of CSCL and their understanding of peer mentoring as a tool to enhance CSCL based on age, gender, and college orientation?

METHODOLOGY

Methods and Instrumentation

We employed a mixed methods research design involving quantitative and qualitative data collection strategies to conduct the study. Combining quantitative and qualitative data to complement each other in unraveling and discussing findings with the extant literature allows for data triangulation and the study's credibility (Aderibigbe, 2022; Creswell, 2014). Grounded in the pragmatic research paradigm, the mixed methods approach offers the chance to conduct research in a concurrent or sequential order with weight distributed to qualitative and quantitative data (Creswell, 2014; Johnson & Onwuegbuzie, 2004). We adopted the concurrent approach by collecting quantitative and qualitative data simultaneously using the data collection tool described in the next paragraph. [Figure 1](#) illustrates the approaches used to address the research questions leading to a thorough discussion of synthesized quantitative and qualitative data.

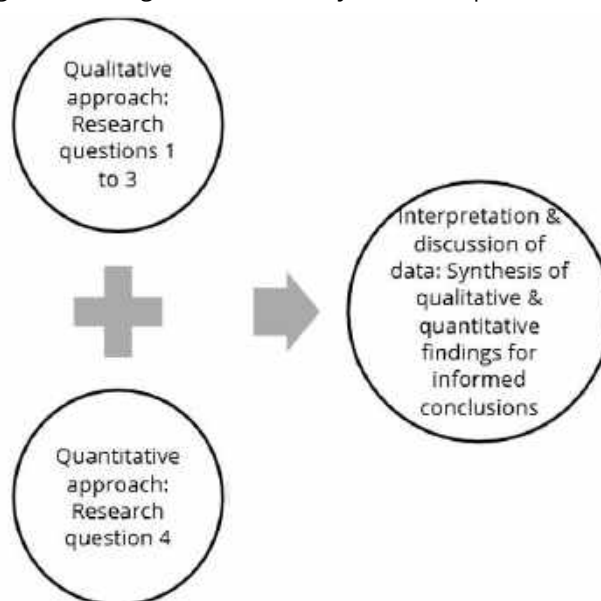


Figure 1. Links between research questions & approaches employed in the study (Source: Authors)

In collecting data for the study, a self-designed questionnaire was crafted, drawing on the literature reviewed and our experience of students' learning processes in peer mentoring and technology-enabled contexts. The questionnaire has two sections, with the first focusing on demographic information, including gender and college. The second section has closed (quantitative) and open-ended (qualitative) items for answering the research questions. The quantitative questions elicited responses on the types of CSCL activities used by students, the importance of CSCL, the relevance of peer mentoring, and the extent to which it supports learning in CSCL. Conversely, the qualitative questions focused on students' understanding of CSCL, how peer mentoring can enhance CSCL, possible challenges when employing peer mentoring to support CSCL, and strategies for effective use of peer mentoring in CSCL. Prior to the data collection stage, we validated the questionnaire using feedback from five colleagues with expertise in the study's subject matter. Using a test-retest approach, we checked the questionnaire's reliability, involving six students who completed the survey twice with accurately consistent responses at a reasonable interval of three weeks. Iterative engagement and reviewing by the authors also lend credibility to the data collection tool and the research process (Lincoln & Guba, 1985; Patton, 2001).

Data Collection and Participants

To collect data in the study, we sent out the questionnaire electronically to the undergraduate students in the research context after the University Research Board (URB) approval to conduct the study was granted being a funded project (VCRG/R.447/2020). We opted for a simple random sampling technique allowing all the students an equal opportunity to complete the survey. In doing that, we hoped to have as many undergraduate students as possible included in the study regardless of their college affiliation and other demographic features. After sending two reminders within three months, 227 questionnaires were completed by the student participants. All 13 colleges at the university were represented by more than 10 participants, except for the Colleges of Dental Medicine (two), Fine Arts and Design (nine), and Sharia and Islamic Studies (eight). Most respondents were female, between 17 and 20 years old, while more than half were in the early stages of their studies, i.e., year 1 and year 2. In completing this process, we ensured strict compliance with ethical standards, such as ethical clearance, informed consent, the right to withdraw, and anonymity. For instance, ethical clearance was provided by the scientific research committee of the College of Arts, Humanities, and Social Sciences within the research context in addition to the URB approval. Students checked the informed consent box on the first page of the electronic questionnaire to indicate that they understood what the study was about and were happy to participate. Also, students completed the online questionnaire anonymously, and with that, no student's identity was revealed in this report, thereby protecting their privacy.

Data Analyses

The data collected were analyzed twofold. On the one hand, the qualitative data were analyzed to generate shared understanding and thoughts of students in the texts of their responses to the open-ended questions. This was done in line with the guidelines provided by Braun and Clarke (2020), starting with data familiarization and reading of the transcripts of students' comments. Doing this allowed for data immersion and made annotating students' thoughts into codes easier. Lastly, the initial codes were developed inductively into themes based on the commonality of critical ideas and supported by concise student quotes. On the other hand, descriptive statistics, including percentage, weighted mean, and t-value, were calculated to determine whether students' views about peer mentoring in CSCL differ based on their age and college orientation. We then presented the results in themes and graphs.

RESULTS

The study's findings are presented under four sub-sections aiming to address the study's goals.

How Do Students Think Peer Mentoring Can Assist Them in Computer-Supported Collaborative Learning?

In terms of how students think peer mentoring can assist them in the learning process through the CSCL approaches, four themes emerged from the data analyzed. These are enunciated, as follows.

Eliminate communication barriers among students

Students indicated that learning in CSCL can be enhanced by peer mentoring as they could easily and comfortably ask for support from each other:

People of the same age group are able to communicate and connect better, leading to better learning outcomes.

Peer mentoring provides students the opportunity to engage directly and more comfortably with their peer, which will improve their learning process.

They added that peer mentoring could quickly strengthen students' learning process in CSCL as students will understand issues that their colleagues may have:

Students may be able to ask assistance from fellow students, if for some reason the teacher is unable to. They can also share different resources and help others increase their overall understanding.

Scaffolding and learning from experienced

Students acknowledged the need to get advice and guidance from their senior colleagues. They noted that peer mentoring is a tool for supporting this notion:

Peer mentors give counsel and direction, advice, and guidance whilst acting as a good example or a role model for younger students who require their support.

An experienced student can be a peer mentor to a new student and help the new student throughout his journey by giving him advice, helping him, and explaining to him certain ideas and phenomena that might seem difficult.

They explained further that an experienced peer mentor can help clarify what may not be clear to their mentees drawing on their prior experience:

A peer mentor might have a clearer understanding of how discussions should take place and more knowledge about the topic, which helps the new students learn the same and take part in discussions in advantageously.

Technical support

In addition to the intellectual and academic benefit, students indicated that peer mentoring could also assist them in developing technical skills for utilizing educational technologies as tools in CSCL:

There will be less difficulties faced on a technical level and learning will be more focused with a collaborative environment and students will take out the most from online collaborative learning.

Learn more technologies and more knowledge transfer.

By educating them on better ways to study and utilize the technology and advise on resources and information, etc.

Emotional and psychological support

Students also thought peer mentoring could assist in improving students' emotional and psychological well-being:

It allows those with social anxiety to flourish and time management to those who need it.

It can support their emotional and mental health while doing their tasks.

Reinforcing this sentiment, they stressed further that improvement in psychological well-being through peer mentoring consequently leads to improved learning:

Lead to improved attitudes and a more personalized, engaging, and collaborative learning experience, all of which can lead to higher achievement.

These findings suggest that peer mentoring has the potential to assist in strengthening students' CSCL. Specifically, it could help students reduce communication, technical and emotional problems while offering them scaffolding learning opportunities. Considering peer mentoring as a tool for enhancing CSCL will not be out of place when planning and deploying CSCL to aid students' learning.

How Do Students Describe Challenges That May Hinder the Effective Use of Peer Mentoring in Computer-Supported Collaborative Learning?

Concerning students' perspectives of the challenges that can hinder the effectiveness of peer mentoring in CSCL, the four themes that emerged from the data analyzed are, as follows.

Language

Students identified language as a possible challenge to effective use of peer mentoring in CSCL settings. As noted, some students may have issues with communicating and understanding concepts in the English language:

Language. Some students are not proficient in the English language and cannot form a full sentence coherently with no grammatical errors.

Some concepts may be harder to grasp and being online might not really help someone focus.

As they explained, language barriers can lead to situations, where providing feedback becomes difficult for students:

Students not being able to give appropriate feedback because of poor training in school or a lack of knowledge/focusing on bolstering the positive attributes alone without counting negatives in and vice versa.

Technical problem

Students overwhelmingly identified issues with internet connectivity and electronic devices as a major hindering factor to peer mentoring in CSCL:

Little malfunctions like slow internet connection, device problems, etc.

I think maybe the tools or the platform itself whether for example, the internet in general can be a hindrance for the online collaborative platform.

They added that there could also be technical problems that may require technical-know how that some students may lack:

Maybe technical issues may occur to some individuals.

Requires tech skill to be able to explain things.

Students not willing to collaborate and cooperate

The data also revealed that some students might be unwilling to collaborate or cooperate with their colleagues, which may hinder effective peer mentoring in CSCL:

The lack of co-operation with peers and refusal to interact and engage.

Not being able to cooperate with new partners.

They explained further that this could be because they are not altruistic, feel forced to work with some individuals, and are not prepared or comfortable around others:

Frustration and the force to do it with students that they do not want to work.

Some students are not prepared or are uncomfortable to share their thoughts and struggles to the person monitoring them.

Distraction

Students thought distraction could set in while engaging with one another, and that may negatively impact the peer mentoring process in CSCL:

Since the student and the peer mentor are of close age and have similar experiences, the possibility of getting off track is inevitable and may lead to poor consumption of time.

Distractions are a big challenge especially while working with peers that could hinder performance ... delayed progress or hurdles in learning objectives can be worrisome in performance.

It is explained further that the attitudes of students involved determine peer mentoring's effectiveness within CSCL contexts:

Challenges are mainly based on the individuals that are collaborating. If the people who are collaborating are genuinely interested, it can assist the students. However, many times the students get distracted or may not take the learning process seriously.

These findings clearly show that peer mentoring in CSCL is not immune to challenges. For instance, there could be language and technical issues. Some students may also find it challenging to collaborate with others, and they may also get distracted while engaging in CSCL using peer mentoring complementarily.

How Do Students Think Peer Mentoring Can Be Planned and Implemented to Strengthen Computer-Supported Collaborative Learning?

Regarding students' views on how peer mentoring can be planned and implemented to strengthen CSCL, four themes emerged from the data analyzed. The measures are presented below:

Various platforms

Students advised that peer mentoring in CSCL will be effective when students can use a variety of relevant online platforms for engagements:

The peer mentor can plan a schedule with the undergraduate students and help them by using social media or online discussion applications to enhance their learning.

A platform with all necessary tools for learning such as sharing documents, communication features.

Pairing and selection

Students also indicated that peer mentoring in CSCL would be effective when attention is paid to the selection and pairing of both mentors and mentees. Essentially, they acknowledged the need to consider students in the same age range and related fields:

Assign a peer to a group of students in the same major and year and schedule a few meetings every week whenever the students feel fit.

Mentoring support groups in every college, which give both mentors and mentees extra credit.

Voluntary Involvement in peer mentoring

Students noted that peer mentoring in CSCL would be effective if the process is less formal and explored when students feel the need to do so with pools of interested peer mentors available:

The university could set up a program whereby the students who find themselves struggling can sign up and get assigned a student volunteer based on common interests.

First peer mentoring program should be scheduled based on the students need and their time availability.

Clarifications of expectations

Students underlined the need for opportunities to be provided for them to clarify expectations and engage with each other before the start of the peer mentoring in CSCL:

For the peer mentoring session to be most effective, the student must have their doubts identified before the peer mentoring session.

Peer mentors should have a discussion themselves and decide on ways to make the students engage in the discussion and in the class generally.

They added that students should be given some training in the process of assisting them in clarifying doubts and develop skills to complete required tasks appropriately:

Provide training and taking in consideration students who have full schedules and unable to attend due to course sessions.

These findings indicate that peer mentoring in CSCL can be effectively planned and implemented with various platforms. However, peer mentoring participants should be carefully selected, paired, and adequately guided about the expectations in the process. More importantly, the participants should not be pressured to engage in the endeavor. Instead, they should willingly participate as volunteers passionate about engaging in collaborative and mutually beneficial learning engagements.

From the qualitative data analyzed, students' nuanced thoughts concerning how mentoring can assist in CSCL, the possible challenges that can hinder its effective usage, and strategies for using it to enhance CSCL are presented in themes. In the next quantitative section, students' convergent thoughts on CSCL usage and peer mentoring as a tool for improving it are illustrated. Precisely, the quantitative findings aim at determining whether students' understanding of peer mentoring usage in CSCL differs based on their demographic characteristics.

Are There Differences in Students' Usage of Computer-Supported Collaborative Learning and Their Understanding of Peer Mentoring as a Tool to Enhance Computer-Supported Collaborative Learning Based on Age, Gender, and College Orientation?

In examining whether students' usage of CSCL and their perceptions of peer mentoring in CSCL differ concerning their age, gender, and college orientation, quantitative data analyzed are presented. We started by asking students to indicate the number of CSCL tools and activities they are familiar with and have utilized to determine the extent of their familiarity with CSCL engagements.

As shown in **Figure 2**, CSCL usage in this context seems reasonable across the different age groups. However, on average across the colleges, CSCL usage appears high among students aged 21 to 24 and encouraging for those ages 17-20, except for those in AHSS whose rating is less than five. Some colleges had no representation in the ages 25-28 group, with Communication's selection less than five. Similarly, some colleges are not represented in the age 29 and above group, while AHSS's choice is less than five.

To understand the CSCL tools and activities usage based on students' college orientation, we asked them to select the specific social computing tools and platforms they have utilized in CSCL contexts.

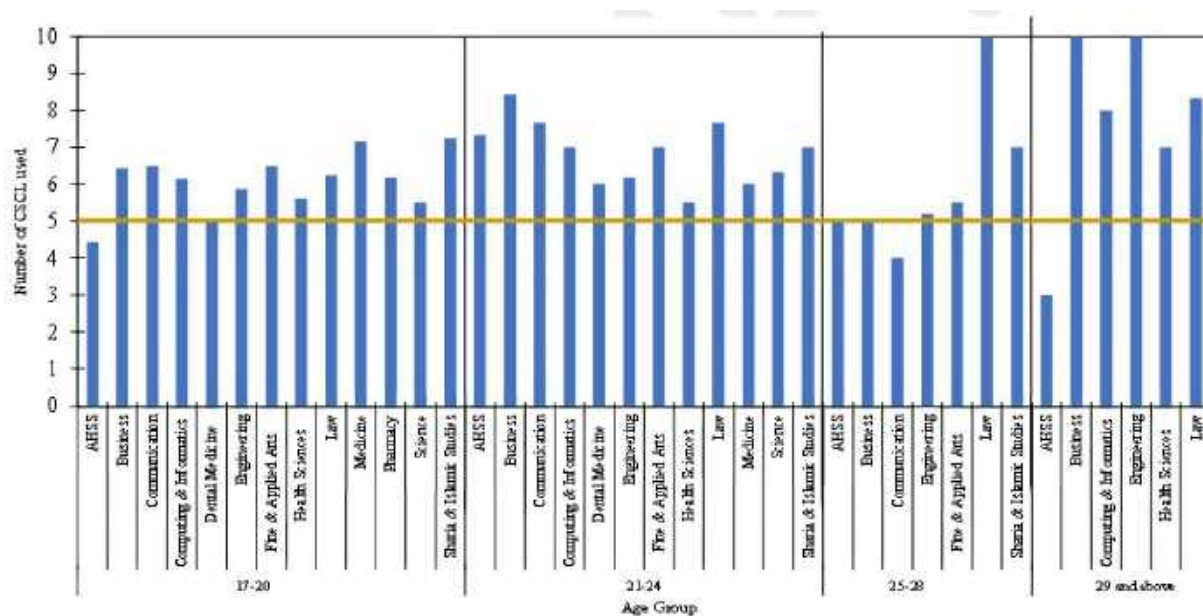


Figure 2. Students usage of CSCL by age group & college orientation (Source: Authors)

Table 1. Types of CSCL usage by students' college affiliation

College	ODF	IC-GD	Blogs	Journals	G	Wikis	GD	W&SM	OCI	OM
AHSS	67%	67%	8%	33%	17%	17%	42%	100%	75%	83%
Business	85%	88%	42%	50%	38%	50%	81%	96%	92%	96%
Communication	100%	86%	29%	36%	36%	36%	64%	86%	100%	86%
Computing & informatics	77%	88%	42%	27%	38%	50%	62%	92%	88%	77%
Dental medicine	50%	50%	1%	1%	1%	50%	100%	100%	100%	100%
Engineering	90%	75%	21%	23%	29%	25%	69%	90%	88%	92%
Fine & applied arts	78%	100%	33%	33%	11%	44%	78%	100%	78%	78%
Health sciences	82%	77%	18%	14%	9%	36%	59%	100%	95%	82%
Law	87%	93%	67%	40%	67%	60%	80%	67%	73%	87%
Medicine	94%	76%	29%	53%	35%	35%	76%	82%	100%	100%
Pharmacy	73%	73%	36%	36%	36%	36%	73%	91%	82%	82%
Science	76%	94%	18%	18%	18%	35%	71%	82%	82%	88%
Sharia & Islamic studies	75%	88%	75%	38%	25%	50%	75%	100%	100%	88%

Note. ODF: Online discussion forum; IC-GD: In-class group discussion (breakout room); G: Glossaries; GD: Google Doc; W&SM: Websites & social media (WhatsApp, Facebook, etc.); OCI: Online class interaction (using Bb collaborate, MS Team, or Skype); & OM: Online meeting (using MS Team or Skype)

Table 1 shows a variation in the percentage of students' CSCL activities based on their college affiliation. More than 50% of all the students engaged actively in at least six CSCL activities, except for wikis, glossaries, journals, and blogs. However, over 50% of students from the colleges of Business, Computing and Informatics, Dental Medicine, Law, and Sharia and Islamic Studies engaged in CSCL using wikis. More than 50% of students from the College of Law used glossaries. Similarly, 50% of students from the Colleges of Medicine and Business used journals, while more than half of them from the Colleges of Law and Sharia and Islamic Studies used Blogs. These data indicate that students' usage of CSCL tools is different based on their college orientation, even though the usage of CSCL is considerably high across the colleges.

Undoubtedly, **Table 1** reinforces the findings in **Figure 2**, showing the high use of CSCL among students despite variations in the usage levels. However, we also wanted to know the specific CSCL tools students use and their significance based on their gender. In doing this, we calculated the t-value of CSCL usage among male and female students.

Figure 3 shows findings from analyzed students' responses. As seen in **Figure 3**, the highest significance level (t-value) of CSCL tool usage was observed for wikis, journals, glossaries, and blogs, regardless of gender. But these significances are more pronounced for the female gender with t-values of 11.5, 11.4, 11.2, 11.0, and 10.8 for glossaries, wikis, journals, Google Docs, and blogs, respectively. Males had the highest significance

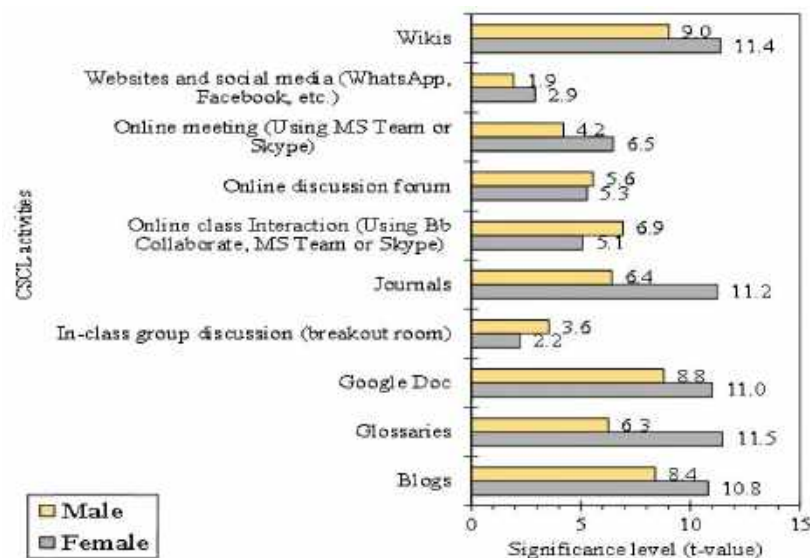


Figure 3. Types of CSCL usage & significance level by students' gender (Source: Authors)

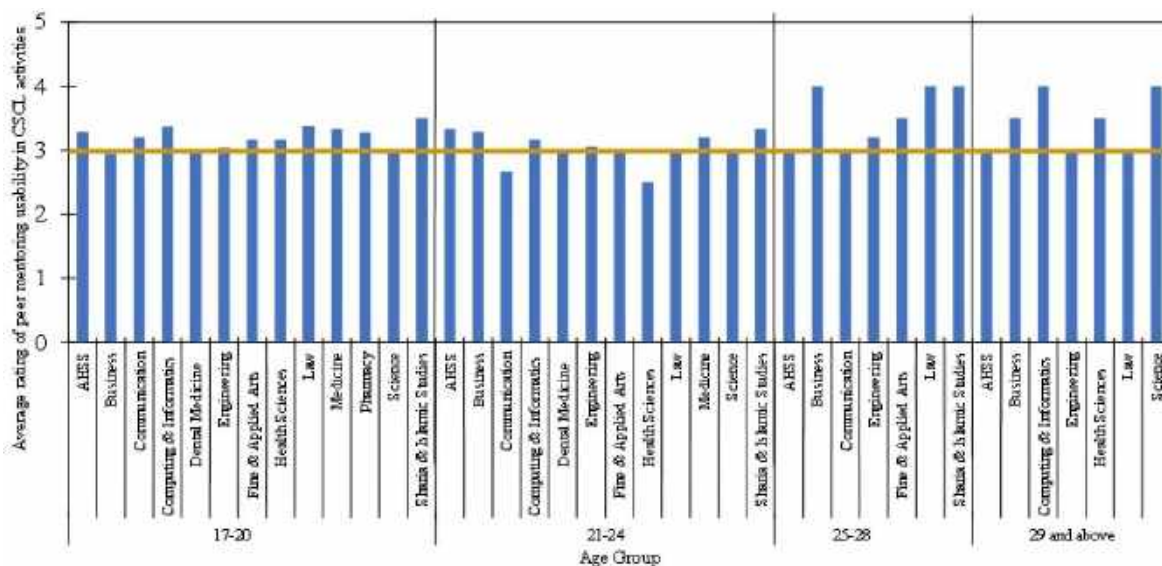


Figure 4. Peer mentoring usability in CSCL by students' age & college orientation (Source: Authors)

CSCL usage in online class interaction through online platforms and in-class group discussions with t-values of 6.9 and 5.6. These results indicate differences in CSCL usage and significance based on gender. Lastly, we wanted to determine students' views on the use of peer mentoring as a tool to strengthen CSCL.

Figure 4 shows students' average ratings of the place and usage of peer mentoring in CSCL. As shown in Figure 4, most students believe that peer mentoring can potentially enhance CSCL. From the result, students between the ages of 17-20 across the colleges overwhelmingly indicated that peer mentoring could strengthen CSCL. Those in the ages 21-24 group also believed peer mentoring could help in CSCL across the colleges, except for the Colleges of Communication and Health Sciences. The two colleges rated the use of peer mentoring below three statistically. Students in the ages 25-28 group rated the use of peer mentoring high, but some colleges had no representation from the group.

Judging by the data presented in Table 1 and Figure 2 to Figure 4, it is clear that students across different ages and colleges are familiar with CSCL and the social computing tools supporting it. From the data, it is also clear that students' usage of CSCL tools and activities is encouraging, and they have a positive disposition to peer mentoring in CSCL. However, there are variations in students' use of CSCL and their perspectives on applying peer mentoring to enhance CSCL based on age, gender, and college orientation. Table 2 presents a synopsis of the findings related to research questions 1 to 4.

Table 2. Summary of findings related to research questions 1 to 4

Research question	Data type	Key findings
Research question 1: How do students think peer mentoring can assist them in CSCL?	Qualitative	<ul style="list-style-type: none"> • Eliminate communication barriers among students • Scaffolding and learning from the experienced <ul style="list-style-type: none"> • Technical support • Emotional and psychological support
Research question 2: How do students describe challenges that may hinder effective use of peer mentoring in CSCL?		<ul style="list-style-type: none"> • Language issue • Technical problem
Research question 3: How do students think peer mentoring can be planned and implemented to strengthen CSCL?		<ul style="list-style-type: none"> • Students not willing to collaborate and cooperate <ul style="list-style-type: none"> • Distraction • Various platforms • Pairing and selection • Voluntary Involvement in peer mentoring • Clarifications of expectations
Research question 4: Are there differences in students' usage of CSCL & their understanding of peer mentoring as a tool to enhance CSCL on age, gender, & college orientation?	Quantitative	<ul style="list-style-type: none"> • CSCL usage is reasonable across different age groups. But it appears high among students aged 21 to 24 & is encouraging for those ages 17-20. • There is a variation in the percentage of students' CSCL activities based on their college affiliation. However, over 50% of them engaged actively in at least six CSCL activities, except for wikis, glossaries, journals, and blogs. • The significance of CSCL usage is more pronounced for the female gender than their male counterparts regarding wikis, journals, glossaries, and blogs. Conversely, males have significant use of online interaction platforms and in-class group discussions. • Most students believe peer mentoring can potentially enhance CSCL, except those aged 21-24 in communication and health sciences colleges.

DISCUSSION

This study was conducted to gain insights into undergraduate students' thoughts about the place of peer mentoring in CSCL. From the data analyzed, students overwhelmingly believed that peer mentoring could foster CSCL, reinforcing the previous studies that peer mentoring benefits students' academic, social, and psychological interests (Aderibigbe, 2015; Fayram et al., 2018; Gunn et al., 2017). Besides, the findings suggest that the students value the opportunity to work and learn together in line with constructivist learning approaches, such as CoP and knowledge-building (Stahl et al., 2005; Wenger, 2011).

As the students indicated, peer mentoring can allow them to learn from each other and support each other emotionally and technically. Thus, institutions must assist students in building good relationships and networks for working together (Winstone et al., 2022) using a peer mentoring scheme. Students should also be encouraged to use peer mentoring to build cultural capital (Hayman et al., 2022), as they could learn about different cultures and traditions. However, they must stay within the established cultural boundaries (Aderibigbe, 2015). The findings further show that peer mentoring could assist in eliminating communication barriers, which in turn makes it easier for them to help each other academically and technically, where possible. In their studies, Gunn et al. (2017) reported that students learn from colleagues known to them seamlessly in non-hierarchical but collegial learning contexts. Perhaps, communication problems could be reduced through peer mentoring as most students are familiar with CSCL activities using social computing tools and platforms, as the quantitative data revealed. Indeed, reducing the communication barrier for students and providing them with skills-building support will assist them personally, academically, and emotionally (Gunn et al., 2017; Winstone et al., 2022). Thus, helping students to strengthen their soft skills, including communication, leadership, and multiple intelligence, becomes essential for effective peer mentoring in CSCL.

Despite the high use of CSCL and the potential benefits of peer mentoring deployment in CSCL, students felt there could be language and communication barriers when peer mentoring is deployed in CSCL settings. Drawing on the data analyzed, some students may need help simplifying terminologies because the university has international employees and students who may not use Arabic to complement learning engagements.

This is essential as developing life-long skills is fundamental for their personal and professional development, as they must provide job-specific feedback in the future (Winstone et al., 2022). As such, educators must complement peer mentors' support in ensuring some concepts are demystified. Doing this aligns with the notion that supporting students using technology-enabled approaches should be done on a continuum from teacher-centered to student-centered (Khan & Markauskaite, 2017).

There could also be technical issues, such as low internet connectivity and technical glitches, which students may be unable to address themselves. This could also be why students in some age groups and colleges reported less CSCL use than their counterparts in the quantitative data. As reported, it is a fallacy to assume that all students have the basic knowledge to utilize social computing tools effectively because most younger generations are described as digital natives (Ashour, 2019). These issues are further complicated by the negative attitudes of students who may not be willing to cooperate and lack enough commitment, leading to situations, where they are distracted and derailed from the right track. The reason for this may also be plausible, as scholars indicate that educators risk over-generalization and negative impacts if they assume that all students will find computer-supported learning tools beneficial (Aderibigbe, 2022; Balakrishnan & Lay, 2016). Further, students who may be comfortable discussing informally with colleagues in Arabic, the mother tongue of most students in this research context, will find informal engagement with colleagues beneficial. Perhaps, this also explains why they indicated that peer mentoring could offer opportunities to learn and develop academic and technical skills through a scaffolding process, which may invariably help them emotionally and psychologically (Aderibigbe, 2015; Gunn et al., 2017).

Regarding how peer mentoring in CSCL can be enhanced, the data analyzed indicated that hindering factors to effectively using it in the context are surmountable. In a previous study, it was reported that there was no rigid obstacle to preventing the usability of peer mentoring (Smailes & Gannon-Leary, 2011). Students explained that peer mentoring usage in CSCL can be fostered when students with different and familiar e-learning platforms are used in CSCL. As Asino and Pulay (2019) argued, educators must consider the physical space to support technology-enhanced learning, including a familiar classroom environment. Besides, educators need to consider a continuum in CSCL application with their active involvement at the initial phase, after which they gradually withdraw for students to peer support each other (Khan & Markauskaite, 2017). In doing this, it will also be essential to consider the differences in students' preference for CSCL (Aderibigbe, 2022) and peer mentoring usability in CSCL to personalize and foster their learning experiences. Additionally, they highlighted the need to carefully select and pair students in the peer mentoring process within the CSCL context, with those passionate and willing to volunteer being considered (Aderibigbe, 2014). Doing this will ensure that the peer mentoring participants are not forced to engage in the endeavor but consider it a moral enterprise to support each other's learning and development. However, the program planners and facilitators need to clarify the expectations and roles of each peer mentoring participant (Aderibigbe, 2014) for effective and mutually beneficial engagements in CSCL. They can do this by organizing orientations to kick start the process, sharing written guidelines, and providing ongoing training support to ensure students stay on the right track.

As the data showed, most students engaged in CSCL and acknowledged peer mentoring as a credible tool for enhancing their learning in CSCL contexts regardless of gender, age, and college. Given that pedagogical strategies with collaboration and technology use enhance students' learning (Hrastinski, 2019;), this revelation indicates the need for institutional leadership to promote CSCL and peer mentoring for strategic engagement and networking among students (Sumi & Kabir, 2021; Grosse et al., 2018). However, students' usage of CSCL and understanding of peer mentoring roles in CSCL differ based on demographic characteristics. For instance, CSCL usage appears high among all the categories of students aged 21 to 24 and is encouraging for those aged 17-20, except those affiliated with AHSS. Students' use of CSCL tools also differs in terms of college affiliations. Specific CSCL tools' usage also differs in magnitude based on students' college affiliation. While over 50% of students from the colleges of Business, Computing and Informatics, Dental Medicine, Law, and Sharia and Islamic Studies engaged in CSCL using wikis, their counterparts from the College of Law used glossaries. Besides, the t-values for CSCL tools varied based on students' gender as the significance usage levels are differently pronounced for male and female students. While female students had higher use of blogs, wikis, and Google Docs, male students had higher use of in-class group discussions and online class interaction. At the same time, most acknowledged peer mentoring as a potential tool for

strengthening CSCL, except those affiliated with the colleges of communication and health sciences aged 21-24. Without a doubt, these findings reinforced the need to promote students' intentional use of technology-aided tools to enhance their collaborative study skills (Alameri et al., 2020; Khan & Markauskaite, 2017) and active engagement in peer support initiatives for life-long skills development (Winstone et al., 2022). The results also underscore the need for educators to customize students' support using peer mentoring and CSCL considering their unique needs based on their demographic characteristics (Aderibigbe et al., 2022; Lee et al., 2022). Doing this ensures students' expectations with better deployment of intervention strategies (Chengzheng et al., 2023; Hayman et al., 2022).

CONCLUSIONS

From the data collected and analyzed in this study, it is safe to conclude that peer mentoring can enhance students' learning experiences in the CSCL context. Specifically, it could help reduce student communication issues while offering the chance to scaffold the learning process and support each other in technical needs. However, some students may be challenged by language barriers, primarily when some cannot describe concepts or provide feedback in simple terms. Technical glitches and issues, which students may not be able to resolve themselves could also hinder the effectiveness of peer mentoring in the CSCL settings.

The study underlined the need for peer mentoring and CSCL stakeholders, facilitators and researchers to consider some factors for effective peer mentoring in CSCL contexts. Drawing on the study's results, educators should select peer mentoring participants who are passionate and do not feel pressured to engage in the exercise. The chosen participants should also be given orientation and training to clarify expectations and develop skills to stay focused while participating in peer mentoring in the CSCL context.

Besides, educators must ensure that students are familiar with CSCL through which peer mentoring takes place and be open to deploying different strategies and e-platforms to engage students in peer mentoring. Additionally, educators must consider deploying peer mentoring in CSCL with the capabilities to assist students based on their academic orientations for personalization and compelling learning experiences. Lastly, educators and researchers should consider exploring quantitative and qualitative approaches for contextual understanding and fostering peer mentoring to enhance students' CSCL.

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