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Saudi female students' perceptions of the Community of Inquiry in online learning environments

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Distance Education in Saudi Arabia is experiencing a steady increase in female student enrollments due to a number of factors including increased E-learning modalities. E-learning provides more equal learning opportunities than traditional gender-segregated face-to-face classes because online learning environments have fewer gender restrictions. This allows women to participate more equally in higher education and benefit from the expertize of male instructors. This study examines Saudi female students' perceptions of online learning in university courses taught by male instructors. It documents the supports and challenges female students encountered when they took these courses and considers cognitive, social, and teaching presence. Recommendations include providing faculty training and professional development programs to build online teaching confidence and equip faculty members with teaching skills in culturally specific teaching contexts.

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Introduction

There is a striking increase in the number of female students attending higher education institutions in Saudi Arabia. Qualified female instructors are needed to meet this demand (Alharbi, 2013). In Saudi Arabia, higher education institutions have traditionally upheld gender segregation, reflecting broader cultural, and societal norms (Hamdan, 2005). This practice manifests as separate campuses or facilities for male and female students. Within these segregated settings, female students are usually taught by female instructors, whereas their male counterparts receive instruction from male educators (Al Alhareth et al., 2015). The rising enrollment of female students in higher education, influenced by initiatives like Vision 2030, underscores an urgent demand for qualified female instructors—ensuring that education meets high standards while also respecting the nation's traditions.

Blended and online learning may help institutions meet demands for female instruction despite the shortage of qualified female instructors (Alasmari, 2020; Al Alhareth, 2013). They may also help institutions better access remote locations and reduce physical disparities across regions (Alebaikan, 2010; Alharbi and Drew, 2014). E-learning is one of the Information and Communication Technology (ICT) alternatives proposed by the Saudi Ministry of Education to reach demographics that need educational opportunities most, including women (Alharbi, 2013). Saudi women find E-learning formats motivating as they pursue higher education because they can study at home, overcome mobility issues, and maintain cultural and social standards (Bin Mubayrik, 2017; Omer and Almasabi, 2017).

The distance learning approach examined in this study consisted of courses that used one-way closed-circuit television with two-way audio and a Learning Management System (LMS). The closed-circuit television was used as a substitute for direct face-to-face instruction, and the LMS was used for asynchronous presentations, discussion, assignment submissions, and limited and staggered synchronized virtual class sessions (approximately four to six sessions during the semester). Although these distance courses were registered as blended in the academic portal, there was no "in-person" or face-to-face communication; all instruction and communication were mediated by technology. In the cultural and educational landscape of Saudi Arabia, the dynamics of male instructors teaching female students are unique and layered with intricate socio-cultural considerations. Online education presents a transformative potential in this context, offering a space where these interactions can unfold with a different set of paradigms compared to traditional classroom settings. While online education has been acknowledged for its potential to bridge gender-based educational challenges in various contexts, its specific impact and relevance in the Saudi Arabian context, especially concerning female students interacting with male instructors, remains under-explored. Moreover, prominent pedagogical frameworks, like the Community of Inquiry (CoI) theory, have yet to be evaluated in this particular dynamic. The purpose of this study is to assess the efficacy of online education as an alternative mode of learning for female students in Saudi Arabia when engaging with male instructors. Specifically, this research seeks to integrate the CoI theory to understand and evaluate the three domains of cognitive, social, and teaching presence within this unique online educational dynamic. The study aims to contribute nuanced insights to the broader discourse regarding online education in gender-specific cultural contexts and expand the applicability of the CoI framework to diverse settings. This research study examined the potential of this distance learning method to influence female students' perceptions of cognitive, social, and teaching presence.

Literature review

Saudi Arabia initiatives. A goal of Saudi Arabia's Vision 2030 plan is to raise women's inclusion in the workforce from 22 to 30% by 2030 (Alshuwaikhat and Mohammed, 2017; Al-Sati, 2017). The plan also seeks to bolster and diversify the country's economy, with more focus on human capital from youth and women. Given these goals, there is an urgent need to provide women with proper education and training. Vision 2030, as discussed in Aldossari and Murphy (2023) and Alghofaily (2019), marks a significant shift towards modernity, aiming to empower women through education and employment while navigating cultural and structural challenges. Saudi Arabia's educational context is evolving from traditionally gendered norms towards greater inclusivity and empowerment of women, reflecting broader socio-cultural transformations.

Previous studies indicate that many Saudi females are dedicated and professional and have the potential to lead the development and modernization of the country (Aljaber, 2018). However, the lack of female instructors, along with the increased number of annual female graduates from secondary schools (Alaugab, 2007), has resulted in high demand for methods to facilitate their education. Indeed, the demand for higher education for females increased by 479% between 2005 and 2009 (Aljaber, 2018). This demand generated support for alternative teaching opportunities, particularly online learning.

Distance learning. The digital revolution has changed how content is taught, learned, and consumed. Distance learning occurs when the educator "uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously" (Allen and Seaman, 2017, p. 41). It facilitates consistent delivery of instruction as it involves both synchronous real-time and asynchronous communication. These communication approaches have the potential to provide equitable learning opportunities for males and females and increase social interactivity, participation, and information dissemination.

Distance learning can be particularly beneficial for nontraditional students, especially female adult learners with children or family responsibilities, as it offers flexibility and the ability to balance personal and academic commitments (Patrick, 2001). Hu and Cheung (2021) found that female students exhibited lower cultural adaptation in cross-border education settings, influencing their academic performance. This suggests that culturally specific distance learning might address these challenges by providing a more familiar learning environment. Further, women's communication patterns in e-learning environments may provide them with a learning advantage. Johnson (2011) found that women communicated more and perceived greater social presence in an online information systems course, leading to higher satisfaction and marginally better performance. Indeed, online teaching platforms create a balanced learning experience where both male and female students have equal access and interaction with instructors using the same tools and systems. This ensures that no group has a preferential edge over the other. Boring (2017) analyzed gender biases in student evaluations of teaching, finding that male students exhibited a bias favoring male professors. This suggests that the instructor's gender can influence student perceptions in online settings. Güllüoglu (2012) identified gender-differentiated communication patterns and educational characteristics in online technologies, suggesting that gender influences instructional design, delivery, and support strategies, thereby affecting student perceptions. Mengel et al. (2017) and

Mitchell and Martin (2018) also found evidence of gender bias in student evaluations, with male instructors often receiving higher evaluations than female instructors.

Expanding opportunities for females. There is currently great interest in online and blended learning among higher education students in Saudi Arabia. This interest was bolstered by two government initiatives. First, the Ministry of Education (MOHE, 2010) proposed that educational institutions need to better use ICTs in educational endeavors (Al-Hunaiyyan et al., 2008). Second, the Digital Transformation Plan (part of Vision 2030) seeks to digitalize government services, including education, to provide equitable access and meet job market demands (Alasmari, 2020). The country's Vision 2030 plan aims to structure the country's social, political, and fiscal future with specific recognition of women's potential to bolster the workforce. Distance learning is viewed as a method to enable women to study and participate in traditionally male-dominated areas such as engineering, architecture, and petroleum management (Aljaber, 2018). It provides both Saudi female instructors and students the opportunity to express their opinions and participate in seminars and discussions within socially acceptable platforms like phones, televised networks, and virtual meetings (Baki, 2004; Onsman, 2010).

Social practices have historically imposed gender segregation on women in education and restricted females to specific professions (Binyamin, 2019). From a national perspective, the Saudi government emphasized the need for equity in higher education opportunities for women (Aldayel, 2017; Mutambik et al., 2020). For example, in 1970, the Saudi education policy stated that women and men have equal rights to education. Since that time, gender gaps in adult literacy rates have been rapidly closing. The female literacy rate is currently 91.84%, which is an astounding rise from 2% in the 1970s (Al Alahareth et al., 2015). This increase is due to a number of initiatives implemented by the government over the past 50 years.

Distance learning initiatives have also provided students in remote areas greater access to higher education, bolstering the country's economy (Aljaber, 2018). However, most education provided to females by male instructors is delivered through one-way closed-circuit television and two-way audio networks (Alasmari, 2020; Alebaikan, 2010; Al-Sarrani, 2010). The purpose of these systems is to provide off-campus courses that allow female students to interact directly with their male instructors (Al Muhaisin and Shawat, 2008; Hamdan, 2005). Unfortunately, the one-way closed-circuit television systems impede Saudi women from fully participating in classroom activities and interaction (e.g., discussions, presentations, and student-instructor interaction) because students compete among themselves for microphone use (Al-Kahtani et al., 2005/2006).

Indeed, the use of one-way closed-circuit television systems in educational settings, such as those in Saudi Arabia, can give rise to myriad challenges for female students. Beyond the overt barriers to participation, such as hindered classroom discussions and presentations, there is the issue of delayed or limited feedback. Without real-time, comprehensive responses to their queries or work, the learning process for these students is notably impeded. Furthermore, the richness of communication is not just in spoken words; it is often in unspoken gestures, facial expressions, and other non-verbal cues. The reduced visibility in one-way systems can lead to these crucial cues being overlooked, potentially resulting in misunderstandings and diminished comprehension. This physical separation can also culminate in a reduced sense of belonging or community for female students, potentially impacting their motivation and overall engagement. The discrepancy might also extend to tangible resources, with female students possibly missing handouts or materials provided in the main classroom. Technical glitches, which are inevitable in any system, present another challenge. A malfunction can mean missed information or a missed lesson, especially if technical support is not readily available. Collaboration, a key aspect of modern education, can also be compromised. Activities that require teamwork or group interaction become logistically challenging, limiting the depth and breadth of the learning experience for women. Instructors, albeit unintentionally, might also evaluate participation differently, with those on-screen potentially facing unconscious biases. The separate environment for female students might also subject them to unique distractions, such as technical interruptions, adversely affecting their focus. Any concerns or issues might see delayed resolutions (due to the inherent communication barriers), leading to extended periods of uncertainty. Lastly, the very essence of a live classroom — its energy, dynamics, and ambiance — plays a subtle yet pivotal role in molding a student's experience. The detached female student's experience might deprive them of these invaluable facets of education. Although technology offers solutions, it also necessitates a thorough understanding and adaptation to ensure educational equity.

Online learning for female students. The Saudi government's Vision 2030 includes initiatives to promote and enhance the quality of education, including online learning, to make it more accessible and equitable, especially for women (Ansari et al., 2021). Despite these advancements, traditional norms continue to influence education, especially in gender-segregated environments (AlShamsi, 2021). The cultural and educational landscape in Saudi Arabia, particularly in the context of women's roles, is characterized by a dynamic interplay of traditional values and modern reforms. El-Sanabary (1994) and Alhawsawi and Jawhar (2023) highlighted the impact of Islamic traditions and their influence on gender roles. Gender roles and family expectations shape females' educational opportunities and experiences (Alruwaili and Ku, 2019). This background impacts how female students engage with and perceive online learning environments.

Therefore, technology's integration into education is pivotal for women's access to learning resources (Al-Shaya and Oyaid, 2021). Online learning might be of special benefit for Saudi female students because it provides a means for socially acceptable interaction with male instructors (Aldosemani et al., 2018) through easily accessible learning systems while preserving the gender spatial segregation norms. These environments have fewer social restrictions for men and women, which allows women to participate more fully and provides access to others more equally (e.g., male instructors). This change is particularly noteworthy given the current shortage of female instructors. Additionally, online and blended learning provides flexibility for women with family commitments (Al Alhareth et al., 2015; Aljabre, 2012).

Al Alhareth and McBride (2014) highlighted the empowering potential of e-learning for Saudi women, which offers them opportunities for education that might be restricted in traditional settings. The study called for inclusive strategies in the deployment of e-learning platforms that acknowledge and address the specific barriers Saudi women face in accessing digital education, emphasizing the need for a holistic approach that considers cultural, societal, and educational factors to effectively empower Saudi women through e-learning. Zouhair (2012) delved into the perceptions of Saudi female undergraduate students regarding JUSUR E-learning systems, highlighting how online chat sessions provided a convenient and culturally appropriate platform for engaging in group discussions, a crucial aspect considering the societal norms around gender interactions

in Saudi Arabia. The students' preference for extending the JUSUR system to other courses underscores its perceived value in supporting their academic journey within the context of their unique social environment. Hamdan (2014) explored the relationship between learning culture and online education in Saudi Arabia, focusing on how online education is changing the learning culture of undergraduate Saudi female students and vice versa. Online learning helps female students challenge some cultural norms, enhances their learning culture, and improves communication skills. Further, distance education in Saudi Arabia contributes to advancing female leadership opportunities by providing greater access to education (Hamdan 2014; Walabe and Luppicini, 2019). Additionally, Saudi female postgraduate students view self-directed learning via distance education positively and plan to continue engaging with online learning tools in the future (Alghamdi, 2021). Alahmari and Amirault (2017) examined the general perceptions of Saudi Arabian faculty members and female students toward E-learning, as well as their perceptions toward replacing closed-circuit technology with an online LMS. Most participants expressed support for female students learning online with male instructors.

Several key recommendations were offered to enhance the online learning experience of female students through culturally specific distance learning approaches. Wang (2007) highlighted that online courses should be designed to address the specific needs and preferences of female students, incorporating elements that encourage their participation and engagement. Hamdan (2014) recommended that a supportive and inclusive online learning environment be created that acknowledges and addresses the unique challenges faced by female students in distance education. Further, previous studies highlighted the importance of ensuring female students have access to necessary technology and support, including reliable internet connectivity and technical training, to participate effectively in distance learning (Mwangi, 2021). In addition, it is equally important to encourage a sense of community and connectedness among students, which can be particularly beneficial for female learners who value collaborative and interactive learning environments (Rovai, 2001). These reasons reinforce the need for effective blended and online learning at Saudi universities (Asiri et al., 2012). Previous studies focused on the macro level and investigated overall student perceptions of substituting traditional television circuits with LMSs.

Therefore, studies regarding female students' perceptions of online environments, particularly with a focus on cognitive, social, and teaching presence, are needed to enhance the quality of the learning environment and sustain the educational community based on the CoI (Garrison et al., 2001). In addition, it is important to provide evidence-based recommendations from the perspectives of female students to enhance their online learning experiences through culturally specific distance learning environments.

E-learning and the Community of Inquiry. Garrison et al. (2001) defined the CoI as an educational community based primarily on teachers and students in online courses. Learning occurs through the interaction of three elements: cognitive presence, social presence, and teaching presence. Cognitive presence is "the extent to which the participants in any particular configuration of a Community of Inquiry are able to construct meaning through sustained community" (Garrison et al., 2001, p. 89). However, social constructivist theorists assert that meaning is constructed through social interactions and learning is primarily a social activity constructed through communication, collaborative activity, and interactions with others (Vygotsky,1978). When one-way closed-circuit television and two-way audio networks are utilized that limit student participation and interaction, it is difficult for students to construct knowledge together. Another key element of Community of Inquiry is social presence, a student's ability to present themselves as "real people" and develop trust and a sense of connection with others (Garrison et al., 2001; Kanuka and Garrison, 2004; Wenger-Trayner and Wenger-Trayner, 2015). In environments where gender dynamics play a prominent role, as in the context of Saudi Arabia's educational system, leveling the playing field between male and female students becomes essential. By ensuring equity in interaction tools and platforms, potential barriers and biases that might otherwise marginalize female students are removed.

When the playing field is leveled, female students are likely to experience an enhanced sense of belonging and self-worth. They may feel empowered to voice their opinions, ask questions, and contribute to discussions without fear of being overshadowed by their male counterparts. This proactive participation, in turn, may significantly amplify their social presence. Furthermore, in a balanced environment, male and female students can challenge and learn from each other's perspectives, deepening their understanding of the subject matter. For female students especially, this environment can counteract the limitations imposed by one-way communication tools, providing them with a more enriching and holistic educational experience.

Teaching presence focuses on instructional management, building understanding, and direct instruction, including presenting information and facilitating student interaction and learning in the course. Teaching presence is a multifaceted construct, anchoring itself in three primary domains: instructional management, building understanding, and direct instruction. While these elements are evident in face-to-face settings, the shift to online learning presents unique challenges and demands different strategies. Instructors need to adapt to the virtual environment, understanding that traditional classroom techniques might not be as effective online due to factors like the lack of physical cues and the potential for digital distractions. Further complicating the matter are gender dynamics. The preferences and needs of male and female students might vary based on cultural, societal, and individual factors. For instance, in certain cultures, female students might find online forums more conducive to participation than mixed-gender physical classrooms. Conversely, online learning could pose barriers to relationship-building. Therefore, it is essential that educators are equipped to navigate these nuances and differentiate their teaching methods to ensure equity in online learning settings. This necessity highlights the importance and need for this study, which aims to enhance the effectiveness and inclusivity of online education for all learners by exploring female students' perspectives of online distance education in a culturally specific context.

The intersection of social, cognitive, and teaching presence creates a sense of community that is based upon common purpose and inquiry. Swan and Shih (2005) found that group cohesion requires intellectual focus and is significantly associated with social presence and perceived learning outcomes. They discussed the clear shift of social presence over time in online course discussions due to the level of effectiveness and interactivity of open communication and its impact on the community's cohesion. Arbaugh (2005) discussed differences in how male and female students communicate, which is affected by community development and the nature of the task. Therefore, Garrison (2007) stated that social, cognitive, and teaching presence need to be interpreted in "the broader context of a Community of Inquiry that concurrently considers social, cognitive and teaching presence issues and variables" (p. 64).

The distance learning approach examined in this study consisted of courses that used closed-circuit television with an LMS. The closed-circuit television was used as a substitute for

direct face-to-face instruction, whereas the LMS was mainly used for asynchronous presentations, discussion boards, assignment submissions, and limited and staggered synchronized virtual classroom sessions. Our research examined female student perceptions of cognitive, social, and teaching presence in this unique, distance learning environment.

The following question guided this study: What are female students' perceptions of male instructors' teaching through distance learning methods? Research questions included:

1. How do online delivery approaches by male instructors influence female students' perceptions of cognitive, social, and teaching presence?
2. What are the advantages and disadvantages for females who took courses with male instructors through this culturally specific distance learning approach?

Methodology

Setting. This study occurred at an emerging public university in the central region of Saudi Arabia. Emerging universities in Saudi Arabia include 13 higher education institutions that were established during the past 10 years to serve communities in regions distant from major metropolitan areas and decrease pressure on eight main universities.

The university has 19 colleges (including two community colleges) on seven campuses interspersed throughout the central region of Saudi Arabia. The university employs more than 1600 academic staff and enrolls more than 26,000 students. Blended learning was initiated (although not mandated) in 2011 with Blackboard as the LMS. Blackboard Learn is an LMS that offers a variety of tools and features designed to enhance teaching and learning experiences in both virtual and blended environments. The platform allows educators to create and distribute course materials, conduct assessments, and facilitate interactive discussions. It also enables students to access course content, submit assignments, participate in discussions, and track their academic progress. Faculty members were expected to utilize Blackboard to post instructional materials, manage their courses, and implement follow-up class activities with discussions, quizzes, and group activities. They were also expected to provide extra feedback on topics discussed during face-to-face instruction.

The university has expanded its reach with various colleges and branches in different locations to cater to the educational needs of the region. The university's commitment to education, especially for women, is evident in its establishment of colleges specifically for female students in various disciplines and access to LMS and closed TV circuits to facilitate the teaching of these students with male instructors. One of the female colleges is the College of Sciences, which has around 1132 students. It offers bachelor's degrees in different sciences, including Biology, Chemistry, Physics, Mathematics, Earth Sciences, Computer Science, Bioinformatics, and Materials Science.

One institutional goal was to support distance learning through Blackboard and provide easily accessible and pedagogically sound materials to all students. Male faculty members teaching female students used the one-way closed-circuit television/two-way audio system as an alternative to face-to-face teaching for their classes with female students. Some teachers used the LMS, whereas others did not. When the COVID-19 pandemic started, all courses were offered online through the LMS.

Participants. All female students assigned to male instructors within the science college received an email invitation to participate in this study by completing a questionnaire. The number of students from the targeted population was 320 (from six academic departments). A total of 110 valid responses, 34.3% of the targeted population, were received. Participants' academic levels were determined based on the number of semesters they completed (ranging from 1–8) with 20% of students in the third, 20.9% in the eighth, 13.6% in the fourth and sixth, 11.8% in the second, 10% in the fifth, 7.3% in the seventh, and 2.7% in the first level. Most students (47.3%) were taking three to five courses with male instructors; 29.1% were taking one online course, whereas 18.2% were taking two courses. Among participants, 37.3% majored in Applied Science, 25.5% majored in Information Systems, 18.2% majored in Administrative Sciences, and 19% majored in different disciplines, such as Chemistry, Math, and English.

Instrument. The CoI survey instrument, as originally developed, has 34 items that are designed to measure three distinct presences in online learning environments: teaching, social, and cognitive. Specifically, the instrument breaks down into 13 items that assess teaching presence, nine items that gauge social presence, and 12 items that evaluate cognitive presence (Swan et al., 2008).

The robustness and reliability of this instrument have been rigorously tested. Arbaugh (2007) conducted a study to ensure the reliability of the CoI survey, confirming its consistency and dependability in measuring the intended constructs. Further reinforcing its reliability, Swan et al. (2008) reported impressive internal consistency reliability scores for each of the three presences: a coefficient of 0.91 for social presence, 0.95 for cognitive presence, and 0.94 for teaching presence. Such high coefficients indicate that the items within each presence category are consistently measuring their intended constructs.

In addition to its reliability, the validity of the CoI instrument has also been established. Garrison et al. (2004) conducted research to verify the validity of the CoI instrument. Their findings confirmed not only the instrument's overall validity but also the validity of its three-factor structure, ensuring that each of the presences (teaching, social, and cognitive) is a distinct and valid construct within the instrument. Its reliability and validity have been well-established through multiple studies, making it a trusted instrument in the field of online education research.

Data collection. Prior to initiating the study, ethics approval and the necessary permissions were secured from the Deanship of Research in Saudi Arabia. The CoI survey was utilized for data collection. This detailed questionnaire was disseminated to the target college/departments via email in May 2023. The survey was originally administered in Arabic to cater to the participants' native language. Subsequent to data collection, the responses were translated into English by members of the research team who are proficient in both languages. To ensure the validity and accuracy of the translations, several measures were undertaken. First, a back-translation method was employed, wherein another bilingual team member translated the English version back into Arabic. This was then compared to the original to identify and rectify any discrepancies. Additionally, to mitigate potential bias or interpretation errors, multiple team members reviewed and cross-verified the translations. This rigorous process was essential to preserve the authenticity and integrity of the participants' responses. To ensure a higher response rate, a reminder email was dispatched three weeks after the initial distribution.

Data analysis. A total of 110 individuals completed the online survey instrument that was distributed to the College of Science/females section. None of these cases included missing data. Frequencies and descriptives for items and subscales were calculated. Internal reliability coefficients were calculated for the total scale and its three subscales, and Pearson correlation coefficients were

Table 1 Frequencies and descriptives for items on the teaching presence subscale ($N = 110$).

Item	Percentage				
	SD/D	N	A/SA	M	SD
Design and organization					
T1- The instructor clearly communicated important course topics.	3.6	4.6	91.8	4.36	0.78
T2- The instructor clearly communicated important course goals.	2.7	8.2	89.1	4.34	0.78
T3- The instructor provided clear instructions on how to participate in course learning activities.	1.8	9.1	89.1	4.40	0.77
T4- The instructor clearly communicated important due dates/time frames for learning activities.	3.6	10.0	86.4	4.32	0.83
Facilitation					
T5- The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	2.7	10.9	86.4	4.17	0.80
T6- The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	2.7	10.0	87.2	4.26	0.82
T7- The instructor helped to keep course participants engaged and participating in productive dialog.	4.5	14.5	80.9	4.15	0.93
T8- The instructor helped keep the course participants on task in a way that helped me to learn.	2.7	9.1	88.2	4.25	0.81
T9- The instructor encouraged course participants to explore new concepts in this course.	3.6	9.1	87.3	4.23	0.83
T10- Instructor actions reinforced the development of a sense of community among course participants.	5.5	10.0	84.5	4.15	0.94
Direct Instruction					
T11- The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	4.5	13.7	81.8	4.17	0.90
T12- The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.	6.4	10.9	82.7	4.14	0.88
T13- The instructor provided feedback in a timely fashion.	2.7	10.1	87.2	4.27	0.79

Scale ranging from 1-Strongly Disagree to 5-Strongly Agree.

generated to evaluate the correlation of subscales. Responses to open-ended questions were analyzed for themes and frequencies (Creswell, 2014; Flick, 2006).

Results

Student perceptions of teaching, social, and cognitive presence. All 37 Likert-type items on the instrument ranged from 1-*strongly disagree* to 5-*strongly agree*, and a significant majority of students generally perceived the CoI constructs positively in their online courses taught by male instructors: teaching ($M = 4.24$), social ($M = 4.21$) and cognitive presence ($M = 4.24$).

Teaching presence. Based on the results, the teaching presence domain was generally perceived positively in areas of course design, facilitation, and direct instruction (see Table 1). Most participants felt that the course was well-organized and the instructor's facilitation and instructional methods were effective. However, there slightly less agreement in reinforcing a sense of community and providing feedback related to individual strengths and weaknesses. Overall, the instructor's performance, as reflected by the mean scores, was commendable.

For the design and organization subdomain, the majority of respondents (over 85% for each item) agreed or strongly agreed that the instructor effectively communicated course topics, goals, participation instructions, and important due dates. The mean scores for these items are all above 4.3, indicating a high level of satisfaction among respondents. For the facilitation domain, the instructor's facilitation skills were also rated positively, with over 80% of respondents agreeing or strongly agreeing that the instructor was helpful in guiding discussions, identifying areas of agreement/disagreement, and keeping participants engaged. However, there is a slight dip in the percentage for the item about keeping participants engaged in productive dialog, with 80.9% agreeing or strongly agreeing. For the direct instruction subdomain, although most respondents felt that the instructor's actions reinforced community development and provided relevant feedback, there is a noticeable decrease in agreement for the items about reinforcing a sense of community and providing feedback related to strengths and weaknesses. Only 84.5 and 82.7% of participants agreed or strongly agreed, respectively. Nonetheless, the mean scores for these items remain above 4.1, suggesting that even though they are slightly lower than other areas, they are still positively viewed. Further, 87.2% of respondents agreed or strongly agreed that feedback was provided in a timely manner, with a mean score of 4.27, indicating strong positive feedback in this area.

Social presence. Participants generally perceived online or web-based communication positively, especially in terms of its capacity for social interaction and collaboration (see Table 2). They felt comfortable interacting, conversing, and participating in discussions. However, while most felt a sense of belonging and formed distinct impressions of others, there was lesser agreement in ensuring that all participants feel their viewpoints are acknowledged. Overall, the attitude towards online communication and its ability to foster group cohesion was positive.

For the subdomain of Affective Expression, 78.2% of respondents felt connected with other course participants, leading to a sense of belonging, and 79.1% formed distinct impressions of their peers. Both metrics had mean scores just above 4. Remarkably, 90.9% endorsed online communication as an excellent medium for social interaction, reflected by a mean score of 4.34.

Regarding Open Communication, comfort levels were high: 89.1% for conversing online, 86.4% for participating in discussions, and 87.3% for interacting with peers, with mean scores ranging from 4.24 to 4.35. For the Group Cohesion subdomain, 84.5% were at ease disagreeing with their peers while retaining trust. However, a slightly lower number (82.7%) felt their perspectives were acknowledged by peers. Still, a strong 88.1% believed online discussions bolstered collaboration, with a mean score of 4.26. Although participants appreciated the online medium for its fostering of interaction and collaboration, there was a nuanced need to enhance acknowledgement in discussions and fortify the sense of community.

Cognitive presence. The majority of participants responded positively to the course's structure and content subdomains, indicating a high level of engagement, exploration, integration, and

Table 2 Frequencies and descriptives for items on the social presence subscale ($N = 110$).

Item	Percentage				
	SD/D	N	A/SA	M	SD
Affective expression					
S1- Getting to know other course participants gave me a sense of belonging in the course.	8.2	13.6	78.2	4.02	0.98
S2- I was able to form distinct impressions of some course participants.	8.2	12.7	79.1	4.05	0.98
S3- Online or web-based communication is an excellent medium for social interaction.	4.6	4.5	90.9	4.34	0.93
Open communication					
S4- I felt comfortable conversing through the online medium.	3.6	7.3	89.1	4.31	0.87
S5- I felt comfortable participating in the course discussions.	5.4	8.2	86.4	4.24	0.95
S6- I felt comfortable interacting with other course participants.	2.7	10.0	87.3	4.35	0.84
Group cohesion					
S7- I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	2.8	12.7	84.5	4.24	0.81
S8- I felt that my point of view was acknowledged by other course participants.	2.7	14.5	82.7	4.18	0.82
S9- Online discussions help me to develop a sense of collaboration.	3.6	8.3	88.1	4.26	0.83

Scale ranging from 1-Strongly Disagree to 5-Strongly Agree.

Table 3 Frequencies and descriptives for items on the cognitive presence subscale ($N = 110$).

Item	Percentage				
	SD/D	N	A/SA	M	SD
Triggering event					
C1- Problems posed increased my interest in course issues.	11.7	10.9	85.5	4.21	0.81
C2- Course activities piqued my curiosity.	7.3	11.8	80.9	4.09	0.93
C3- I felt motivated to explore content related questions.	5.4	10.0	84.5	4.18	0.92
Exploration					
C4- I utilized a variety of information sources to explore problems posed in this course.	4.5	15.5	80	4.09	0.88
C5- Brainstorming and finding relevant information helped me resolve content related questions.	6.3	10.0	83.7	4.11	0.92
C6- Online discussions were valuable in helping me appreciate different perspectives.	1.8	12.7	85.5	4.23	0.77
Integration					
C7- Combining new information helped me answer questions raised in course activities.	1.8	10.9	87.3	4.23	0.79
C8- Learning activities helped me construct explanations/solutions.	3.6	11.8	84.6	4.15	0.87
C9- Reflection on course content and discussions helped me understand fundamental concepts in this class.	5.4	8.2	86.4	4.17	0.87
Resolution					
C10- I can describe ways to test and apply the knowledge created in this course.	2.7	17.3	80	4.13	0.86
C11- I have developed solutions to course problems that can be applied in practice.	4.5	18.2	77.3	4.11	0.89
C12- I can apply the knowledge created in this course to my work or other non-class related activities.	2.7	12.7	84.5	4.22	0.84

Scale ranging from 1-Strongly Disagree to 5-Strongly Agree.

ability to resolve and apply knowledge (see Table 3). The data suggested that the course effectively fosters curiosity, encourages diverse information sourcing, and aids in the practical application of knowledge. However, there were areas, especially in exploration and the application of knowledge, where slight improvements could further enhance the learning experience.

For the Triggering Event sub-category, a majority of participants (85.5 and 80.9%, respectively) indicated that the course's problems and activities effectively sparked their interest and curiosity, with mean scores above 4. For the Exploration phase, between 80 to 84.5% of respondents were proactive in their learning approach, from feeling motivated to explore questions and using diverse information sources to valuing brainstorming, all reflected by mean scores hovering around 4.1.

In the Integration sub-category, the data reveals a strong inclination towards collaborative learning. Between 84.6 to 87.3% of participants found value in online discussions, integrating new information, and engaging in learning activities, with mean scores ranging from 4.15 to 4.23. These scores indicate the course's effectiveness in fostering comprehensive understanding.

Lastly, in the Resolution sub-category, the majority (ranging from 77.3 to 84.5%) felt equipped to apply their acquired knowledge, either by testing it, developing practical solutions, or integrating it into their work or other activities. The mean scores, all above 4.1, further emphasize the course's success in facilitating actionable knowledge. All three subscales had a mean score above 4.0 (Table 4). The teaching presence subscale had the highest mean score ($M = 4.24$), whereas the cognitive presence subscale had the lowest mean ($M = 4.16$).

To evaluate the correlation of the three subscales, correlation coefficients were calculated. The Pearson correlation coefficients were high (Table 5).

The correlation matrix reveals significant relationships between three educational subscales: Teaching presence, Social presence, and Cognitive presence. A strong positive correlation of 0.83 exists between Teaching presence and Social presence, suggesting that when the quality of teaching presence increases, there's a corresponding increase in social presence. Similarly, Teaching presence and Cognitive presence share an even stronger correlation of 0.89, indicating a robust relationship between the quality of teaching and cognitive engagement. Lastly, Social presence and Cognitive presence are also positively correlated at 0.82. This means that heightened social interactions in a course setting are likely associated with increased cognitive engagement.

Table 4 Descriptives for subscales.

Subscale	*M*	SD	No. of items
Teaching presence	4.24	0.71	13
Social presence	4.21	0.76	9
Cognitive presence	4.24	0.71	12

Table 5 Subscale correlation matrix.

Subscale	Teaching presence	Social presence	Cognitive presence
Teaching presence	-	0.83[a]	0.89[a]
Social presence	0.83[a]	-	0.82[a]
Cognitive presence	0.89[a]	0.82[a]	-

[a]Significant at the .01 level (2-tailed).

All these relationships are statistically significant at the 0.01 level, underscoring the interconnectedness of teaching, social, and cognitive elements in an educational environment.

Advantages of online learning through the LMS. In this study, female students were asked about the advantages they perceived in taking courses with male instructors through this culturally specific distance learning approach. Several themes emerged regarding their positive experiences with an online LMS as opposed to a closed-TV circuit as a means for instruction.

Teaching presence

Feedback and support: Regarding feedback and support, 27 students valued the LMS's feedback mechanisms. "The feedback I received on my assignments was timely and helpful" mentioned one participant, emphasizing the platform's integrated grading and commenting systems. The value placed on timely and helpful feedback reflected the students' desire for responsive and engaging instruction. This indicates a need for continuous instructor involvement to support the learning process.

Personal growth and development: Twenty-four students felt the LMS played a pivotal role in personal growth and development, "Using the LMS encouraged me to explore topics on my own. I feel I've grown so much academically", reflected one student. The platform's flexibility and diverse tools were seen as catalysts for improved self-directed learning skills and academic growth. The role of the LMS in fostering academic growth suggests students' appreciation for self-directed learning opportunities. This indicates a preference for learning environments that promote autonomy and exploration.

Social presence

Engagement and interaction: Thirty students emphasized the LMS's enhanced interactivity and engagement. One student remarked, "The LMS platform made it so much easier to interact. I felt more involved in the class". This attitude was echoed by many who appreciated the immediacy of responses and the platform's digital nature, which fostered dynamic interactions and a deeper connection to the instructor and course content. One student mentioned, "The LMS truly brought the course to life for me; the prompt responses and real-time interactions made the learning experience immediate, and I felt more connected to the course." The preference for the immediacy and interactivity of the LMS indicates a need for dynamic, real-time communication in online learning, which fosters a sense of connection and belonging in the virtual classroom.

Collaborative learning: Collaborative learning was another favorable area in the LMS. Of the respondents, 28 felt empowered by the platform's collaborative tools, such as discussion boards. "The discussion boards on the LMS gave me a voice. I could share my thoughts without hesitation", shared one student. The asynchronous nature of the platform was also appreciated, allowing for paced engagement and deeper reflection. Another student mentioned, "The LMS's tools have changed my learning experience. I found myself more actively participating and collaborating with peers and I could freely express my ideas and learn from others". Another commented "Being able to contribute on my own time using the LMS's asynchronous features allowed me to reflect deeper and produce more thoughtful responses, the discussion boards were a place to connect, discuss, and truly understand the material". Finally, another student expressed "I always felt intimidated speaking in the traditional classroom setting taught by male instructors, but the LMS discussion boards offered a safe space where I felt empowered to contribute". The positive reception of discussion boards and asynchronous features reveals a desire for flexible, inclusive platforms that cater to diverse communication preferences and learning styles.

Learning environment: The learning environment was positively perceived by 20 students, who reported a more conducive atmosphere for learning compared to the closed-TV circuit. One student commented, "I felt more comfortable participating in the LMS, especially given our unique classroom dynamics". The platform's sense of privacy and security was underscored as fostering inclusivity. This suggests that students value a comfortable and safe atmosphere in their learning, especially in contrast to more traditional methods like closed-TV circuits. The findings indicate that an online environment, like the LMS, is perceived as less intimidating and more controlled and can significantly enhance engagement and participation, particularly for students who might feel marginalized in traditional classroom settings. This underscores the importance of creating online learning platforms that cater to both the educational and socio-emotional needs of students.

Cognitive presence

Course structure and clarity: In terms of course structure and clarity, 25 students praised the LMS's structured layout. "Everything was organized and easy to find. It made learning so much smoother", noted one participant. The clarity and ease of navigation on the LMS were highlighted as factors contributing to their understanding and retention of material. The emphasis on structured layout and ease of navigation suggests a preference for well-organized online environments, which reduce cognitive load and enhance learning.

Application and understanding: Twenty-two students lauded the LMS's interactive tools. One student stated, "The quizzes and simulations on the LMS really deepened my understanding of the topics". Features like quizzes and interactive videos were highlighted as instrumental in deepening understanding and facilitating the practical application of concepts. The appreciation for interactive tools like quizzes and simulations indicates that students value practical, applied learning experiences that deepen their understanding and engagement with the subject matter.

Disadvantages of online learning through LMS. While many advantages of the LMS were highlighted, several challenges and

disadvantages also emerged. Several themes emerged regarding the experienced drawbacks of an online LMS for instruction.

Teaching presence

Inadequate instructor proficiency: Inadequate instructor proficiency in online teaching was a recurring theme. Thirteen participants highlighted the lack of instructor expertize in managing online classes. Additionally, 21 participants suggested a need for more comprehensive training in both content delivery and assessment, and 16 pointed out inconsistencies in instructors' approaches, noting deviations from planned schedules and a lack of clarity regarding assignment submissions. Concerning feedback delays, 12 students felt that feedback on assignments, while detailed, was not always timely on the LMS. "I sometimes had to wait days to get feedback on urgent queries," mentioned one student, highlighting the asynchronous nature of the platform. The concerns about instructor proficiency in online teaching point to a gap in skills and training among instructors, highlighting the need for professional development in effective online pedagogy.

Student disengagement: Twenty-eight students reported feeling disengaged and even bored due to the instructors' lack of online presentation skills. This attitude was compounded by feelings of isolation, with 15 students citing inadequate communication as a primary concern. There were also instances where student queries went unanswered, leading to unresolved academic challenges. Despite the potential of various online tools, students reported that instructors predominantly relied on synchronous methods, underutilizing asynchronous communication tools like announcements or forums, which could have enhanced the learning experience. This situation points to a gap in effective online interaction and highlights the importance of instructors being adept not only in their subject matter but also in engaging students in a virtual environment. Additionally, the underutilization of asynchronous tools like announcements or forums, despite their availability, suggests a missed opportunity to diversify and enrich the online learning experience. These findings indicate a need for a more balanced approach to using synchronous and asynchronous methods in online education, ensuring that the full potential of online tools is leveraged to maintain student interest and foster a more interactive and inclusive learning environment.

Cognitive presence

Technical difficulties: Concerning technical difficulties, 35 students reported occasional issues with the LMS platform. One student reported that "sometimes the LMS would lag or not load my assignments properly". These technical glitches occasionally disrupted the learning process and caused frustration. Technical issues with the LMS reflect a need for reliable and user-friendly technology infrastructure in online education.

Overwhelming information: Ten students felt that the LMS, with its myriad features and resources, could sometimes be overwhelming. "There's so much content on the LMS; I often didn't know where to start," shared one participant. This response indicates that while a wealth of information can be beneficial, it can also lead to confusion and cognitive overload, particularly if not structured or curated effectively. The student's comment about not knowing where to start points to the need for a more intuitive and user-friendly design in online learning platforms. It suggests that while providing comprehensive resources is valuable, it's equally important to guide students through the learning path in a way that is easy to navigate and aligns with their learning progression. This feedback underscores the importance of balancing the richness of content with clear, structured learning pathways to enhance the overall educational experience in an online environment.

Social presence

Lack of personal presence: Lack of personal presence was a concern for 15 students. They felt that while the LMS facilitated learning, it lacked the personal touch and immediacy of a closed-TV circuit. "I missed seeing the instructor's immediate reactions and body language," noted one student, emphasizing the nuances of non-verbal communication that the LMS couldn't replicate. The lack of personal presence observed in LMS points towards a need for more interactive and engaging tools that can mimic face-to-face interaction, addressing the lack of non-verbal communication cues in online settings.

Recommendations for improvement: In response to the challenges faced in online learning, students proposed several recommendations to enhance the online learning experience. Foremost, 16 students emphasized that there is a pressing need for comprehensive training programs for instructors, ensuring they are well-versed in online teaching best practices, from content delivery to assessment techniques. This training should emphasize the importance of a clear course structure, with defined plans, schedules, and transparent guidelines for assignments. Thirteen students recommended that instructors should be encouraged to diversify their teaching methods, incorporating multimedia resources like videos and interactive quizzes. Seventeen students considered communication, both synchronous and asynchronous, as a pivotal element in the success of online learning environments.

While live sessions can cater to immediate concerns, the results showed that 19 students recommended the use of forums, threaded discussions, and announcements as they can foster an ongoing dialog. In addition, nine students highlighted that timely feedback from instructors is crucial, not only for assignments but also in addressing student queries. To alleviate feelings of isolation, 18 students emphasized the need for the introduction of community-building activities, such as group projects and peer reviews. Thirteen students recommended periodic check-ins or feedback surveys that they can provide instructors with insights into the course's effectiveness, allowing for real-time adjustments. Given the technical nature of online platforms, 23 students recommended providing robust technical support for all users as an essential online learning success enabler. Further, recognizing the unique challenges of online education, 18 students recommended that more flexible assignment deadlines need to be considered. Additionally, eight students suggested the need for a centralized resource repository as an invaluable tool to give students access to essential readings and supplementary materials at their convenience. Lastly, 14 students recommended the use of interactive tools, like polls and collaborative whiteboards, which can make sessions more engaging, ensuring a participatory learning environment.

Discussion and recommendations

This study delved into the experiences of female students in Saudi Arabia as they navigated online courses taught by male instructors. The statistical results from the study provide compelling insights into the dynamics of online learning for female students within the context of Saudi Arabia. A significant majority of students generally perceived positively the teaching ($M = 4.24$), social ($M = 4.21$), and cognitive presence ($M = 4.24$) in their online courses taught by male instructors. They reported areas of course advantage associated with online platforms, emphasizing

enhanced interactivity, clearer course structure, and more inclusive learning environments. While many of these students perceive their online learning experiences positively, the study also identified areas of concern. Notably, there was a perceived gap in instructor proficiency in online teaching methodologies, underscoring the need for comprehensive instructor training. Additionally, the recurrent technical disruptions point to a requisite for more robust technical infrastructures.

Applying the CoI framework, the study offers a structured exploration of the online learning experience in terms of teaching presence, social presence, and cognitive presence. Teaching presence was challenged by the perceived lack of instructor expertize, necessitating comprehensive training programs. Social presence highlighted the need for community building in online spaces and the need to address gender dynamics. Meanwhile, cognitive presence underscored the importance of balancing the advantages of online platforms with their inherent challenges, ensuring robust student engagement and effective feedback mechanisms.

Teaching presence

Instructor expertize and online pedagogy. Teachers must be knowledgeable of the interrelated aspects of teaching, learning, and technology to support positive pedagogical outcomes (Koehler et al., 2014). A significant concern emerging from the data is the perceived lack of instructor expertize in online teaching (Aljaber, 2018; Al Alhareth and McBride, 2014). Within Garrison's CoI framework, teaching presence is multi-faceted, encompassing course design, facilitation, and direction of cognitive and social processes.

Student perceptions and feedback dynamics. Students may rate one aspect, like course design, favorably in closed-ended surveys while providing detailed feedback on other elements, like facilitation, in open-ended comments. Such dichotomies can arise from the general nature of rating scales versus the specificity allowed in open feedback. Furthermore, students' perceptions of strong teaching presence might be influenced by the frequency of online interactions, yet the depth and quality of these interactions, crucial for online pedagogy, might be areas needing improvement. It is also possible that students' high ratings are relative, based on previous less-optimal experiences, while their open feedback reflects aspirations for an ideal educational environment.

Continuous improvement and instructor development. Therefore, instructors must consider creating continuous feedback loops, ensuring that student voices are not just heard but acted upon and incorporated into the continuous improvement of online learning platforms (Al Alhareth and McBride, 2014). Institutions must prioritize comprehensive training programs, ensuring instructors are familiar with the platform's technical aspects and also pedagogically equipped to teach online (Alasmari, 2020; Aljaber, 2018). As Al Alhareth and McBride (2014) emphasize, the onus is on educational bodies to ensure that instructors transition seamlessly to this new mode of teaching, maintaining the quality of education.

The importance of instructional design partnerships. Research has shown that successful online course development involves faculty members and instructional designers as partners (Brown et al., 2013; Outlaw et al., 2017). Instructional designers should play a key role in improving the quality of online higher education courses. Academic support centers can also offer consulting programs for faculty seeking assistance in curriculum and pedagogical development in undergraduate and graduate programs across the university and in courses designed for female students in similar contexts. According to Garrison et al. (2004), a CoI requires clear expectations, satisfactory participation standards, academic objectives, tasks, and discussion. Interaction and discussion activities are key elements in higher-order learning but "not without structure (design) and leadership (facilitation and direction)" (Garrison et al., 2004, p. 69).

Social presence

Social presence and female student empowerment. The research's survey results and open-ended questions themes illuminate how the LMS provided a platform for female students to engage actively and collaboratively, giving them a voice they may not have felt in traditional settings. This sentiment is mirrored in the survey results, where participants expressed positivity towards online communication, particularly in its potential for fostering social interaction and collaboration. The quote by one of the participants, "The discussion boards on the LMS gave me a voice. I could share my thoughts without hesitation," reflects a female student's sense of empowerment and newfound confidence in the online learning environment. This sentiment is further solidified by the appreciation for the asynchronous nature of the platform, which facilitates paced engagement and encourages deeper contemplation. This reflects an overarching idea that online learning levels the playing field between male and female students in such a unique learning context. It suggests that digital platforms might be eroding traditional barriers and biases present in face-to-face settings. The online realm appears to democratize the learning experience for female students, offering an egalitarian space where female students feel on par with their male counterparts and instructors, allowing for uninhibited participation and expression.

Given the emphasis on understanding and addressing gender dynamics in online learning, as highlighted by Al Alhareth and McBride (2014), it is crucial for institutions to be aware of these dynamics. Institutions should strive to create an environment where female students feel equally represented, heard, and comfortable. Further, the challenge of fostering community in online spaces is not unique to education (Al Alhareth, 2013; Al Alhareth and McBride, 2014). However, given the collaborative nature of learning, it is especially pertinent in this context. Institutions must explore innovative ways to foster community, from virtual group projects to online social events (Al Alhareth and McBride, 2014). As Al Alhareth (2013) suggests, a sense of community can significantly enhance the online learning experience.

Cognitive presence

Challenges in online learning environments. The LMS's interactive nature and analytics features have been a boon for student engagement (Al Alhareth, 2013; Al Alhareth and McBride, 2014). However, feelings of isolation reported by some students are concerning. Therefore, instructors must explore creative strategies to ensure every student feels connected, valued, and heard, replicating the camaraderie of a physical classroom in a virtual learning environment to foster a sense of cognitive presence, which can significantly enhance knowledge creation and reflections as well as trigger learners' interest in the course.

Balancing online and traditional learning strategies. The transition to online learning platforms, such as LMSs, has been largely positive, with students appreciating the enhanced interactivity and clearer course structure (Alasmari, 2020; Aljaber, 2018). However, the challenges, especially around instructor proficiency and occasional technical issues, can impede students' sense of cognitive presence (Al Alhareth and McBride, 2014; Aljaber, 2018). Institutions must ensure that the potential of online learning is not

diminished by these challenges. Therefore, educational institutions must harness the strengths of online platforms while proactively addressing their inherent weaknesses (Al Alhareth, 2013; Al Alhareth et al., 2015). As Alasmari (2020) suggests, a balanced approach that combines the best of both online and traditional learning strategies might be the way forward.

Technical infrastructure and student experience. Blackboard Learn offers various features that can significantly influence student learning experiences and provide a sense of cognitive presence. Its user interface and design impact student engagement and usability, with the potential for higher satisfaction and learning outcomes. Interactive tools such as discussion forums, live chats, and virtual classrooms facilitate engagement and community among students. Blackboard's content delivery methods, including video lectures and interactive content, play a crucial role in the accessibility and understanding of course materials. The assessment tools and feedback mechanisms within Blackboard can significantly influence student learning and motivation. Analytics and data tracking features in Blackboard can contribute to personalized learning experiences, adapting to individual student needs. The platform's technical reliability and support are essential for a smooth learning experience, especially during high usage periods. Additionally, Blackboard's integration with other educational tools enhances its effectiveness in supporting blended learning environments.

Therefore, institutions must invest in similar robust technical infrastructures (Al Alhareth and McBride, 2014). This includes ensuring that the platform has all the necessary tools for effective teaching and learning as well as reliability in providing real-time technical support. Aljaber (2018) emphasizes the importance of a seamless technical experience in ensuring student satisfaction and engagement.

Using the CoI framework, the study aimed to understand the nuances of online learning, touching upon teaching presence, social interactions, and cognitive engagements. Feedback from students emerged as an essential factor, highlighting its potential to refine the course content and delivery. When placed in the broader research context, this study contributes a perspective that is tailored to the Saudi Arabian setting. It offers insights into the relationship between female students and male teachers in online environments, adding a new layer to the existing body of knowledge. The study's acknowledgement of its limitations encourages further exploration in this domain. Overall, it provides a starting point for understanding the intersection of gender and culture in online education within Saudi Arabia.

Limitations

Study limitations and considerations. This study presents insights from selected cohorts in a single college in a Saudi university, limiting its geographical scope and potentially making its findings less applicable to other settings within Saudi Arabia. The scope may also limit the applicability of its findings across broader demographics or different cultural settings. The small sample size further challenges the generalizability of the results to the broader student population. The reliance on self-reported data introduces the possibility of social desirability bias, where participants might offer socially acceptable responses rather than their genuine views. Additionally, the study did not use multiple methods or data sources for validation. Technological variables, such as internet connectivity and individual familiarity with the LMS were not deeply explored, despite their potential influence on student experiences. As such, while the study provides valuable initial insights, readers should interpret the findings with caution, recognizing the need for broader, more comprehensive research in the future.

Future research opportunities. Looking forward, there is a rich tapestry of opportunities for future research in this domain. Expanding the demographic focus to encompass different cultures, age groups, or educational stages can provide a more universally applicable understanding of online learning dynamics. A mixed-methods approach, weaving quantitative with qualitative data, might paint a more nuanced picture. The experiences and challenges faced by male instructors in online courses remain a largely untapped area of study. Additionally, given the foundational role of technology in online education, there is an evident need for research delving deeper into the impacts of different and mixed platforms or tools on gender dynamics. Further, as online education methodologies and technologies continue to evolve, longitudinal studies spanning multiple years could offer invaluable insights into the changing nature of student experiences in this digital era.

Lastly, future research can delve into the long-term impacts of online learning on female students' academic achievements and career paths. This includes exploring how online education influences their academic success metrics, such as retention and graduation rates, and its effect on their subsequent employability and integration into the job market. Additionally, it is crucial to examine the role of online learning to enhance digital literacy, leadership skills, and professional development. In addition, assessing the contribution of online learning to bridge the gender gap in STEM and other fields would provide valuable insights into creating more equitable educational environments. Understanding the effects of online education on mental health, social perceptions, and work-life balance is also critical. Research could investigate how online platforms facilitate networking and community engagement, potentially impacting career opportunities.

Conclusion

In conclusion, this study sheds light on the intricate dynamics of online learning experiences for female students in a Saudi university setting, particularly when engaging with male instructors via a LMS. The experiences of female students in higher education with male teachers in online courses in Saudi Arabia provide a glimpse into the potential influences of cultural norms on online education. Gender dynamics certainly play a role in these digital interactions, and many female students shared positive feedback about their experiences. Nonetheless, there were some indications of male instructors' varying comfort levels with online teaching methods, suggesting room for improvement in online pedagogical training. Moreover, technical issues occasionally emerged, pointing to the need for consistent technical support.

The results emphasize the capacity of digital platforms to create a more inclusive, dynamic, and immersive educational experience. However, they also bring attention to certain challenges, notably the expertize of instructors in digital teaching techniques. Based on these insights, it is crucial for educational bodies, particularly in unique cultural settings such as Saudi Arabia, to prioritize extensive training initiatives for their teaching staff. Such initiatives should aim to bolster online teaching methodologies, guaranteeing that educators are well-versed in their respective subjects and are skilled in maximizing the advantages of digital platforms to enhance genuine student participation.

Additionally, institutions should consider periodic reviews and updates of their LMS platforms, ensuring they remain user-friendly and conducive to fostering a sense of community among students. Feedback mechanisms should be robust, ensuring that students feel heard and supported throughout their learning journey. Lastly, while this study offers valuable insights, it also underscores the need for broader research encompassing diverse geographical and institutional contexts within Saudi Arabia. Such expansive research will provide a more comprehensive

understanding, enabling stakeholders to make informed decisions that truly elevate the online learning experience for all students. As online learning continues to gain traction globally, ensuring that it is effective, inclusive, and engaging becomes paramount. This study serves as a stepping stone, highlighting both the potential and the challenges of online education in specific cultural contexts, and underscores the need for continued efforts in research and practice to truly harness its benefits.

Data availability

The primary datasets analyzed in this study are not accessible to the public as the data ownership belongs to Prince Sattam bin Abdulaziz University. The author is contractually prohibited from granting access to the data, as specified in the agreement with Prince Sattam bin Abdulaziz University. The datasets are available upon request from https://vrpssr.psau.edu.sa/en# vgrector@psau.edu.sa.

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Author contributions

Tahani Aldosemani, PhD is the principal investigator. She conceptualized the research project, designed the survey instrument, and oversaw data collection. She contributed to data analysis and interpretation, wrote the initial draft of the manuscript, and led revisions based on feedback from co-authors and reviewers. She acted as the corresponding author, handling communication with the journal and addressing revisions. She reviewed and approved the final version of the manuscript. Craig Shepherd, PhD, is the co-principal investigator. He collaborated in conceptualizing the research design and refining the survey instrument. He contributed to data analysis and interpretation of findings, assisted in drafting the manuscript, and provided critical feedback during the revision process. He reviewed and approved the final version of the manuscript. Doris Bolliger is the co-principal investigator. She collaborated in refining the research design, objectives and survey instrument. She conducted statistical analysis, contributed to data interpretation and analysis, and provided critical feedback on manuscript drafts. She reviewed and approved the final version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The questionnaire and methodology for this study were approved by the Human Research Ethics Committee of Prince Sattam bin Abdulaziz University. (Ethics approval number 04122019).

Informed consent

Informed consent was obtained from all participants to participate in this study and publish their data prior to submitting their paper to a journal.

Additional information

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