Enhancing the quality of online teaching and learning of a research module through the community of inquiry framework

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The COVID-19 pandemic imposed a quick change to online teaching and learning, emphasising the importance of the community of inquiry (CoI) framework in reimagining the quality of higher education in an online setting. In the study reported on here I focused on how lecturers adopted the CoI to enhance the quality of online learning and teaching of a research module. Additionally, it examines the extent to which students experienced the 3 key presences within the CoI framework, namely the teaching, social and cognitive presence during online teaching and learning of the research module. I employed a design-based research (DBR) approach, focusing on teachers studying B.Ed. Hons. part time. Data were generated through a CoI survey and students' reflections. The findings reveal that the lecturer's use of diverse instructional strategies resulted in students experiencing a higher level of teaching presence, a varied range of social presence, and a high level of cognitive presence. These high levels of cognitive and teaching presences could suggest the enhancement of online learning and teaching within the research module.

Keywords: community of inquiry; online teaching; quality; research module; students

Introduction and Background

In response to the intense global impact of the COVID-19 pandemic on higher education, the past 3 years (2020–2022) have shown a rapid adoption of online learning and teaching. Like their counterparts worldwide, institutions of higher learning in South Africa faced the imperative to digitalise their operations. Starting in March 2020, educators were compelled to change to online teaching. According to Gutiérrez-Santiuste, Rodríguez-Sabiote and Gallego-Arrufat (2015), transition demands not only the provision of intellectual and academic leadership but also the facilitation of tools and guidance for students to engage at elevated levels of academic rigour. In line with the authors mentioned above, Motala and Menon (2020) emphasise that learning and teaching in higher education should produce well-educated students equipped with the skills, knowledge and attributes required in a rapidly changing era. However, the global experience of the COVID-19 pandemic brought disruptions, reshaping, and profoundly tested higher education's capacity to meet the demands of the Fourth Industrial Revolution (4IR) (Onwuegbuzie & Ojo, 2021). Therefore, "technology has become an important aspect of the teaching and learning process across the world" (Jantjies & Joy, 2016:1). It is believed that a community of inquiry (CoI) could be used to enhance online education. This is supported in several studies (Dunlap, Verma & Johnson, 2016; Fiock, 2020; Garrison, Anderson & Archer, 1999; Kozan & Caskurlu, 2018) in which it was concluded that the essence of the online educational experience aimed at achieving the best results is based on three presences, namely, social, cognitive and teaching. These are crucial prerequisites for a successful higher education experience. In the light thereof, it is vital to ensure that teaching in higher education not only adapts to the challenges posed by the 4IR but also maintains and enhances its quality. Furthermore, the increased use of online learning and teaching has prompted "a plethora of research on its quality – particularly on the instructional strategies that impact on online students' learning" (Watson, Bishop & Ferdinand-James, 2017:420).

Using the CoI framework in the author's teaching reflections (Zulu, 2022) highlighted areas for personal and professional development regarding the quality of online teaching for the research module. For example, the findings of autoethnography suggest that authors need to use a pedagogical approach that relies heavily on the collaborative and social component of learning to enhance the quality of online teaching and learning practices (Zulu, 2022). Based on these findings, I adopted a CoI framework as an intervention strategy to enhance the quality of online teaching. Garrison et al. (1999) highlight that a CoI framework is a pedagogical model for blended and online teaching. In 2022 a design-based research (DBR) project focusing on teachers studying the part-time Bachelor of Education Honours (B.Ed. Hons.) degree was conducted to implement the CoI framework in online teaching. This was done because deep and meaningful learning results are achieved when students and lecturers experience teaching, social and cognitive presences in an educational community. With the study I sought to answer the following research questions: 1. How was the CoI framework implemented to enhance the quality of online teaching and learning within a specific research module at a South African (SA) university? 2. To what extent do students experience teaching, social and cognitive presences in online teaching and learning via the research module?

The objectives of the study were to implement the CoI framework to enhance the quality of online teaching and learning within a specific research module and to evaluate the extent to which students experience social, cognitive and teaching presences in an online teaching and learning research module. While this study was

conducted at a South African university, its findings contribute to the scholarship of how a CoI framework could be used to enhance the quality of online and blended learning and teaching in higher education worldwide.

The research module explored in this study is offered at B.Ed. Hons. level in the teacher development studies discipline. Research studies in teacher development focuses on the research on and theorising formal and informal processes and policies that contribute to the development of teacher identities, teacher learning, teacher knowledge and teacher socialisation, among other things (Research module course outline, 2022). The focus in research and scholarship in teacher development studies is on the processes of teacher development taking place against a backdrop of initial or continuing teacher education programmes or interventions, but that are not limited to such programmes and interventions. The aim of the module is to develop students' abilities to pursue specific lines of empirical or theoretical research in education in the South African context through an supervised independent research project (IRP). Students are also supported to develop academic literacy, namely, the ability to write clear, relevant and interesting academic texts and to read,

understand and respond to academic texts (Research module course outline, 2022). At my institution, this particular research module is categorised under supervision within the lecturers' workload norm, rather than being regarded as a module that is taught. Typically, there are 10 scheduled contact sessions, which are not considered part of the lecturers' teaching load. Supervision is not included in these 10 sessions, but it takes place outside the scheduled sessions, according to arrangements made by the student and supervisor. I argue for a re-evaluation of the classification of the B.Ed. Hons. research module, believing that it should be recognised as both a teaching and supervision responsibility. The scheduled sessions are used to introduce students to research processes, literature review, theoretical and conceptual frameworks, and so forth (see Table 1 – plan for the online sessions of the research module in 2022). The following is an extract from the module outline showing the research focus for 2022.

Considering the new normal that COVID-19 has enforced on the education system, the broad research focus is on the impact of the COVID-19 pandemic on the teaching profession. Students need to choose a specific area of interest (Research module course outline, 2022:6).

Table 1 Plan for online sessions of the research module in 2022

Session	Content and tasks	Plan of action for remote teaching and learning
Session 1 19 February	Introduction • Welcoming and ice breaker: Students watch YouTube video (https://youtu.be/8L9aZsgMcGk) on the new normal (Taylor, 2020). • Presentation of course outline. • Discussion of areas of interest and choosing possible focus areas • Identifying research title, purpose, research focus, rationale, and research questions • Discussion of expectations of myself as supervisor. Expectations of the supervisor and students. **Task 1: Choosing the focus area** Read/review literature on your research area and ensure that it is researchable. Prepare a 5-minute presentation on an area of interest, focus, research questions, and rationale for your study in which you articulate: 1) What you are trying to do? 2) Why you are trying to do it? 3) With whom will you do it? In the second session (16 April 2022), you will each be given 5 minutes to present the rationale and proposal for your study.	Class session on Zoom, WhatsApp and electronic mails (emails). PowerPoint with audio uploaded on the modular object-oriented dynamic learning environment (Moodle) and emailed to students.
Session 2 16 April	• Students' presentation of individual research areas/foci • Literature review • Theoretical framework. **Task 2: Literature review** 1) Read and review 10 articles based on your research topic 2) Summarise the important points of each article using the template provided. Indicate how this relates to your project. 3) Write a literature review of five to seven pages based on what you have read and reviewed for your study. Submit to your supervisor together with the reading record for each article you have read by 15 May 2022.	Class session on Zoom, WhatsApp and emails. PowerPoint with audio uploaded on Moodle and emailed to students.

Session	Content and tasks	Plan of action for remote teaching and learning
Session 3 14 May	Research design and methodology • Discussion of methodology viz. case study, research paradigm, qualitative research, context, sampling, data collection, data analysis, trustworthiness, ethical issues and study limitation. • Preparing letters of consent and developing research instruments. **Task 3: Research design and methodology** 1) Read four books/articles based on your methodology (Bertram & Christiansen, 2014, is one of them) and as discussed in the lecture 2) Submit an assignment of four pages on the following to your supervisor: 　a) Describe the methodology and justify the study design 　b) Research paradigm 　c) Discussion of qualitative research 　d) Sampling and recruitment strategy 　e) Discussion of context where the research is being conducted 　f) Methods of data collection, i.e. semi-structured interview 　g) Ensuring trustworthiness 　h) Ethical considerations 　i) Limitations of the study 3) Request permission from the various stakeholders to conduct your study (you will need to prepare letters of consent for each stakeholder) 4) Prepare a presentation of the research proposal.	Class session on Zoom, WhatsApp and emails. PowerPoint with audio uploaded on Moodle and emailed to students
Session 4 11 June	Oral presentation of proposal • Each of you will be given 20 minutes (min) to present a PowerPoint presentation of your research proposal. • 20 min presentation and 10 min for discussion (30 min per student). • The oral presentation is another step in refining your proposal. • All of us need to engage, ask questions, comment and make suggestions. • A mark will be allocated out of 50 (according to the rubric included in module outline) and converted to 5% as part of proposal assessment. **Task 4** Use the feedback from your presentation to refine your proposal and to clarify how you will collect data to answer your research question. Students to arrange meetings with their individual supervisors to finalise their proposals. Submission of FINAL FULL PROPOSAL (soft copy) with research instruments and letters of consent to supervisor for assessment. Signed letters of consent are needed from gatekeepers. Submission date: 30 June 2022	The research proposal presentation was conducted via Zoom. The recordings of presentations were emailed to presenters.
July – August	Ethics explanation on ethical clearance amendments were given as undertaken by the supervisor as a principal investigator and approved ethical clearance was emailed to the nine students as co-investigators. **Task 5: Data collection period (July - August 2022)** • Students to conduct interviews with five participants. • Students to transcribe all five interviews. • Students to complete all revisions required by the supervisor on the proposal	The amendments to the existing ethical clearance was done online through the university's Research Information Gate system after the students submitted their final research proposals electronically in a class session on Zoom, WhatsApp and emails.
Session 5 2 July	The writing process and structure of final independent research report • Students begin the process of writing up their research reports. • Work on writing of introduction, literature review, and methodology sections of the report.	PowerPoint with audio uploaded on Moodle and emailed to students.

Session	Content and tasks	Plan of action for remote teaching and learning
Session 6 14 August	Data analysis and interpretation • Deductive and inductive data analysis • In this session the student is expected to share one interview transcript on Zoom and reflect on their experiences of the fieldwork. **Task 6: Data analysis** Work on the following aspects: Data analysis and interpretation Focus on: • What did you find? • What examples from the data support these findings? • You may use narratives, quotes from data, samples of student work, tables and charts to display your data and provide evidence for your findings. • Use themes that emerged from the data to organise your findings. Relate the findings to your research question/(s). Submission date: 15 September 2022	Class session on Zoom, WhatsApp and emails. Recordings of the Zoom session were emailed to students.
Session 7 10 September	Discussion of findings, recommendations and conclusion • Students were shown how to engage with findings using the theoretical/conceptual framework and the literature. • Discussion of findings in relation to the research questions. **Task 7: Discussion of Findings** • Address issues relating to compiling your full research report. • Students to arrange meetings with their individual supervisors to discuss draft IRP reports.	Class Zoom session Supervision (individual and group). Consultation was done via WhatsApp, Zoom and emails.
Session 8 1 October	Address issues relating to compiling of full research report (continue)	Class Zoom session. Ongoing consultation via WhatsApp, Zoom and emails.
Session 9 22 October	Address issues relating to compiling of full research report (continue) **Task 8** Submit your first draft IR report to your supervisor electronically by 30 October 2022	Class Zoom session. Ongoing consultation via WhatsApp, Zoom and emails. Students arrange meetings with the individual supervisors to discuss feedback in preparation for the final draft.
Session 10 19 November	Address issues relating to compiling your research report • Feedback on the full first draft of the research report. • Module evaluation. **Task 9** Submit the final independent research report to the supervisor: 15 November 2022.	Students arrange meetings with their supervisors to discuss draft IRP. Submission of the first draft IRP report to supervisors electronically on 15 November 2022.

Literature Review and Theoretical Framework
Quality of online teaching and learning in higher education
Online teaching and learning quality in higher education is a global concern. Carrillo and Flores (2020) systematically reviewed 134 empirical studies on online teaching and learning practices in teacher education. They found that lecturers lacked basic skills and resources to facilitate teaching and learning. These challenges have an impact on the quality of online teaching and learning. Online teaching and learning have been criticised for poor quality (Martin, Polly, Jokiah & May, 2017).

Hence, theoretical and practical frameworks have been developed to ensure the quality of online programmes in higher education. Watson et al. (2017) identify seven principles for good practices in undergraduate education. According to Watson et al. (2017), the five pillars of online education stress constructive, timely, and substantive interaction between the lecturer and the students that impact the effective design of instructional strategies for achieving students' satisfaction in online learning.

In the South African context, the National Association of Distance Education and Open

Learning of South Africa (NADEOSA) developed 13 criteria for distance education that highlight the importance of quality. The criteria include policy, planning, programme development, course design, course materials, assessments, learner support, human resources strategy, management and administration, quality assurance, information dissemination and results (Martin et al., 2017). Currently, the Council on Higher Education (CHE) and the South African Qualifications Authority (SAQA) regulate and assure quality in higher education. The universities have policies and procedures to assure quality in the modules. The module assessments using the quality promotion and assurance (QPA) questionnaire are allowed to add another tool to the QPA questionnaire. However, a study conducted at six South African universities on the quality of teaching and learning established that "the benchmarks set by CHE are only met on paper, and little or nothing is done to translate them into practice" (Fomunyam, 2018:44).

At the university where I was employed at the time of publication, the QPA questionnaire for module evaluation is accessible on the Moodle Learning Management System (LMS). The university uses Moodle for many services that are to aid lecturers in managing lectures and modules. Student evaluations and reflections help to identify areas of improvement and modification to teaching and learning, and assessment where necessary. Saleem, AlNasrallah, Malik and Rehman (2022) maintain that the quality of the educational process online depends on the level of training and knowledge that the lecturers have in using technology, their teaching style, interaction with students, and strategies used to capture the students' attention. Therefore, it was important for me to interrogate my online teaching practice to improve the quality thereof. In this study, the quality of the online teaching and learning environment involves creating a dynamic online teaching and learning environment that fosters critical thinking, collaboration and research skills among students. It also involves ensuring that students are well-prepared to engage in research activities and contribute meaningfully to their academic and professional fields.

Community of inquiry framework presences
The CoI framework combines the concept "learning community" with that of social activity. Learning is the result of the interaction of the three presences: social, cognitive and teaching (Fiock, 2020). In this study, the CoI serves as both a framework and a strategy for enhancing the quality of online teaching and learning.

According to Garrison et al. (1999), teaching presence plays a central role in supporting and enhancing cognitive and social presences,

ultimately aimed at achieving the desired educational outcomes. They explain that teaching involves the deliberate act of designing, facilitating, and orienting cognitive and social processes to obtain the results foreseen according to the students' needs and capabilities (Garrison et al., 1999). The teaching is characterised by three key components (also known as indicators): direct instruction, building understanding and instructional management. Instructional management focuses on designing and delivering the curriculum, activities, and assessments. Building understanding involves strategies to promote the acquisition of content knowledge and also involves "creating an effective group consciousness for the purpose of sharing meaning, identifying areas of agreement and disagreement, and generally seeking to reach consensus and understanding" (Garrison et al., 1999:101). Direct instruction involves the explicit and intentional guidance provided by the instructor to support the learning process. According to Dunlap et al. (2016), direct instruction is an important component of teaching and should be balanced with the other presences – cognitive presence (engaging students in critical thinking and reflection) and social presence (establishing a sense of community and connection among students). Therefore, effective teaching presence, including direct instruction, plays a crucial role in creating a supportive and engaging online learning environment.

The social presence is an "ability of participants in a community of inquiry to project themselves socially and emotionally, as real people (i.e., their full personality), through the medium of communication being used" (Garrison et al., 1999:103). Garrison et al. (1999:101) identify three indicators of social presence. The first indicator is the expression of emotion – an emotional response to the learning experience, which can be implemented through humour and self-disclosure (Garrison et al., 1999:101). The second indicator, open communication, is fulfilled through interactions that show mutual awareness, such as respect, recognition and acknowledgment of peer-generated contributions (Garrison et al., 1999:101). Group cohesion, which is strengthened by strategies that help students feel part of a learning community, thus promoting the sharing of information and collaborative critical thinking, is the third group (Garrison et al., 1999:101). In relation to community, Carrillo and Flores (2020:468) emphasise that social presence is strengthened by the participants' ability to engage effectively with the community. Therefore, the community needs to communicate purposefully in a collaborative environment and develop interpersonal relationships by presenting themselves as the people they are (Carrillo &

Flores, 2020; Garrison et al., 1999).

Cognitive presence involves knowledge building. According to Moore and Miller (2022:132), cognitive presence is the extent to which participants construct meaning through sustained reflection and communication in a CoI. Cognitive presence has four unchanging, non-sequential indicators, namely state of dissonance, exploration, integration, and resolution (Fiock, 2020; Garrison et al., 1999). A state of dissonance or unease, often referred to as a triggering event or communication, marks the initial stage of the process. The next stage involves exploration, where individuals actively seek information, knowledge, and alternatives to better understand the situation or problem (Fiock, 2020). According to Garrison et al. (1999), the integration phase focuses on synthesising insights and interpreting the gathered information to comprehend the issue and direct one's attention effectively. The final stage is resolution, which entails tackling the problem or issue and applying a potential solution (Dunlap et al., 2016).

A growing body of studies (Cleveland-innes & Campell, 2012; Kozan & Caskurlu, 2018; Lam, 2015; Pollard, Minor & Swanson, 2014; Shea & Bidjerano, 2010) shows the development of CoI. These studies recommend additional presences to the current ones. The new presences are autonomy, learning, emotional and instructor social presence. According to Lam (2015:56) "Autonomy presence relates to the unstructured learning initiated from individuals' independent drive of communication and exploration of learning opportunities in order to achieve learning objectives." Shea and Bidjerano (2010:1721) do not provide a definition of the learning presence but gave its elements, which include "self-efficacy as well as other cognitive, behavioural, and motivational constructs supportive of online learner self-regulation." Emotional presence is defined as "the outward expression of emotion, affect, and feeling by individuals and among individuals in a CoI, as they relate to and interact with the learning technology, course content, students, and the instructor" (Kozan & Caskurlu, 2018:108). Pollard et al. (2014) say that the instructors' social presence involves the social behaviour of the instructor. In my study I adopted the teaching, social and cognitive presences.

Several studies (Bozkurt, 2019; Bozkurt & Sharma, 2020; Carlon, 2020; Chiroma, Meda & Waghid, 2021; Garrison, Cleveland-Innes & Fung, 2010; Gutiérrez-Santiuste et al., 2015; Waghid, Meda & Chiroma, 2021) established that the application of the CoI framework in an online teaching environment has potential to support higher-order and deep learning through the interaction of teaching, social and cognitive presences. However, the application of the CoI framework within diverse cultural contexts is equally significant. According to Thaman (2013), in a study conducted in the Pacific context, the success of learning communities relies not only on structured interaction but also on cultural practices rooted in communal trust and knowledge sharing. These practices highlight the importance of social presence in that collective knowledge construction becomes a cultural norm.

Methodology

Research Design

DBR was used to explore innovations in online teaching and learning. Several scholars (Herrington, Reeves & Oliver, 2010; Reeves, 2006) state that DBR is the methodology for implementation and evaluation of the online environment. According to Reeves (2006), DBR is a practical methodology that could bridge the gap between educational research and the real world. DBR consists of four connected phases (Reeves, 2006:52–66):

- Analysis of problem: According to Reeves (2006) the analysis of the problem involves three key areas: the problem (in this study the problem was the quality of online teaching and learning), the literature review and practitioners' experiences. In the first phase of DBR I, as a teacher educator (lecturer), conducted an autoethnography to examine the extent to which teaching, social and cognitive presences emerged during transitioning to online teaching during disruptions.
- Development of solutions: Based on the findings of the autoethnography showing personal and professional areas of development, more literature (e.g. Dunlap et al., 2016; Fiock, 2020; Kozan & Caskurlu, 2018; Moore & Miller, 2022) on the CoI was reviewed to learn how it has been used to design and evaluate online and blended teaching and learning.
- Implementation of testing of solutions: In 2022 I implemented CoI presences to enhance the quality of online teaching of the research module. The participants in this study were nine teachers studying B.Ed. Hons. in teacher development studies (TDS) part-time.
- Reflection and refinement phase: This is the last phase of the research. I report here on how I adopted the CoI framework to enhance the quality of the online teaching and learning module. This study was presented at the Global trends in management, information technology (IT), and governance in an e-world 2023 conference.

Sampling

Purposive sampling was used to select participants. The participants were two male teachers (P1 and P6) and seven female teachers (P2, P3, P4, P5, P7, P8 and P9). They were all enrolled for the research module, the IRP.

Data Collection Methods

To determine the effectiveness of CoI, mixed method research was used to generate quantitative

and qualitative data. The quantitative data were generated through a CoI survey questionnaire with 34 questions and the students' reflections generated qualitative data. The CoI survey questionnaire was developed by a group of scholars (Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson & Swan, 2008; Garrison, Cleveland-Innes & Fung, 2004). The CoI survey questionnaire is available freely online. Likert scales; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree were used. The CoI survey questionnaire includes 34 questions divided into three sections: teaching presence with 13 questions, social presence with nine questions and cognitive presence with 12 questions. This survey was not used to generate data in a wider population but as an additional tool for evaluating teaching and learning in the research module. The questionnaire was emailed after the last Zoom session in the second semester. After analysing the questionnaire, the participants were asked to write an evaluation of the module. The students were allowed to reflect freely on the research module. The intention was to obtain in-depth insight into their perspectives and subjective experiences. While all questionnaires were returned, one participant (P3) chose not to complete the reflection on the module.

Data Analysis
The quantitative data were presented and analysed using Microsoft Excel where the average scores of each question in the teaching, social, and cognitive presences were calculated. The average score for each question was calculated by adding the participants' Likert scores and dividing the total by the total number of participants. My threshold criteria for interpreting the quantitative data was: 4.0 – 5 .0: high presence, 3.0 – 3.9: low 2.0 – 1.0: very low presence. I wanted to understand the trends in each participant's responses hence, I did not use the quantitative data analysis software to analyse the quantitative data. The indicators of each presence of CoI were used to analyse the data. The qualitative data helped to interpret the quantitative data. The qualitative data were analysed deductively using the CoI presences.

Validity and Reliability
A group of researchers developed the CoI survey questionnaire and tested it in several studies where online and blended teaching and learning were the focus (Arbaugh et al., 2008; Garrison et al., 2004). I intended to implement the CoI framework to enhance the quality of online teaching and learning within a specific research module and to evaluate the extent to which students experienced teaching, social, and cognitive presences in an online teaching and learning research module. The CoI questionnaire covers CoI aspects, teaching, social,

and cognitive presences. These constructs were measured in this study. The detailed records of students' reflections were collected and analysed deductively. The participants' reflections were compared with their questionnaire responses.

Limitations
The small sample size is a limitation of this study. Since I researched my practices, there might be issues of bias that may impact negatively on the findings of the study.

Results and Discussion
The goal was to understand the extent to which students experienced teaching, social and cognitive presences in online teaching and learning of the research module. While the mixing of quantitative and qualitative data was employed through DBR design, the correlation between the quantitative and qualitative data was not established because the students were not given any structure for the reflections about the module. As mentioned in the methodology section, the students were given the freedom to express their thoughts and experiences. The qualitative data from the students' reflections played a crucial role in enhancing the understanding and interpretation of the quantitative data in this study. The results are presented according to the two research questions underpinning the study. It is necessary to mention that participants' responses in this section are quoted verbatim.

How was the Community of Inquiry Framework Implemented to Enhance the Quality of Online Teaching and Learning within a Specific Research Module at a SA University?
In preparation for the implementation of online teaching, along with fellow lecturers, I engaged in comprehensive training designed to be equipped with the necessary skills for effective online teaching and learning. This training encompassed essential tools and platforms such as Google Classroom, Zoom, and the art of creating PowerPoint lectures with audio. After the training, the university initiated a crucial phase of trial runs, often referred to as "dry runs", which served as a pivotal testing ground for online teaching and learning across all academic modules. It became evident during this trial period that the efficacy of online pedagogy hinged on the level of technological proficiency and familiarity of both lecturers and students, echoing the sentiment expressed by Pokhrel and Chhetri in their 2021 study (Pokhrel & Chhetri, 2021:135). Consequently, I found myself in the position of bridging the knowledge gap between the theoretical training provided by the university and the practical support offered by my colleagues and friends. This amalgamation of resources became

essential to ensure that I was adequately prepared to navigate the challenges of online education effectively.

CoI principles were incorporated to enhance the online learning experience. Synchronous (Zoom and Microsoft Teams) and asynchronous (recorded lectures, supportive videos, WhatsApp group messages and emails) elements were used. All the tasks were submitted via email and I gave feedback in emails and during Zoom sessions.

Table 2 Summary of the findings in relation to each presence

Community of inquiry presences	Example of activities associated with each presence
Teaching presence	1) Presented the course outline, the purpose and focus of the module, assessments and time frames for activities. 2) Discussed the lecturer and students' expectations. 3) Presented the research project focus area: *You will look at the impact of the COVID-19 pandemic on the teaching profession within your school/subject cluster. The final outcome for this module is a research report of your project.* 4) Discussed students' areas of interest and possible focus areas. 5) Presented content. 6) Gave feedback on tasks. 7) Prepared support material: Audio recorded PowerPoint for academic literacy and research design and methodology. 8) Facilitated student presentations.
Social presence	1) Used various features on the platform (e.g., Zoom, WhatsApp, emails). 2) Welcomed with ice breaker: Students watched YouTube video (https://youtu.be/8L9aZsgMcGk) on the new normal (Taylor, 2020). 3) Discussed the lecturer and students' expectations. 4) Group discussion of areas of interest and possible titles within the focus areas. 5) Incorporated audio, and videos with the course outline content. 6) Shared Zoom recordings after each session. 7) Sent messages of support through emails and WhatsApp group. 8) Online class discussion took place.
Cognitive presence	1) Used group discussion to brainstorm on the title of the research, students were given questions: What are you trying to do? Why? And with whom? 2) Identified research title, purpose, research focus, and rationale and research questions. 3) Orally presented research proposal findings. 4) Exposed students to step-by-step research processes and application of knowledge. 5) Provided detailed feedback. 6) Developed additional content to enhance understanding of research process. PowerPoint with audio.

The activities shown in Table 2 not only enriched the educational content but the activities (such as three presentations) fostered a sense of community and engagement among students, which are critical elements of successful online instruction. The findings in Table 2 do not show evidence of how Moodle LMS was used. However, the plan for online sessions of the research module in 2022 (see Table 1) indicated Moodle LMS was going to be used. Moodle LMS is a formal university platform with various services designed to assist lecturers in the management of their lectures and modules. This is a requirement of the teaching and learning policies of the institution where I was employed. The reason for not using Moodle LMS could be a lack of technological knowledge or the structure of the course materials which were delivered and accessed. This limited students' access to educational resources. These findings support the assertion by Saleem et al. (2022) that the quality of the online educational process depends on the level of training and knowledge that the lecturers have in using technology. These findings highlight the crucial role of an institution and the policy, which is unclear in CoI presences. Hence, refinement of the CoI framework is needed. This could be done by adding the "institutional and policy presence focusing on staff development, provision of online-related resources, and ensuring a conducive environment in pursuit of inspiring and enabling both staff and students to participate in impactful research" (Dongwe & Zulu, 2022:142).

To what Extent do Students Experience Teaching, Social and Cognitive Presences in Online Teaching and Learning via the Research Module?
Teaching presence

The teaching presence involves everything the lecturer does – from course design and organisation to facilitation, guiding, discussion and instruction (Carrillo & Flores, 2020). Hence, in the CoI survey questionnaire, the 13 questions are about what the instructor (lecturer) does in relation to instructional management, building understanding and direct instruction. Table 1 provides a summary of the topics, tasks and how

the teaching and supervision of the research module took place online. As mentioned earlier in this section, the questions on teaching presence were based on the lecturer's actions. The average of each question indicates the participants' perception of the lecturer's actions. Table 3 shows the participants' responses regarding teaching presence.

Table 3 Students' responses on teaching presence and average scores for 13 questions

Teaching presence responses of students on 13 questions according to Likert scales	P1	P2	P3	P4	P5	P6	P7	P8	P9	Total	Average
1) The instructor clearly communicated important course topics.	4	4	4	5	5	4	5	5	5	41	4.6
2) The instructor clearly communicated important course goals.	4	5	4	5	5	4	5	5	5	42	4.7
3) The instructor provided clear instructions on how to participate in course learning activities.	5	4	5	5	5	4	5	5	5	43	4.8
4) The instructor clearly communicated important due dates/time frames for learning activities.	4	5	5	4	5	4	5	5	5	42	4.7
5) The instructor was helpful in identifying areas of agreement and disagreement on course topics in a way that helped me to learn.	5	5	5	5	4	4	5	5	5	43	4.8
6) The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	5	5	5	5	5	4	5	5	5	44	4.9
7) The instructor helped to keep course participants engaged and participating in productive dialogue.	4	4	5	5	5	4	5	5	5	42	4.7
8) The instructor helped keep the course participants on a task in a way that helped me to learn.	5	5	4	5	5	4	5	5	5	43	4.8
9) The instructor encouraged course participants to explore new concepts in this course.	5	4	5	5	4	4	5	5	5	42	4.7
10) Instructor actions reinforced the development of a sense of community among course participants.	5	4	5	5	4	4	5	5	5	42	4.7
11) The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	4	5	5	5	5	4	5	5	5	43	4.8
12) The instructor provided feedback that helped me understand my strengths and weaknesses.	5	5	5	5	5	4	5	5	5	44	4.9
13) The instructor provided feedback in a timely fashion.	4	5	5	5	5	4	5	5	5	43	4.8
Total for Likert scale on each question	59	60	62	64	62	52	65	65	65	554	61.6

The average score of question (q)1 is 4.6, implying that the participants experienced high teaching presence in relation to the communication about the important course topics. A group of questions: q2, q4, q7, q9 and q10 have the same higher average score of 4.7, which implies that participants experienced clear communication on course goals and time frames for activities. Additionally, the higher average scores indicate that the participants, during the exploration of new concepts they engaged in, had productive dialogue, and the sense of community among the participants was reinforced effectively. The qualitative data generated through students' reflections seem to correlate with the higher score average. For example, P7 reflected as follows: "*When we presented our topics through online learning, it was fruitful as she allowed us to discuss and critique each one of us' topic in a respectful manner.*"

Question 3, q5, q8 and q13 shared the same average score of 4.8, which shows that my presence was slightly higher in keeping the participants on task to help them to learn. In relation to knowledge construction, the reflections of the eight participants indicate that they have learnt how to write the literature review, theoretical and conceptual frameworks and apply academic writing. P1 reflected about the literature review and theoretical framework: "*I learnt that it is from the framework chosen and literature review that enable one to develop and sustain the argument.*"

P4 commented about the writing: "*The academic writing materials suggested and offered through the writing process has been extremely useful with guidance of writing each chapter.*"

The two questions, q6 and q12, with the highest score of 4.9 suggest that I was helpful in guiding the class towards understanding the course topics and provided feedback that helped participants to understand their strengths and areas of development. The results suggest that the participants were actively engaged in critical thinking and problem-solving throughout their online learning experience. The higher averages in certain questions suggest strengths while the slightly lower averages provide insight of potential areas for improvements.

Social presence
Social presence is an important element of the online education experience, which mediates between the teaching and cognitive presences. According to Carlon (2020), social presence features the expression of emotion in response to teaching and learning experiences, open communication and group cohesion. Table 4 shows the response of students and average scores for nine questions based on social presence.

Table 4 Students' responses on social presence and average scores for nine questions

Social presence (response of participants) Likert scales 1–5	P1	P2	P3	P4	P5	P6	P7	P8	P9	Total	Average
14) Getting to know other course participants gave me a sense of belonging in the course.	5	4	5	5	5	4	5	5	4	42	4.7
15) I was able to form distinct impressions (ideas, feelings, or opinions) of some course participants.	4	4	5	5	4	5	4	5	4	40	4.4
16) Online discussions are an excellent tool for social interaction.	2	5	1	4	4	5	3	5	3	32	3.6
17) I felt comfortable conversing through the online medium.	3	5	5	5	4	5	4	5	3	39	4.3
18) I felt comfortable participating in the course discussions.	3	4	5	5	4	5	5	5	4	40	4.4
19) I felt comfortable interacting with other course participants.	4	4	4	5	4	5	5	5	4	40	4.4
20) I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	4	4	3	5	3	5	5	5	4	38	4.2
21) I felt that my point of view was acknowledged by other course participants.	4	4	5	5	4	5	4	5	4	40	4.4
22) Online and class discussions help me to develop a sense of collaboration.	5	5	4	5	5	5	4	5	3	41	4.6
Total for Likert scale on each question	34	39	37	44	37	44	39	45	33	352	39.1

Table 4 shows that the average scores of the nine questions ranged from 3.6 to 4.7. The lowest average score was 3.6 in q16 on online discussion and social interaction. P1 rated 2 (disagree) for this question while P3 rated this question at 1 (strongly disagree). The lower rating from these two participants could suggest that they experienced challenges regarding social interaction in online discussions during the Zoom sessions. While P3 chose not to reflect on the module, P1's reflection did not have any specific comments on challenges with online interaction but he commented about his challenges as a teacher:

> The project took its tall to me because I had a lot in my plate in terms of work, extra classes, extra-curricular. Being a lead teacher also hampered my progress in terms of completing my IRP before the stipulated time.

While q20 shows an average score of 4.2, two participants (P3 & P5) scored 3 (neutral). The scores of these two participants seem to suggest that they did not feel comfortable in disagreeing with other course participants while still maintaining a sense of trust. The average for Q17 was 4.3, a slightly higher scoring, and the group of questions q15, q18, q19 and q21 had a slightly higher average of 4.4. These three questions are based on online conversations and participation in the course discussion and suggest that participants had a positive experience with online conversations and participation. The average score of q22 was 4.6 even though P9 was neutral (3) in her response about online class discussion. She could not say whether it helped her to develop a sense of collaboration. Moreover, in her reflections she did not comment about online collaboration. The highest average score on the social presence was 4.7 (q14) indicating that most participants felt that getting to know other participants provided them with a sense of belonging. The reflections show that some participants found value in using online discussion. For example, P7 stated as follows:

> I professionally learnt how to respect others and myself as well. I also learnt to listen to others' ideas and reflect whether they could address my problems as well. The results show that some participants experienced moderate levels of social presence while other participants experienced relatively high levels of social presence.

Therefore, the results indicate that the participants experienced varying levels of social presence in the online environment.

Cognitive presence
Cognitive presence involves the construction of knowledge through constant communication in a CoI. Table 5 shows the responses of participants and the average scores for cognitive presence measured using 12 questions (q23–q34).

Table 5 Students' responses on cognitive presence and average scores for 12 questions

Cognitive presence: Response of students on 12 questions according to Likert scales	P1	P2	P3	P4	P5	P6	P7	P8	P9	Total	Average
23) Course problems and activities increased my interest in course issues.	5	4	2	5	4	5	5	5	5	40	4.4
24) Course activities piqued my curiosity.	4	4	2	5	4	4	5	4	4	36	4.0
25) I felt motivated to explore content-related questions.	4	4	2	5	5	4	5	4	5	38	4.2
26) I utilised a variety of information sources to explore problems posed in this course.	5	5	2	5	5	4	4	5	5	40	4.4
27) Brainstorming and finding relevant information helped me resolve content-related questions.	5	5	3	5	4	5	4	5	5	41	4.5
28) Online discussions were valuable in helping me appreciate different perspectives.	5	5	2	5	4	5	5	5	4	40	4.4
29) Applying new information helped me answer questions raised in course activities.	5	4	2	5	5	5	5	5	5	41	4.5
30) Learning activities helped me construct explanations/solutions.	4	5	2	5	5	5	4	4	5	39	4.3
31) Reflection on course content and discussions helped me understand fundamental concepts in this class.	5	5	2	5	4	5	4	4	5	39	4.3
32) I can describe ways to test and apply the knowledge created in this course.	4	5	3	5	4	5	5	5	5	41	4.6
33) I have developed solutions to course problems that can be applied in practice.	5	5	2	5	4	5	4	5	5	40	4.4
34) I can apply the knowledge created in this course to my work or other non-class-related activities.	5	5	1	5	5	5	5	5	5	41	4.6
Total for Likert scale on each question	56	56	25	60	53	57	55	56	58	476	52.9

Table 5 shows that the average scores for cognitive presence ranged from 4.0 to 4.6 across all questions. The lowest average score of 4 was for q24 on course activities which asked whether the activities piqued participants' curiosity. From P1's reflection it seems as though the IRP course activities piqued his curiosity:

> The journey was not smooth sailing during data collection I had a lot of challenges with my participants who would cancel the interview meeting 30 minutes prior and I had to reset another time of the interview and that was really difficult and it hampered my progress. Sometimes I even considered to change my data collection strategies, however that was not possible looking at the time frame given to complete the project.

Q24 is related to q23 but the average score of q23 was 4.4, implying that the participants exhibited a high level of cognitive presence in relation to course problems and activities that increased their interest in the IRP module. The eight participants raised academic writing as a course problem but after several academic scaffolding activities they had improved. For example, P4 said: "*The academic materials suggested and offered through the writing process has been extremely useful with guidance on writing each chapter.*"

Similarly, q23, q26, q28 had an average score of 4.4. Q25, with an average score of 4.2, was slightly higher showing that participants were motivated to explore the module content. Two questions had average scores higher than q25. These were q30 and q31, with an average score of 4.3, showing that the participants found learning activities helpful to construct explanations. The higher average score of q27, 4.5, suggests that the participant found brainstorming and finding relevant information helpful to resolve content-related issues. Similarly, q29 had an average score of 4.5, suggesting that participants experienced a higher level on the application of new information to respond to the IRP activities. Responding to IRP activities, P9 reflected as follows:

> I had no idea that every study conducted needs to be guided by either a theoretical or conceptual framework, I learnt that it is from the framework chosen and literature review completed that one is able to develop and sustain their argument. In addition, on the aspect of research methodology it was surprising that each and every element that compromises of the methodology requires literature, as a result I learnt that everything written down or developed has literature or theory supporting it.

The highest average score on cognitive presence was 4.6 in q32 and q34. These two questions are both about the application of knowledge created in the module in practice, work or in other non-class-related activities. Application of knowledge was evident from P5's reflection:

> From the research proposal every part of the research proposal went well, the very difficult part for me was the literature review, but through presentations of my colleagues and supervisor's comment, I have learned how to develop my literature review and final research report.

While the eight participants scored 4 to 5 across all 12 questions, P3 scored 3 in q27 and q32, 2, in nine questions and 1 in q34. This suggests that P3 had a relatively lower level of cognitive presence compared to other participants. The results suggest that the participants were actively engaged in critical thinking and problem-solving throughout their online learning experience.

The findings of this study were presented at the Global trends in management, IT, and governance in an e-world conference in 2023. At the conference it was recommended that emotional presence should be attended to on its own, despite currently being included within the social presence construct of the CoI framework. This recommendation aligns with the need to more accurately capture and enhance the emotional engagement of learners in online education. This is supported by Kozan and Caskurlu (2018) who say that emotional presence, as the outward expression of emotion, affect, and feeling in a CoI, plays a crucial role in how individuals interact with learning technology, course content, students, and instructors. The incorporation of feedback from the conference further refined the approach, specifically by considering the distinct role of emotional presence in fostering a supportive and motivating online community.

Conclusion
In the initial DBR phase, I conducted an autoethnography to assess the emergence of CoI presences during the sudden transition to online teaching amid disruptions. Subsequently, the findings from the autoethnography informed the second where a comprehensive literature review on the application of the CoI framework in designing and evaluating online and blended teaching and learning was conducted. Phase three, of this study, was initiated in 2022 and involved the practical implementation of the CoI framework to enhance the quality of online teaching in the research module. I employed quantitative and qualitative data to understand the extent to which students experienced teaching, social and cognitive presences in the online teaching and learning of the research module. The qualitative data from the students' reflections played a crucial role in enhancing the understanding and interpretation of the quantitative data. The findings reveal that the lecturer's use of diverse instructional strategies resulted in students experiencing a higher level of teaching presence, a varied range of social presence, and a high level of cognitive presence. The high levels of cognitive and teaching presences could suggest the enhancement of online teaching and learning within the research module.

However, my inability to use Moodle LMS impacted on the quality in relation to the utilisation of the resource, potentially limiting the variety and quality of educational resources available to students. The sample in this study was limited to nine participants but future research could use the CoI survey to investigate students' perspectives of teaching, social and cognitive presences in the context of online learning in big classes.

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Notes

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