# Teaching, social, and cognitive presences and their relations to students' characteristics and academic performance in blended learning courses in a Tanzanian University

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This study examines teaching, social, and cognitive presences in relation to students' academic performance in blended learning courses in a Tanzanian university. The study involved 353 students and examined several aspects of blended learning including face-to-face lectures, online and offline group assignments, online feedback, discussions, and online messaging via Moodle. A community of inquiry survey was used to measure students' perceptions of teaching, social, and cognitive presences. Performance scores consisted of students' coursework and final examination grades. The results showed no statistically significant differences in the reported scores of teaching, cognitive, and social presences based on gender and age groups. Students with more advanced ICT skills reported higher teaching, social, and cognitive presences. Reported teaching presence was significantly different among the blended learning courses. Teaching, social, and cognitive presences showed a positive correlation with each other. The conclusion shows that although positively correlated, social and cognitive presences were not predictors of students' performance; however, ICT skills were important in the studied courses.

Key words: teaching presence, social presence, cognitive presence, academic performance, blended learning

## 1. Introduction

   Although blended learning in higher education is increasingly regarded as a "new normal" in developed countries (where technology is regarded as a part of everyday life), it is still new in developing countries (Norberg, Dziuban, & Moskal, 2011). Many studies on blended learning have been carried out, yet there is still a lack of widespread consensus in the operational definition of the term (Graham, 2013). Graham (2006) defines it as a combination of traditional face-to-face instruction and online learning. In this study, blended learning is defined as a pedagogical approach that combines face-to-face

learning, and online instruction and learning activities. The study views blended learning as a fundamental redesign of the instructional model with two basic characteristics: (1) a shift away from teacher centred preaching methods (Zhu, DePryck, Sesabo, & Zhang, 2014); and (2), emphasis on increased interaction between student-instructor, student-student, student-content, and student-outside resources (Dziuban, Hartman, & Moskal, 2004).

Blended learning ushers in a shift from teaching to learning, with instructors' roles changing from information transmitters to facilitators (Norberg *et al.*, 2011). It offers students the opportunity to learn from the best of both traditional face-to-face classroom practices and online sessions via means such as learning management systems (LMSs), social media, smartphones, and digital devices. Students can also learn at their own pace and in their own time.

In their study, Vo, Zhu and Diep (2017) find that blended learning is associated with improved performance among students in disciplines such as science, engineering and mathematics compared to their counterparts in traditional classrooms. Also, Owston and York (2018) find that students tend to prefer blended learning to traditional classes. The same study finds that students in the high and medium blends perform significantly better than students in the low and supplemental blends.

However, some researchers such as Amro, Mundy and Kupczynski (2015) argue that while blended learning provides convenience to learners, student performance should be the primary concern. This is true in the sense that the very purpose of an educational experience, be it online, face-to-face or blended learning, is to structure the educational experience to achieve the intended learning outcomes (Garrison & Cleveland-Innes, 2005).

This study examines blended learning through the community of inquiry (CoI) theoretical framework. The overall purpose of the study is to examine students' rating of their teaching, cognitive, and social presences and its association with students' characteristics and academic performance in blended learning. The term "presence" is defined by Picciano (2002) as a "student's sense of being in and belonging in a course and the ability to interact with other students and an instructor although physical contact is not available" (p. 20). Moreover, Morgan (2011) argues that "presence" suggests that participation or non-participation of the instructor serves to influence the CoI. Nevertheless, Picciano's (2002) definition is based on an online setting, and is defined from the student point of view; it excludes other forms of presence such as cognitive presence and teaching presence. Building on Picciano's definition, presence can be expanded as follows: presence refers to students' and instructors' sense of belonging, participating in a blended learning course, their ability to interact with each other (student and instructor, student and student) and the course content in a way that brings about effective learning for the student. This interaction occurs in both online and offline settings.

However, interaction does not mean presence; as Picciano (2002) argues, "interaction may indicate presence but it is also possible for a student to interact by posting a message on an electronic bulletin board while not necessarily feeling that she or he is a part of a group or a class" (p. 20). Furthermore, Garrison and Cleveland-Innes (2005)

stress that even though interaction is necessary for blended learning, it is not the equivalent of critical discourse; nor is it sufficient for sustaining a CoI. This means that interaction and presence are both important for learning in blended learning communities. This is because it is through such interaction that ideas are communicated and knowledge is constructed (Garrison *et al.*, 2001). The CoI has three components: social presence, cognitive presence, and teaching presence (Garrison, 2013). Each of the presences reflects categories and indicators that operationalise the elements used to study and design the teaching and learning transaction (Garrison, 2013).

The term teaching presence refers to the design and organisation, facilitation and direct instruction functions of the educational experience (Garrison, Anderson, & Archer 2000). Teaching presence (facilitation) is not the sole responsibility of the instructor; the student and other teachers are also said to be part of the teaching presence (Garrison *et al.*, 2000). Teaching presence establishes curriculum content, learning activities and timeline, and monitors and manages purposeful collaboration and reflection. Teaching presence also identifies the needs of the learners and provides information and direction to the learners to optimise the intended learning outcomes (Garrison, Cleveland-Innes, & Fung, 2010).

Social presence is a mediating variable between teaching presence and cognitive presence and relates to the environmental conditions for higher learning (Vaughan, Garrison, & Cleveland- Innes, 2013). It also involves a high level of student engagement, peer support and sense-making (Armellini & De Stefani 2015).

Cognitive presence is the content related interaction that explains blended learning collaboration and supports the way meaning is constructed (Garrison & Arbaugh, 2007). It deals with learning and inquiry (Garrison, Anderson, & Archer, 2001). Garrison, Anderson and Archer (2000) define it as the extent to which learners can construct and confirm meaning through sustained reflection and discourse within the CoI. It consists of four elements: triggering event, exploration, integration and resolution (Garrison *et al.*, 2000). The construct has been associated with perceived and actual learning outcomes (Akyol & Garrison, 2011).

Most studies on teaching, cognitive, and social presences and student performance have been based on subjective measurements such as students' self-report of perceived learning as a means of measuring student learning outcomes (Garrison, 2013) in the developed world. This study focuses on students' perceived teaching, cognitive, and social presences in blended learning and their relationships with students' characteristics and academic performance in the Tanzanian context.

### 1.1. Blended learning at Mzumbe University

Mzumbe University's strategic plan emphasises creating and utilising a digital environment for learning, research and administration to achieve its strategic objectives. The plan stipulates that by 2017, learning materials of all courses should be available through virtual and online learning. In so doing, the university has renovated computer labs and increased Internet connectivity and bandwidth. Furthermore, to enhance stu-

dents' learn ing, the university adopted new teaching technologies by deploying the LMS Moodle in 2009. The aim was to supplement the existing face-to-face learning.

The Moodle e-learning platform is equipped with features such as uploading and sharing documents, creating content online in HTML, online discussions, grade discussions/participation, online chat, student peer review, online assignment/quizzes/survey, online grade books and student submission of documents. Other features include self-assessment of assignments, student group work, student journals and embedded glossary. However, the use of the system faces several challenges. According to 2014, 2015 and 2016 Mzumbe e-learning utilisation reports , only a few features are being utilized. Most instructors use the system for uploading learning materials, monitoring students' online discussion, posting assessment and feedback, and posting group work. This limited use is due to a lack of knowledge that would allow users to master other features. Interestingly, on the part of students, a number of students have tried to access various courses on the system.

### 1.2. Theoretical background

The CoI framework guides this study. The concept of CoI owes its origin to the American philosopher, John Dewey, who believed that educational experience must combine the interest of the individual and society (Swan, Garrison, & Richardson, 2009). The concept of inquiry defines the relationship between thought and action, and it is based on the notion of individual responsibility and collaboration. The CoI is a form of pedagogy that emphasises thinking for oneself and with others; thus, the main business of a CoI is critical dialogue (Kennedy, 2004).

In higher education, a CoI arises from the notion that higher education is based on the opportunities for learners to construct meaning and confirm understanding through discourse (Garrison & Vaughan, 2008). This notion is based on the need for transformation in higher education. This transformation can only be sustained with a clear understanding of the nature of the educational process and intended learning outcomes (Garrison & Vaughan, 2008). The CoI views higher education learning as a constructivist collaborative learning process (Garrison *et al.*, 2001:92), in which students learn through the interplay of three basic elements: teaching, social, and cognitive presences (Garrison & Anderson, 2003). The framework is a means to study educational interaction – be it online, blended or face-to-face environments.

In this light, the CoI is a dynamic process model designed to define, describe and measure elements supporting the development of online and blended learning communities (Swan & Ice, 2010). It is the conceptual model that is used for exploring and measuring the quality of instruction (Garrison, 2013). There is disagreement as to which element of the model is the most important. While some favour cognitive presence (Garrison, 2013), others refer to teaching presence. In simple terms, the CoI is made up of students, content and instructors (Morgan, 2011). The components of the CoI have been variously studied. In a study involving language teachers in Uruguay, Armellini and De Stefani (2016) find that social presence is core to the teaching and cognitive presence

discourse. The author's further state that both teaching presence and cognitive presence "became social"; thus suggesting a new model of the CoI in which social presence is central to higher order thinking.

However, the generalisability of the CoI has been questioned. Morgan (2011), for instance, argues that the CoI is developed on distance education, and therefore it does not take into consideration the complexities of communities' global and local contexts such as multilingualism and agency, and what he calls identities negotiations. On this point, Graham, Henrie, and Gibbons (2014) argue that the CoI is the only model that is useful for describing relationships between and among variables in blended learning. The rest of the models can best bee seen in terms of categorising and designing blended learning.

Based on the CoI, there is an interdependence among the three elements, which in turn brings out the educational experience in blended learning. For instance, teaching presence will influence cognitive presence, and social presence will influence cognitive presence. However, the overlap does not have to be proportioned (Garrison & Vaughan, 2008). High rates of cognitive, social, and teaching presences are mentioned as indicators of the efficacy of course design (Kotze & Nagel, 2010). Some studies link student performance to the teaching, cognitive, and social presences in online and blended learning (Garrison, 2013; Quek & Choy, 2010; Vickers, Shea, & Hayes, 2010); however, the relationship and influence of these presences on the students' characteristics and their academic performance in newly challenging blended learning environments have not been examined at length. Therefore, the main research question of this study is how are teaching, social, and cognitive presences related to students' characteristics such as age, gender, ICT skills, and type of course and academic performance in blended learning courses in the Tanzanian context.

### 1.3. The context of the study

This study involved three blended learning undergraduate courses at Mzumbe University. The courses are taught over four months through face-to-face instruction and are supported by online learning through Moodle. For these blended learning courses, online delivery supplements several activities such as tests, provision of course syllabi, videos, study links, online discussions, coursework provision and feedback. Instructors chose when and how to blend courses, doing a number of test online sessions with the major portion of learning being done via face-to-face sessions. Students' examination scores, combining assignments are done online, individual as well as group presentations, group assignments and end of semester university examinations, are used as assessment tools. These courses are housed in the Department of Education in the Faculty of Social Sciences. The three blended learning courses include classroom practical teaching and interaction, phonetics and phonology, and comparative education. The students involved were in their third, second and first-year of a Bachelors of Education in various majors including Economics and Mathematics, Languages, Commerce and Accountancy.

*Classroom practical teaching and interaction* is a three-credit compulsory course offered to all first-year education students. The course introduces student teachers to the basic

concepts of classroom teaching skills when faced with handling class intervention for the first time. It prepares student teachers for effective teaching practice and helps them to deal with disciplinary issues that impinge upon effective teaching and learning.

*Phonetics and phonology* is a three-credit compulsory course for Bachelor of Education Languages second-year students. This course introduces students to the sound structures of human language and the principles of phonetics and phonological analysis. This includes understanding the nature of the sounds and the organisation of these sounds in forming other larger linguistic elements such as words/phrases and various theories in phonology and phonetics.

*Comparative Education* is a three-credit compulsory course for third year Bachelor of Education students, which aims to understand and compare different education systems in the world. The course introduces students to the global trends, issues and schooling practices in various educational systems around the world from a comparative perspective.

### 1.4. Research objective and research questions

The overall research objective is to examine whether the teaching, social, and cognitive presences reported by students are related to student performance in blended learning courses in a Tanzanian university. The three research questions are as follows:

1. Do the teaching, social, and cognitive presences reported by students predict student performance in blended learning courses at Mzumbe University?
2. Are students' background characteristics (age, gender, nature of the course and ICT skills) related to their reported social, cognitive, and teaching presences in blended learning courses at Mzumbe University?
3. How are teaching, social, and cognitive presences correlated in the blended learning courses at Mzumbe University?

## 2. Methods

### 2.1. Participants

This study involved first, second and third-year Bachelor of Education students taking courses offered in blended learning mode at Mzumbe University. The courses were selected from a list offered by the unit responsible for eLearning. A total of 353 students were involved, of which 192 (54.4%) were male, and 161 (45.6%) female. These were compulsory courses for students taking education programmes majoring in English and Kiswahili Languages, Economics and Mathematics, and Commerce and Accounting. The study questionnaire contained various background characteristics that students had to fill in. These included their age, gender, courses studied, degree programme, year of study and ICT skills. Regarding age, most students were between 22 and 34 years old (75.4%); those aged between 35-44 comprised 12.7% of the participants, 21 (9.9%) were younger than 22, and those aged between 45-54 made up 2%. Of the three courses, "Phonetics and Phonology" had 76 (21.5%) students, "Comparative Education" 118 (33.4%), and "Classroom Practical Teaching and Organisation" had 159 (45%) students. Based on

a personal rating of ICT skills, most students (263; 74.5%) reported being comfortable using computers, 41 (11.6%) reported being a novice (not comfortable in using computers), and 49 (13.9%) reported being advanced users. There were 159 (45%) first-year students, 76 (21.5%) second-year students, and 118 (33.4%) third-year students.

### 2.2. Data collection and data analysis

Data were collected from first, second and third-year education students involved in blended learning courses. The courses were selected based on the presence of discussion forums, online tests, uploaded videos, course contents and assignments online. Students were issued with the questionnaires in their class sessions with permission from their instructors. The first author managed the data collection. Students filled the questionnaire and returned to the first author after about 35 minutes. Some students opted to complete the questionnaires in their own time and returned them to their class supervisors or instructors. These questionnaires were later collected in person by the first author.

Before data collection, students were informed of the objectives of the study, their right to withdraw or continue with the study, confidentiality and anonymity. Student consent was obtained by asking students if they were willing to participate in the study before issuing questionnaires. All students who took part in the study voluntarily agreed to do so. The responsible course instructors gave permission. Data analysis began with principal component analysis (PCA) to confirm the structure of the CoI elements and their factor loadings. Student characteristics were analysed using the descriptive statistics to obtain the mean scores. Multiple regression was used to analyse student reported scores of the CoI presences and their associations with student performance. Both Kruskal-Wallis and Man-Whitney U tests were used to analyse the differences in the reported scores of teaching, cognitive, and social presences and student characteristics. The relationship between teaching, social, and cognitive presences was analysed using Spearman's correlation.

### 2.3. Instrument and measurement

A CoI survey (34 items) was used to measure teaching, social, and cognitive presences. The survey was adopted from Arbaugh *et al.* (2008). The CoI instrument has been validated and established as a reliable measurement for the three presences (Arbaugh, 2007; Arbaugh *et al.*, 2008; Yu & Richardson, 2015; Swan *et al.*, 2008). The survey was tested with 15 students; their responses were used to make some minor corrections and were later administered to the target students. Thirteen items measured teaching presence, nine items measured social presence, and twelve items measured cognitive presence. Teaching presence was composed of three elements: *course design* and *organisation, direct instruction* and *discourse facilitation*. Cognitive presence comprised four elements: *triggering event, exploration, integration* and *resolution*. Social presence included: *effective expression, open communication* and *group cohesion*.

The questionnaire had two main parts. The first part was student characteristics, which included respondents' age, gender, year of study, ICT skills and course of study.

The second measured the reported scores of the teaching, social, and cognitive presences; students were required to respond to the questionnaire by indicating whether they *strongly disagree*, *disagree*, *neutral*, *agree* or *strongly agree* with the 34 items of the survey. Regarding teaching presence, the items were such as "*the instructor communicated important course topics*". With regard to social presence, there were items such as "*getting to know other course participants gave me a sense of belonging in the course*". Regarding cognitive presence, there were items such as "*problems posed increased my interest in course issues*". Teaching, social, and cognitive presence variables were computed to give the scores that could be used as dependent variables. Student performance scores were obtained from their final exam sheets and recorded as raw numbers, e.g., 70 and 60 in the SPSS. The reported scores obtained from the CoI survey were also filled in the SPSS template prepared by the first author.

### 3. Findings

#### 3.1. Students' Performance

Student performance is the ultimate goal of education in learning (Tran, 2011). Students' performance in the three blended learning courses was measured using grade scores obtained from two tests and two assignments (coursework), and the final examination scores. The tests included an online multiple-choice test (15 marks) and an in-class test (10 marks). Of the two written assignments, which comprised 25 marks, one was a group assignment (mostly submitted online), and the other was an individual assignment. Students also obtained their scores by doing a group presentation. The scores of the two tests, group presentation and written assignments, made up 50% of the scores that were later combined with 50% of the university examination scores, which were done in class at the end of the semester. Therefore, final scores (coursework and university final examination scores) were used as a measure of student performance. The actual scores, e.g., 70, 65, were entered into the SPSS and analysed. The mean score of students' performance in the studied blended learning courses was 64.8, with the SD of 7.14 indicating that students performed better on average. Table 1 shows the descriptive statistics of dependent and independent variables.

| Dependent Variables | Mean | SD |
|---|---|---|
| Student performance | 64.8 | 7.14 |
| Teaching presence | 4.1 | .52 |
| Social presence | 3.9 | .55 |
| Cognitive presence | 4.1 | .56 |
| **Independent variables** | **Frequency** | **Percentage** |
| **Age** | | |
| 21 and under | 35 | 9.9 |
| 22-34 | 266 | 75.4 |
| 35-44 | 45 | 12.7 |
| 45-54 | 7 | 2.0 |
| Total | **353** | **100** |
| **Gender** | | |
| Male | 192 | 54.4 |
| Female | 161 | 45.6 |
| Total | **353** | **100** |
| **ICT skills** | | |
| Advanced | 49 | 13.9 |
| Intermediate | 263 | 74.5 |
| Novice | 41 | 11.6 |
| Total | **353** | **100** |
| **Course name** | | |
| Comparative education | 118 | 33.4 |
| Phonetics and phonology | 76 | 21.5 |
| Classroom practical | 159 | 45 |
| Total | **353** | **100** |

*Table 1: Descriptive results of the dependent and independent variables.*

### 3.2. Factor analysis

To reduce the observed correlated variables to a set of independent composite variables, and confirm the three subscale elements of the CoI survey, PCA was conducted. Kaiser-Meyer-Olkin (KMO) was run to establish sampling adequacy. The KMO results were .888, which was considered adequate. Bartlett's Test of Sphericity was significant. The principal component analysis confirmed the three substructures of the CoI survey. The initial Eigenvalue of teaching presence was 9.2, social presence was 2.5, and cognitive presence was 1.6. Teaching presence explained 27% of the variance, social presence explained 7.4%, while cognitive presence explained 4.9% of the variance. The total variance explained by the three presences was 39.5%. Teaching presence had a Cronbach al-

pha of .869, while social presence had a Cronbach alpha of .745 and cognitive presence had .784 Cronbach alpha. The scores of the Cronbach alpha for the three elements were above the .700 standard, which suggests a satisfactorily high internal consistency. The mean for teaching presence was 4.1 and an SD of .52, while social presence had a mean of 3.9 and SD of .55, and cognitive presence had a mean of 4.14 and SD was 56. This shows that the three elements had very close mean scores and were almost equally valued by the students.

### 3.3. Teaching, social and cognitive presences and students' performance

The first objective was to examine whether teaching, cognitive, and social presences predict students' performance in blended learning courses at Mzumbe University. To examine this prediction, a multiple regression analysis was conducted. The results of multiple regression showed that teaching, cognitive, and social presences were not significant predictors of students' performance in the studied blended learning courses. This was expressed by the data in which the p-value = .452. The $R^2$ of .008 indicated 0.8% of the predictive outcome, which was too small to warrant the supposed prediction. This unexpected finding could be explained by the newness of the blended learning approach undertaken by Tanzanian universities. Also, blended learning courses lack the high integration of online and offline activities seen in other blended learning courses, and also possibly by the mode of assessment, which relies less on collaborative assessments and more on traditional in-class examinations. Table 2 shows the results of multiple regression predicting performance from teaching presence, social presence and cognitive presence.

| Variable | Unstandardized B | Standardized Coefficients beta | t | sig |
|---|---|---|---|---|
| Teaching presence | -1.034 | .909 | -1.138 | .256 |
| Social presence | -.185 | .934 | -.198 | .843 |
| Cognitive presence | 1.413 | .970 | 1.457 | .146 |
| $R^2$ | .008 | F value | .880 | .452 |

Predictors: (Constant), cognitive presence, teaching presence, social presence. Dependent variable: Student performance.
Table 2: Results of multiple regression predicting performance from teaching presence, social presence and cognitive presence.

### 3.4. Student characteristics and social, cognitive, and teaching presences

As a second objective, the study examined students' background characteristics in relation to their reported teaching, social, and cognitive presences in blended learning. The results of the Man-Whitney U tests showed that there was no significant difference in their reported teaching, cognitive, and social presences among male and female students. However, based on mean rank scores, female students reported higher levels in teaching presence (mean rank = 176), while male students reported higher levels (mean rank = 160) in social presence. Moreover, male students reported a higher social presence with a mean rank of 176, while female students reported a lower social presence (mean

rank = 164). Also, in cognitive presence, male students also reported higher scores (mean rank = 177), and female students had lower scores (mean rank = 170) in cognitive presence. Age-wise, the results of the Kruskal-Wallis test showed there was no significant difference in their reported teaching, social, and cognitive presences in blended learning across the age groups.

Students were asked to rate their ICT skills based on how they perceived their skills as either high, intermediate or novice (not comfortable using computers). The Kruskal-Wallis test was used to determine whether students' reported teaching, social, and cognitive presences were the same as their rating of ICT skills. The results showed that there was a significant difference in the reported teaching, cognitive, and social presences across students based on their ICT skills. In teaching presence, the results were significant, $\gamma^2(2) = 7.85$, p = .020, with the mean scores of advanced ICT skills having higher teaching presence (198), intermediate (165), and novice (142). In social presence, students with advanced ICT skills reported higher scores (226); intermediates had 168 and novices had 122, which were significant, $\gamma^2(2) = 25.52$, p<.000. Meanwhile, in cognitive presence, those with advanced ICT skills had higher scores (218), intermediate (168), and novice (154), which were significant $\gamma^2(2) = 11.71$ p <.003. This means that students with advanced ICT skills reported high scores in teaching, social, and cognitive presences, although they performed low in academic scores, as indicated in other studies such as that of Almasi and Zhu (2017).

Again, a Kruskal-Wallis test was carried out to determine whether the teaching, social, and cognitive presences reported by students were different across blended learning courses. The findings showed that there was a significant difference in teaching presence among the three blended learning courses ($\gamma^2(2) = 24.58$, p<.000) with phonetics and phonology having a high mean rank (205), followed by classroom practical teaching and organisation (173) and comparative education (135). However, there was no significant difference in social and cognitive presences in the three courses, suggesting that the instructor in phonetics and phonology exerted higher teaching presence than instructors on the comparative education and classroom practical teaching courses.

### 3.5. The relationship between teaching, social, and cognitive presences in the blended learning courses

Spearman's correlation analysis was used to address the relationship between teaching, cognitive, and social presences. The results of the Spearman's correlation show that there was a positive statistically significant correlation between teaching presence, social presence and cognitive presence in blended learning courses (p<.0.01), indicating that students on the sampled blended learning courses who reported teaching presences were also likely to report about social and cognitive presences. The results suggest that CoI exists in blended learning courses offered at Mzumbe University. Table 3 shows the relationship between teaching presence, social presence and cognitive presence in the studied blended learning courses at Mzumbe University.

| Variables | teaching presence | social presence | cognitive presence |
|---|---|---|---|
| Teaching presence | – | | |
| Social presence | .452** | – | |
| Cognitive presence | .548** | 574** | – |

*\*\*p<.0.0*

*Table 3: Relationship between teaching presence, social presence and cognitive presence in blended learning courses.*

## 4. Discussion of the findings

Theoretically, teaching, cognitive, and social presences are thought to influence students' performance (Beaudoin, 2001; Shea *et al.*, 2011). This study found that teaching, cognitive, and social presences do not predict students' performance in blended learning courses. This finding is contrasts to those in other studies such as Akyol and Garrison (2008) and Swan and Shih (2005). However, in Akyol and Garrison (2008), only teaching and cognitive presence related to perceived learning; furthermore, Swan and Shih (2005) find that students who perceived high social presence in the online discussions also believed they learned better.

This finding is explained due to the new nature of the blended learning, which is based on the face-to-face instruction supplemented by Moodle. There is a lack of integration of the online and offline learning activities. Other studies show that the relationships between actual measures of interaction and student performance provide mixed and inconsistent results depending upon the measures used (Picciano, 2002). Choy and Quek (2016) argue that a mere combination of online aspects and face-to-face instructional techniques do not guarantee a quality of learning outcome. Furthermore, students' sense of social presence was inversely related to actual objective examination results but was significantly related to the written assignment, because objective examinations results are an asocial impersonal activity (Picciano, 2002). The absence of the link between the presences and students' actual outcome has also been associated with a lack of clear instructions, prompt feedback and lack of coherent design (Choy & Quek, 2016; Garrison *et al.*, 2003).

The nature of students' assessment in blended learning courses has been cited as one of the reasons for the lack of the link between students' teaching, cognitive, and social scores and their learning outcomes. According to Choy and Quek (2016), it might not be adequate to solely rely on examination scores as the measure of students' performance. In the blended learning courses studied, students did not have many collaborative and peer-reviewed activities, which are more engaging; the courses were mostly designed with an instructor centred approach, with little attention to collaborative learning. However, similar to our study, Horzum (2015) finds that social presence does not have a direct effect on learning outcomes.

The findings report no gender difference in teaching, cognitive, and social presences among students implying that gender identity across the group categories has no bearing on student learning in the studied BL courses. Previous studies such as those of

Shea, Li and Pickett (2006), Kim, Kwon and Cho (2011) and Horzum (2015) also find no gender differences in the CoI elements. In contrast, Shea and Bidjerano (2009) find gender differences in teaching and social presences. Reasons such as the nature of blending, whether the courses are fully online, blended learning or eLearning based tend to influence the findings.

In terms of age, there was no significant difference in teaching, social, and cognitive presences across the age groups. This shows that age is not an important variable in the studied blended learning courses. Contrary to the findings of this study, Gibson, Ice, Mitchell and Kupczynski (2012) find that the age of traditional students is significantly related to CoI presence. Nevertheless, Choy and Quek (2016) find that age is negatively associated with cognitive presence, continuous achievement and academic achievement.

 Further, ICT skills have been noted as an important variable in blended learning courses. Our study found that there was a significant difference in the teaching, cognitive, and social presences across students' rating of ICT skills. Moreover, students with advanced ICT skills reported higher teaching, social, and cognitive presences than those with intermediate or low-level ICT skills. There is no other study that has related students' ICT skills and their perception of teaching, cognitive, and social presences. However, in a similar study, that of Almasi and Zhu (2017), students with high ICT skills performed poorly in academic scores compared to their counterparts with low or intermediate ICT skills.

Further, this study finds a significant difference in students' reporting of their teaching presence among the three blended learning courses, but not in their reported social and cognitive presences. This means instructors exerted different levels of teaching presence. However, Horzum (2015) also finds no significant difference between the teaching, cognitive, and social presences according to departments. In contrast, Garrison *et al.* (2010) find the relationship between the programme and cognitive presence as statistically significant in humanity and social sciences. In the same study, social and teaching presences were not related to academic performance (Garrison *et al.*, 2010).

The study examined the correlations between the teaching, cognitive, and social presences in the blended learning courses. In line with the CoI model in Garrison *et al.* (2010), the findings show that there is a significant relationship between teaching, cognitive, and social presences. This implies that students in the blended learning courses who reported teaching presences were also likely to report on social and cognitive presences in the same blended learning courses. Similar findings are made by Quek and Choy (2016) in Singapore. Akyol and Garrison (2008) find a significant positive relationship between teaching presence and cognitive presence. Garrison *et al.* (2010) find that student perceptions of teaching presence predict a significant direct effect on perceptions of cognitive presence. In their study, Gutiérrez-Santiuste, Rodríguez-Sabiote and Gallego-Arrufat (2015) find the highest correlations between social and cognitive presence, and between cognitive and teaching presence. All these studies confirm the interrelationship and interdependence of the CoI elements that were found to exist in the blended learning courses we studied, thus warranting the existence of the CoI.

## 5. Conclusion, implications and limitations of the study

This study investigated teaching, cognitive, and social presences and their relationship with students' characteristics and academic performance in blended learning courses at a university in Tanzania. Based on the study findings, the following conclusions can be drawn.

First, despite high levels of reported teaching, cognitive, and social presences, the three elements were not predictors of students' performance. Possible reasons for this are the fact that the blended learning courses were based on content designed for traditional face-to-face learning and that they have few collaborative assignments set up within the CoI framework. Based on this important finding, there is a need to redesign courses in accordance with the CoI framework to enhance effective student interactions and learning.

Second, students' ICT skills are crucial elements in influencing students' reporting of their teaching, social, and cognitive presences. This is because students with advanced ICT skills tend to report high teaching, social, and cognitive elements compared to other groups. However, instructors exert distinct levels of teaching presence, but students report similar levels of social and cognitive presences. This may be because teaching presence is dependent on what instructors do, while the learners themselves mostly experience cognitive and social presences.

Third, the existence of a statistically significant correlation between teaching, social, and cognitive presences in the blended learning courses studied indicate that the CoI framework is applicable in the settings. However, the framework is limited in terms of explaining the link between the CoI presences and students' learning outcomes due to poor course design and organisation not being framed in the CoI structure.

Nevertheless, our study is limited in the following ways. Firstly, the study was based on students' survey of teaching, cognitive, and social presences, thus limiting the study to the drawbacks of survey-based research. Future research needs to involve a qualitative study to examine students' conceptions of teaching, social, and cognitive presences. Secondly, our study employed a cross-sectional design with the data collection being conducted across the courses, thus limiting its ability to establish causal relationships among the teaching, cognitive, and social presences and students' learning outcomes. Future research may involve longitudinal experimental studies that may help to establish the causal relationships among the variables. There is also a need to examine the nature of feedback and types of activities provided on both face-to-face and online sessions.

This study contributes to the empirical evidence of the existence of the CoI framework in the blended learning courses in the Tanzanian context where blended learning is still emerging. Despite the presence of the CoI, however, an important contribtion of this study is the finding that teaching, social and cognitive presences do not neccesairly predict students' performance in all blended courses. This means, the nature of blended learning and the context are important variables in the prediction of students' performance.

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