Validity Testing of the Community of Inquiry (CoI) Survey as a Tool for Student Evaluation of Teaching and Learning in a Fully Online Philippine University

Roja Rivera[1] & Rita Ramos[2]

[1]Assistant Professor, UP Open University, Philippines, roja.rivera@upou.edu.ph
[2]Associate Professor, UP Open University, Philippines, rita.ramos@upou.edu.ph

Abstract

A Student Evaluation of Teaching (SET) is essential in any system of education. Not only does it provide vital information and feedback to enhance student learning outcomes, and thus, functioning as quality control and tool for teaching improvement (Holi Ali & Al Ajmi, 2013; Wright & Jenkins-Guarnieri, 2012), but it also serves as a platform for sharing of students' experiences in their courses (Golding & Adam, 2016) while providing empirical evidence for faculty tenure and promotion. This study examined the validity of the Community of Inquiry (COI) Survey as a SET in a fully online university in the Philippines. A questionnaire incorporating the COI Survey was pilot tested among all students in the university who were enrolled in the first term of AY 2018-2019. The pilot testing and validation methods resulted in a four-factor, 31-item COI Survey that has mediocre to acceptable goodness of fit.

***Keywords**: Community of Inquiry, Community of Inquiry Survey, Student Evaluation of Teaching, Open and Distance Learning*

Introduction

A Student Evaluation of Teaching (SET) is essential in any education system. It not only provides vital information and feedback to enhance student learning outcomes - functioning as quality control and tool for teaching improvement (Holi Ali & Al Ajmi, 2013; Wright & Jenkins-Guarnieri, 2012), but it also serves as a venue for students to share their experiences (Golding & Adam, 2016), while at the same time providing empirical evidence for faculty tenure and promotion.

However, Barrie, Ginns, and Symons (2008) noted in their review of Australian SET systems that most university-developed evaluations of teaching instruments have a weak formal theoretical and psychometric rigor, which defeats the purpose of having a SET. Nonetheless, the use of a teaching evaluation tool for students in academic institutions, whether it be on an on-site campus or online distance learning, has remained significant.

Previous studies, however, have shown that conventional face-to-face student evaluation instruments do not sufficiently capture the nuances and distinct

characteristics of online teaching and learning, which embraces a more constructivist approach (Bangert, 2008; Berk, 2013; Ravenscroft et al., 2017). Although online and face-to-face forms of education share common functional characteristics with online learning, the two may differ in their pedagogical, communication, and structural approaches (Drouin, 2012).

The advancements in information communication and digital technologies in recent years have revolutionized teaching and learning and have propelled the growth and expansion of open and distance learning (ODL). The online learning setting is expected to be an environment where "educators and learners create, shape and evolve knowledge together, deepening their skills and understanding as they go" (Open Society Institute, 2007), as emphasized in the Cape Town Open Education Declaration. Thus, educators in this educational context are impelled to transform their teaching practices into a more collaborative and constructivist approach.

Creasman (2012, p. 2) underscored the unique features of online learning that distinguish it from the traditional mode of teaching, namely: 1) asynchronous activity, where students can interact with each other and course materials anytime; 2) non-linear discussions on message boards or forums, where students can participate in multiple conversations simultaneously; 3) primarily written communication; 4) slower communication between instructor and students, mainly via e-mail; 5) greater social contact and time spent by instructor with students on course sites; 6) greater volume of information and resources available; 7) instructor's roles as a facilitator and also co-learner. These characteristics and the unique context of the university under study as a "single-mode distance institution within a conventional or campus-based university system" (Arinto, 2013a) that is fully online and adheres to the open education principle, distinguish it from the other conventional brick-and-mortar academic institutions in the Philippines.

Hence, given ODL's different pedagogical emphasis and educational construct and framework of ODL, the student evaluation instruments used in residential, face-to-face campuses may not sufficiently assess the distinct aspects of online teaching and learning that are brought by its distinct mode of instruction. It is, therefore, necessary and important that ODL institutions make use of student evaluation of teaching systems that are not only psychometrically sound, but most importantly are appropriate and aligned with their nature as distance education providers.

One of the tools being used to assess online teaching is the Community of Inquiry (COI) Survey (Arbaugh et al., 2008), which was developed using the COI theoretical framework. The COI is a model of teaching and learning in an online environment that is grounded in a collaborative-constructivist perspective (Garrison, 2012). It asserts that a community of learners and teachers in an online learning setting is comprised of three presences – cognitive presence, social presence, and teaching presence, whose synergy allows for deep learning to take place (Garrison, 2009; Garrison et al., 1999) (See Figure 1). Cognitive Presence represents the process of learning and inquiry, while Social Presence refers to the extent to which learners develop a sense of belonging

in their online community, deliberately communicate positively, and build interpersonal relationships (Garrison et al., 2010). The Teaching Presence, the third presence, ties all the presences together (Garrison et al., 2010). It involves "the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., 2001).

This study intends to adopt and validate the COI Survey as a tool for student evaluation of teaching and learning. If the COI is found to be valid and aligned with the context of the fully online university under study, the COI Survey may be considered as a suitable student evaluation of teaching and learning tool for the university's use.

The outcome of this research will contribute to the growing research on the Community of Inquiry framework. A perspective from the Philippine context in a fully online learning set-up could enrich the literature on COI. Moreover, validating the COI Survey in the subject's context will open the possibility of its use as SET in similar fully online universities.

Research Objectives

The main objective of this study is to determine the applicability of the COI Survey as a tool for SET in a fully online, open and distance learning university. In doing so, this study will involve validity testing of the COI Survey as a student evaluation of teaching and learning tool in the Philippine context using Exploratory and Confirmatory Factor Analyses.

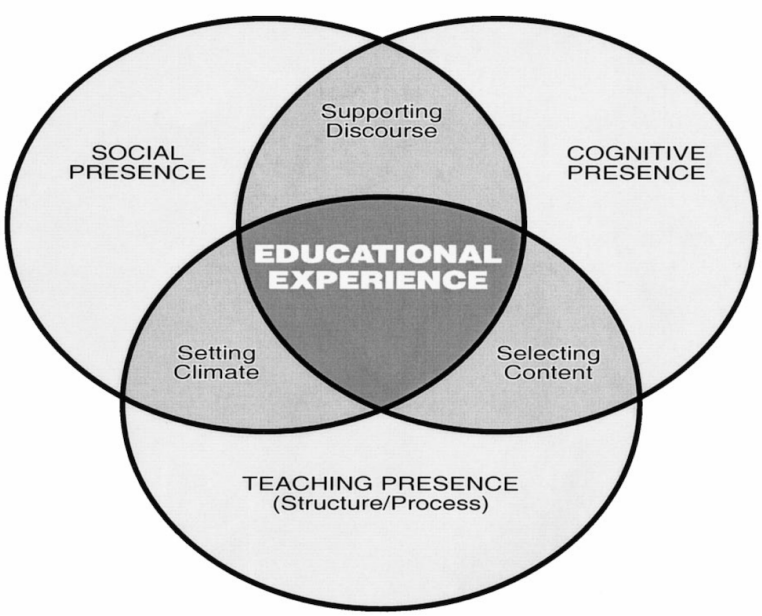
Theoretical Framework

Overview of the Community of Inquiry (COI)

The theoretical framework that will be used in this study is the Community of Inquiry (COI) (Garrison et al., 1999), which is a framework that may be used for teaching and learning in online, computer-mediated, or blended educational settings. It provides educators in the field of e-learning "the order and structural elements needed to begin the process of understanding the complexities of online learning" (Garrison et al., 2010). According to the COI framework, meaningful learning is a result of the interaction and convergence of three interrelated elements – cognitive presence, social presence, and teaching presence, that takes place within a community of learners and instructors (Garrison, 2009; Garrison et al., 1999) (See Figure 1). In a community of inquiry, learners are actively collaborating to explore, inquire, critically reflect, and create knowledge and meaning as opposed to merely receiving information from lectures or course packages (Garrison, 2009). This framework is a useful guide for effective instructional design and administration of online courses (Richardson et al., 2012).

Figure 1

The COI Framework (Garrison, Anderson, & Archer, 1999)



Impact of COI on Students' Learning

Research on COI shows a positive impact of COI on students' learning and engagement. Yidana and Aboagye's (2024) study on the relationship of COI presence with the development of 21st century skills in the Ghanaian higher education context shows that cognitive presence, social presence, and teaching presence have a significant positive relationship with the 21st century skills development. Positive learning experiences and student engagement were also observed in the study of Ang, Ng, Lee, and Yong (2024), where the COI framework was used in designing asynchronous lectures in a Singaporean polytechnic university.

The study of Alshammari and Alrehaili (2025) on the effects of the three COI presences – teaching, social, and cognitive, on the engagement of students in an online course in Saudi Arabia reveals that cognitive presence and social presence have a significant positive influence on students' active participation in their class. Their findings also show that teaching presence has no direct impact on students' engagement, which they attribute to the nature of online teaching where the bulk of the work is in the design and preparation of courses, which includes aspects and activities that foster social and cognitive presences, as well as autonomy and self-directedness. All of these take place before classes start. In addition, students, particularly those new to online learning, usually associate teachers' engagement with real-time interaction, owing to their learning experience with face-to-face teaching; thus, perceiving that the role of teachers is merely in the delivery of the course (Alshammari & Alrehaili, 2025).

Contrarily, in the study of Teng, Yin, Wang, and Yang (2024) of Chinese EFL

students' perception of COI, teaching presence is shown to have gained the most positive perception among students and had the most impact on students' learning, while social presence has the least positive perception. They ascribe the low perception of social presence to the Chinese culture of conflict avoidance in public.

The positive perception of and impact on learning of teaching presence, where discussion or discourse facilitation, timely feedback, and communication clarity are given greater importance, is also noted in Pham and Nguyen's (2025) study of teaching presence in a Vietnamese virtual learning environment. They pointed out that teaching presence may be culture-bound rather than a universal condition.

The Community of Inquiry Survey

To validate the COI framework, Arbaugh et al. (2008) developed the COI survey, which consists of 34 items that represent and assess the three presences of the COI. The instrument was administered in four higher education institutions in the United States and Canada, and yielded high internal consistencies with Cronbach's Alpha equal to 0.94 for Teaching Presence, 0.91 for Social Presence, and 0.95 for Cognitive Presence (Arbaugh et al., 2008).

The COI instrument has been further validated in different studies, such as those by Bangert (2009), Shea and Bidjerano (2009), Garrison et al. (2010), and Diaz et al. (2010). Validation of the COI survey was implemented in various contexts and cultures as well. Horzum and Uyanik (2015) reported the COI survey applied in a state university in Turkey as valid and reliable. Similarly, the Chinese version (Ma et al., 2017) and Korean version (Yu & Richardson, 2015) adaptations of the COI scales were likewise found valid and reliable. The foregoing studies were conducted using large sample sizes in various online and blended courses and universities or colleges in both undergraduate and graduate levels across disciplines, such as education, business, Math and sciences, health care disciplines, social science, architecture, library science, and humanities (Arbaugh, et al., 2008; Bangert, 2009; Diaz, et al., 2010; Garrison, et al., 2010; Ma, et al., 2017; Yu & Richardson, 2015). Although the COI Survey has already been validated in various contexts and academic disciplines and programs, examining its validity in the Philippine setting, particularly in the context of the university under study, is still useful to ensure that the assessment tool for evaluating teaching and learning is appropriate to the institution's circumstances and practices.

Method

Measure

The Student Evaluation of Teaching and Learning questionnaire was developed by adopting the COI Survey items and adapting the open-ended questions in the UP System's revised student evaluation of teaching. The thirty-four (34) CoI survey items (Arbaugh et al., 2008) were scored using a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5).

Research Context and Participants

The research data were collected during the academic year 2018-2019 from both the undergraduate and graduate students of the institution's three Faculties of Study (N=3,419). A voluntary response sampling method was employed, where the evaluation form was sent to all the enrolled students during those terms. Those who responded to the survey and agreed to take part in the research were included in the sample (Khan Academy, n.d.).

Procedures

Using Google Forms, the questionnaire was administered to all students enrolled in the academic year 2018-2019. At the end of each term, the students were instructed to evaluate at least one of the courses they took using the questionnaire. No personal information or identifiable data was collected during the survey.

Data Preparation

After the administration of the questionnaire that included the items in the COI survey, a total of 883 student responses were obtained. These raw data of individual student responses to the survey were screened before running them through EFA. Individual responses from a batch with an erroneous item (161 responses) and those from participants who disagreed to take part in the study (8 students) were removed. After the screening, the final number of responses included in the data analysis was 714.

According to Fabrigar and Wegener (2012), an adequate sample size would range from 100 (when conditions are favorable) to 400 (when conditions are poor). With this rule-of-thumb, the 714 net responses for the data analysis are sufficient. This is supported by the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) in the Exploratory Factor Analysis (EFA), which yielded a 0.973 MSA. This indicates that reliable factors may be generated using the obtained data or responses (Arbaugh et al., 2008).

Data Analysis Procedures

The following statistical treatments were used in this study: Exploratory and Confirmatory Factor Analyses to determine the construct validity and internal consistency of the COI survey, descriptive statistics to determine mean scores and standard deviations, and reliability analysis to determine the reliability of the scale.

The Exploratory Factor Analysis is a statistical method commonly used to determine underlying factors in a measure (Fabrigar & Wegener, 2012; Navarro & Foxcroft, 2018; Tabachnick & Fidell, 2019; Watkins, 2021), which can assess the construct validity of a scale (Worthington & Whittaker, 2006). Thus, it is a good tool to use in scale or instrument development (Fabrigar & Wegener, 2012). It is for these reasons that this statistical method was applied to validate

the COI survey in a fully online Philippine university context and determine if the same COI factors shall emerge from the data. To determine if the data is sufficient and suitable for EFA, Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) were conducted (Fein, et al., 2022; Navarro & Foxcroft, 2018).

According to Osbourne (2015), the steps in conducting EFA are as follows:

1. Data cleaning
2. Deciding on the extraction method to use
3. Deciding the number of factors to retain
4. Deciding on a method of rotation (if desired)
5. Interpretation of results

The extraction and rotation methods applied in the EFA were Principal Axis Factor (PAF) and Oblimin. PAF was chosen because it is "better able to recover weak factors" (de Winter & Dodou, 2012, p. 695) and the data are not normally distributed (Fabrigar et al., 1999). On the other hand, oblimin was used given that the common factors are expected to be correlated based on the COI theory (Arbaugh et al., 2008), and oblique rotations let factors correlate unlike orthogonal rotations (Fabrigar & Wegener, 2012; Osbourne, 2015).

After conducting EFA, the data were also subject to Confirmatory Factor Analysis (CFA) as Worthington and Whittaker (2006) suggest. "CFA is most commonly used during the scale development process to help support the validity of a scale following an EFA" (Worthington & Whittaker, 2006, p 824). Three rounds of CFA were conducted to determine the model's goodness of fit: 1) all data were run following the three-factor model of COI; 2) items 14, 15, and 28 were deleted and the remaining data were run following the three-factor model of COI; and 3) items 14, 15, and 28 were deleted and the remaining data were run following the extracted four factors in EFA. The statistical software, Jamovi and JASP, for confirmation, were used in both EFA and CFA.

Results and Discussion

The results of the EFA and CFA are as follows. Running the 714 cases through EFA yielded these results:

a. Bartlett's Test of Sphericity, $X2\ (561) = 28881$, $p < 0.001$, shows that the variables are correlated with each other (Smyth & Johnson, n.d.).
b. While Kaiser–Meyer–Olkin (KMO), KMO=.973, indicates that sampling is sufficient for the factor analysis and that the correlations among the items can generate latent factors (Watkins, 2018; Worthington & Whittaker, 2006). The KMOs of the individual items range from 0.953 to 0.986. According to Tabachnick & Fidell (2019), a good factor analysis needs to have a KMO greater than or equal to 0.6.

   The Bartlett's Test of Sphericity and KMO results both signify that the data are appropriate for EFA (Watkins, 2018).

c. Using a factor loading cutoff of 0.32, four factors emerged (see Appendix A). According to Tabachnick & Fidell (2019), variables with factor loadings of at least 0.32 are considered for interpretation in EFA; a large value of factor loading signifies that the variable is a strong measure of the factor. The communalities of the items show moderate to high levels (>0.40) (Widaman, 2018), which denote that the variables or items are explained by these four factors.

Items for Cognitive Presence (CP) (items 23-34) obtained loading scores that ranged from 0.467 to 0.902; while Teaching Presence (TP) (items 5-13) received 0.637-0.869 values, and Social Presence (SP) (items 14-22), 0.452-0.951 values. The fourth factor, Design and Organization (DO) (items 1-4), has a range of correlations from 0.525 to 0.733. All the items that loaded on Cognitive Presence, Teaching Presence, and Social Presence are consistent with the categorization in the COI survey. Likewise, the items in the fourth factor compose the Design and Organization subcategory of the instrument. Almost all items loaded on their expected factor except for item 14. Getting to know other course participants gave me, 15. I was able to form distinct impressions of some course participants, and 28. Online discussions were valuable in helping me appreciate different perspectives, which loaded under two factors. Items 14 and 15, which are items measuring Social Presence by the instrument, loaded on both Teaching Presence and Social Presence. While item 28, an item under Cognitive Presence in the battery, also loaded on Social Presence.

Both items 14 and 15 are under the Affective Expression subcategory of Social Presence in the COI Survey. Their cross-loading on Teaching Presence may indicate that the items need to be rephrased and clarified to be explicit measures of social presence in the course. Items 14 and 15 may be a function of the teacher's course design rather than a result of "the ability of learners to project themselves socially and affectively" (Rourke, et al., 1999) within the course. The conditions for interactions to take place in courses are primarily deliberately created by the faculty-in-charge of these courses. "Facilitating active learning" is among the features of Teacher Presence (Rourke et al., 1999). Hence, this may be indicative of students not being fully able to "feel affectively connected [to one] another" (Swan & Shih, 2005, p. 115).

The cross-loading of item 14 in Social Presence and Teacher Presence is also found in Yu and Richardson's (2015) study, which they posit could be attributed to the translation of the instrument and the mode of instruction in online learning in Korea where Video on Demand is primarily used, which "interacting with other peers is not a major component" (p. 51). Similarly, the main mode of learning in the university is guided independent study, where students, through a virtual learning environment (VLE), are provided with learning materials and course packages that they must study mostly independently (Arinto, 2013b, 2014, 2016; UP Open University Helpdesk, 2020).

As for the case of item 28, which cross-loaded on social presence, recasting of this item may also be needed, as online discussions can also foster social presence. Discussion forums may create a condition for building a sense of community and relationships, as they can stimulate active engagement with peers, thereby

providing an opportunity to enhance social presence. Moreover, in Ribas and Perine (2016), discussion forums were found to facilitate discussions, as well as reflections, which contributed to critical thinking. According to Martirosyan et al. (2022), some of the emerging themes of the discussion forum were perceived as both in-depth knowledge and teaching abilities.

Nonetheless, Tu and McIsaac (2002) posit that social presence is dependent on the degree to which participants feel, respond to, or perceive the connection with their peers, rather than on the frequency of participation. In a study by Swan (2003), discussion forums allow students to make use of textual verbal immediacy techniques that bridge the psychological distance among them. These verbal immediacy behaviors can develop social presence in asynchronous online discussions (Swan, 2003). According to Garrison, et al. (2000), "a true community of inquiry, [where social presence is enhanced], the tone of the messages is questioning but engaging, expressive but responsive, skeptical but respectful, and challenging but supportive" (p. 96).

These items, i.e., 14, 15, & 28, that cross-loaded on two factors were omitted from the survey because they fail to be accurate measures of either factor they loaded on (Fabrigar & Wegener, 2012; Navarro & Foxcroft, 2018), and the difference of these cross-loadings is less than 0.15 (Worthington & Whittaker, 2006). The deletion of these items aims to achieve a simple structure, which is a basis for retaining an item or factor (Tabachnick & Fidell, 2019; Watkins, 2018; Worthington & Whittaker, 2006).

After deleting items 14, 15, and 28 from the pool, a rerun of EFA was conducted "to ensure that item elimination did not result in changes to factor structure, factor intercorrelations, item communalities, factor loadings, or cross-loadings, so that all of the originally established criteria for these outcomes are still met" (Worthington & Whittaker, 2006, p 833). Based on the factor summary statistics (see Appendix B), the four factors account for 75.5% of the overall variance of the data, i.e., 27.48% by Cognitive Presence, 22.60% by Teaching Presence, 16.42% by Social Presence, and 9% by Design and Organization. Further, the four factors show positive correlations with CP, having strong correlations (Cohen, 1988; Valančius et al., 2019) with TP (r=0.734), SP (r=0.715), and DO (r=0.611). TP also shows strong correlations with SP (r=0.553) and DO (r=0.658); while SP has a moderate correlation with DO (r=0.432). These results indicate that the factors are substantially correlated (>0.3) and thus confirm the appropriateness of oblique rotation (Navarro & Foxcroft, 2018).

Further, the reliability test of the extracted factors indicates high reliability or internal consistency (see Tables 1 and 2). An internal consistency reliability of every factor that is greater than or equal to 0.70 (Watkins, 2018) would "[establish] the integrity of the factors derived from the factor analysis" (Lurie, 2021, p. 5).

Table 1

Scale Reliability Statistics

	Cronbach's α
scale	0.980

Table 2

Scale Reliability Analysis

Factor	Cronbach's α
Cognitive Presence	0.970
Teaching Presence	0.964
Social Presence	0.944
Design and Organization	0.925

The four-factor outcome, where DO emerges as a separate factor, is consistent with the study of Arbaugh et al. (2008). The bifurcation of the teaching presence into Instructional Design and Organization, and Directed Facilitation was observed in Shea et al.'s (2006) study, where Rovai's Classroom Community Index was used to examine the teaching presence and community in online courses. The separation of DO in the context of this study may be ascribed to the formal course development process in the university where the course package, which contains the course guide, study guides or modules, and the recommended assignment guides, of the course is developed by a course writer who is not necessarily the faculty that will deliver or teach the course (Arinto, 2014; Garcia, 2014).

Confirmatory Factor Analysis

Data for earlier EFAs were used for the CFA procedures. CFA was then undertaken to further validate the scale (Yang, 2005; Worthington & Whittaker, 2006). The data was passed through CFA thrice. The first run was to determine the goodness of fit of the existing three-factor COI survey. The second run was intended to also validate the three-factor COI survey, but using the data sans items 14, 15, & 28; while the third run was to validate the four factors extracted from the EFA, with items 14, 15,and 28 being deleted from the battery. Brown (2015) recommends that "at least one index from each fit class (absolute, parsimony, comparative) should be considered because each provides different information about the fit of the CFA solution" (p. 96-97). Hence, the combination of SRMR, CFI, TLI, and RMSEA model fit indexes were used (Brown, 2015; Kline, 2016; Tay & Jebb, 2017; Worthington & Whittaker, 2006). The following standards, based on the literature, were used to examine goodness of fit:

Table 3

Goodness of Fit Indicators

Goodness of Fit Measure	Model Fitness Indicator	Authors/Source
SRMR	≤ 0.08= minimum standard of good fit	Tay & Jebb (2017)
	< 0.10 = generally indicative of acceptable model fit	Worthington & Whittaker (2006)
	0.0 = perfect fit; the smaller the SRMR, the better the model fit	Brown (2015)
CFI	> 0.9 = satisfactory fit	Navarro & Foxcroft (2019)
	0.90-0.95 = acceptable model fit	Brown (2015)
	> 0.95 = good fit	Navarro & Foxcroft (2019)
	≥ 0.90 = minimum standard of good fit	Tay & Jebb (2017)
TLI	> 0.9 = satisfactory fit	Navarro & Foxcroft (2019)
	0.90-0.95 = acceptable model fit	Brown (2015)
	> 0.95 = good fit	Navarro & Foxcroft (2019)
	≥ 0.90 = minimum standard of good fit	Tay & Jebb (2017)
RMSEA	≤ 0.05 = close or good model fit	Brown (2015); Fabrigar & Wegener, 2012; Worthington & Whittaker (2006)
	<0.08 = adequate model fit	Brown (2015)
	0.05 – 0.08 = satisfactory fit	Fabrigar & Wegener, 2012; Navarro & Foxcroft (2019)
	≤ 0.08= minimum standard of good fit	Tay & Jebb (2017)
	0.08–0.10 = marginal or mediocre fit	Brown (2015); Fabrigar & Wegener, 2012
	≥0.1 = poor fit; reject model	Brown (2015); Fabrigar & Wegener, 2012

The results of the first CFA run of the items following the three factors, Teaching Presence (TcP), Cognitive Presence (CgP), and Social Presence (ScP), show that (see Table 4) the model does not fit the context of the setting.

Table 4

CFA results where the three-factor model of COI was followed

CFI	TLI	SRMR	RMSEA	RMSEA 90% CI	
				Lower	Upper
0.873	0.864	0.0517	0.0992	0.0964	0.102

Likewise, the CFA of the survey where items 14, 15, and 28 were removed and a three-factor model was applied show poor fit (see Table 5).

Table 5

CFA results where cross-loaded items were removed, and the three-factor model was followed

CFI	TLI	SRMR	RMSEA	RMSEA 90% CI	
				Lower	Upper
0.887	0.878	0.0464	0.0984	0.0954	0.102

On the other hand, the third CFA run, where the extracted four factors (Teaching Presence [TcP], Social Presence [ScP], Cognitive Presence [CgP], and Design and Organization [DaO]) were used and items 14, 15, and 28 were dropped, yielded satisfactory fit measures based on CFI, TLI, and SRMR results (see Table 6). However, a marginal fit was obtained through RMSEA. Based on these outcomes, it seems that the four-factor model is a better fit than the three-factor framework in this case.

Table 6

CFA results where cross-loaded items were removed, and the four factors were applied

CFI	TLI	SRMR	RMSEA	RMSEA 90% CI	
				Lower	Upper
0.916	0.908	0.0411	0.0853	0.0822	0.0884

Nonetheless, the average model fit could be indicative of courses not being true COIs, especially if they are designed for independent study rather than for purposeful collaboration and reflection intended to build a community of inquiry (Garrison, 2012). The mode of instruction in the university generally follows a "guided independent study of resource-based course packages and online

tutorials conducted through a Modular Object Oriented Dynamics Learning Environment (Moodle) - based virtual learning environment (VLE)... Resources are usually digital materials like webpages, PowerPoint presentations, and files in portable document format that are created outside of the VLE and uploaded or linked to the course site on Moodle. Activities include discussion forums, chat rooms, and online quizzes that are generally created directly on the Moodle system to enable interaction and dialogue among learners" (Arinto, 2014, p. 72). Some academic programs in the university incorporate a "collaborative inquiry" approach (UPOU Faculty of Education, 2018).

In the university under study, course authors or the faculty in charge of teaching the course develop the course materials or modules that specify the learning objectives to be attained; contain the content and indicate the learning resources that students should study; provide the prompts and scaffolds to help students learn the resources; and explain the activities and requirements that the students must accomplish. These materials are posted on the university's VLE, where interactions among the students and with the teacher and/or tutor also take place. Thus, a student in the university generally:

> "(i) engage in guided independent study of mostly text-based course packages;
> (ii) participate in computer-mediated discussion and collaborative learning activities conducted asynchronously through a Moodle-based VLE;
> (iii) submit assignments; and
> (iv) for most courses, [take final examination]" (Arinto, 2013a; 2016).

Kirschner, Valcke, & Sluijsmans (1999) classify guided independent study as second-generation distance education that "makes use of specially designed and developed learning materials in which the content and the pedagogy are fully integrated into the material" that are "developed in teams according to an industrial approach". (p. 82). It is more structured and incorporates more interaction with the teacher than the traditional independent study or correspondence approach of distance education (Kuskis, 2006).

Garrison (2012) explains that the COI framework is "essentially incompatible with traditional distance education approaches that value independence and autonomy over collaborative discourse in purposeful communities of inquiry" (p. 251). Thus, the general mode of instruction in the institution may not be completely aligned with the COI theoretical model as courses where students are "reliant on independent activities and tests" may have "little teaching, cognitive, or social presence" (Garrison, 2012, p. 251).

The third generation of distance education, where information, communication, and digital technologies are utilized to bridge the separation of time and space, is conducive to social-constructivist approaches to be integrated in online distance learning, and therefore suitable for the application of the COI framework (Anderson & Dron, 2011). Given the positive impact of COI on students' learning and development, as shown in various COI research works, the application and integration of COI concepts in online curriculum and instruction can be

beneficial. Yidana and Aboagye (2024) argue that designing a higher education curriculum should ensure that the three presences – cognitive, social, and teaching- are established. Likewise, they encourage members of the faculty to incorporate the three presences in their instruction. It would therefore be useful for online and distance higher education institutions to review their curriculum and instructional policies, as well as their faculty development programs, in relation to the application of COI in curriculum and instructional design and development. Should online universities decide to fully integrate COI in their pedagogy, a training program on COI for teachers may be essential for curriculum and instructional design and development.

Conclusion

This study examined the applicability of the COI Survey as a tool for SET in a fully online, open and distance learning university. By applying Exploratory and Confirmatory Factor Analysis and Confirmatory Factor Analysis, this study examined the validity of the COI Survey for student evaluations of teaching and learning within the Philippine online education context.

Based on the findings of this research, the four-factor, 31-item COI Survey (where items 14, 15, and 28 were removed) could be an acceptable tool to evaluate teaching effectiveness in the university. However, the following must be noted and considered:

a. The courses to be evaluated must be a true COI for the survey to be a valid and reliable measure thereof. Thus, the use of the COI survey as a tool for the Student Evaluation of Teaching in all courses may not be appropriate, given that some courses in the University may not be fully applying the COI framework, considering the guided independent study as the general mode of instruction in the institution. This approach may not sufficiently support the highly collaborative, reflective, and constructivist nature of COI (Garrison, 2012). Although there are opportunities for online interactions and discussions in the VLE, it must be emphasized that not all interactions and discussions can foster a COI. There should be a convergence among social, cognitive, and teaching presence for a true community of inquiry to be developed (Garrison & Cleveland-Innes, 2005).

   Garrison (2012) asserts "that it is misleading and counter-productive to critique a framework from an incompatible paradigmatic perspective that is not congruent with a context or for a purpose for which it was not intended" (p. 251). Likewise, the COI Survey will not be a fair assessment tool of teaching effectiveness if the courses are not expected to fully implement the COI framework.

b. The COI survey may be used by faculty members espousing the COI theoretical model for their own self-evaluation and reflection. As Garrison (2012) remarks, the COI "can also be used as a rubric to test for functioning communities of inquiry" (p. 251).

Thus, it would be interesting to know the extent to which the COI framework or collaborative-constructivist paradigm is being applied in courses in the university. Similarly, an examination of the compatibility and adaptability of COI across disciplines could also be explored.

A separate validation study of the COI instrument in courses that adapt the COI model may be warranted to confirm the findings in this research. If such a study yielded similar results, a rephrasing of items 14, 15, and 28 may be warranted, and further exploration of DO as a separate factor may be considered. Mixed-method research may also be conducted to triangulate results and to examine the perceptions of the teachers on COI and its application in online distance learning. Additionally, a meta-validation study could show if results will still be similar in a post-pandemic context, considering that this study was done prior to the foregoing health crisis.

Further, it would also be worthwhile investigating the impact of using the COI survey for teachers' self-evaluation and reflection. By conducting focus group discussions (FGD) with both students and faculty members, future research can examine whether the features of COI reflected in the items of the CoI survey exist in the university. Juhnus et al. (2021) examined quantitative as well as qualitative data to further understand the framework of community of inquiry. Such an approach may also be adapted in future research on COI in a fully online university.

The results of this research can contribute to institutional efforts in ensuring the quality of teaching and learning in the university. Moreover, it can also be used as a point of reflection on the epistemological stance and pedagogical approaches and practices of the institution. Further, this study can contribute to the research on COI in the Philippine context and in the cultural contingency of the COI framework.

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Appendix A

Factor loadings (Pattern Matrix)

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
34. I can apply the knowledge created in this course to my work or other non-class related activities.	0.902				0.255	0.745
25. I felt motivated to explore content related questions.	0.887				0.206	0.794
33. I have developed solutions to course problems that can be applied in practice.	0.878				0.206	0.794
32. I can describe ways to test and apply the knowledge created in this course.	0.843				0.221	0.779
30. Learning activities helped me construct explanations/ solutions.	0.841				0.175	0.825
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.	0.814				0.192	0.808

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
29. Combining new information helped me answer questions raised in course activities.	0.786				0.214	0.786
26. I utilized a variety of information sources to explore problems posed in this course.	0.763				0.308	0.692
24. Course activities piqued my curiosity.	0.742				0.296	0.704
27. Brainstorming and finding relevant information helped me resolve content related questions.	0.614				0.282	0.718
23. Problems posed increased my interest in course issues.	0.598				0.279	0.721
28. Online discussions were valuable in helping me appreciate different perspectives.	0.467		0.356		0.295	0.705
12. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.		0.869			0.319	0.681

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
7. The instructor helped to keep course participants engaged and participating in productive dialogue.		0.824			0.178	0.822
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.		0.824			0.172	0.828
13. The instructor provided feedback in a timely fashion.		0.82			0.375	0.625
10. Instructor actions reinforced the development of a sense of community among course participants.		0.811			0.206	0.794
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.		0.802			0.195	0.805
8. The instructor helped keep the course participants on task in a way that helped me to learn.		0.733			0.187	0.813

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.		0.644			0.207	0.793
9. The instructor encouraged course participants to explore new concepts in this course.		0.637			0.25	0.75
15. I was able to form distinct impressions of some course participants.		0.376	0.358		0.423	0.577
19. I felt comfortable interacting with other course participants.			0.951		0.147	0.853
20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.					0.36	0.64
18. I felt comfortable participating in the course discussions.			0.828		0.218	0.782
17. I felt comfortable conversing through the online medium.			0.733		0.293	0.707

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
21. I felt that my point of view was acknowledged by other course participants.			0.701		0.293	0.707
22. Online discussions help me to develop a sense of collaboration.			0.623		0.239	0.761
16. Online or web-based communication is an excellent medium for social interaction.			0.523		0.395	0.605
14. Getting to know other course participants gave me a sense of belonging in the course.		0.323	0.452		0.356	0.644
2. The instructor clearly communicated important course goals.				0.733	0.143	0.857
1. The instructor clearly communicated important course topics.				0.611	0.202	0.798
3. The instructor provided clear instructions on how to participate in course learning activities.				0.567	0.247	0.753

Items	Factor				Uniqueness	Communality
	1 CP	2 TP	3 SP	4 DO		
4. The instructor clearly communicated important due dates/time frames for learning activities.				0.525	0.378	0.622

Note. 'Principal axis factoring' extraction method was used in combination with an 'oblimin' rotation

Appendix B
Factor Statistics

Table B1

Summary

Factor	SS Loadings	% of Variance	Cumulative %
1	8.52	27.48	27.5
2	7.01	22.60	50.1
3	5.09	16.42	66.5
4	2.79	9.00	75.5

Table B2

Inter-Factor Correlations

	1	2	3	4
1	—	0.734	0.715	0.611
2		—	0.553	0.658
3			—	0.432
4				—