

Preprint: “Measuring Social Presence in Online Learning: A Validation Study”

Cite as: Alsayer, A. A., & Lowenthal, P. R. (2024). Measuring social presence in online learning: A validation study. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-024-12972-w>

## Measuring Social Presence in Online Learning: A Validation Study

**Ahmed A. Alsayer**

<https://orcid.org/0000-0003-1280-2660>

**Patrick R. Lowenthal**

<https://orcid.org/0000-0002-9318-1909>

### Abstract

Despite continued research into the Community of Inquiry framework, the best way to measure each presence of the framework, and in particular social presence, continues to be debated. As a result, researchers have continued to revise and modify instruments to measure social presence over the years. The purpose of this study was to evaluate the validity of the social presence questions and subscales in the Community of Inquiry questionnaire. Our results indicate that social presence is mainly affected by affective expression, and that all the three subscales explain approximately 72% of the variance in social presence. The implications of this variance and future research items are presented in the discussion.

Keywords: Social presence, Online learning, Community of Inquiry, Measurement, Validation

### Introduction

Even prior to COVID-19, in higher education, enrollments in online courses have increased while enrollments in face-to-face courses have decreased (Seaman et al., 2018). As a result, online education has become a critical component in long-term strategic planning for colleges and universities (Sanchez, 2020). However, online educators still struggle to improve retention rates in online courses and programs (McClendon et al., 2017), which is likely to become an even bigger problem as more students are forced to take some or all of their courses online (e.g., due to things such as pandemics, wars, or even simply course availability) despite preferring to take courses in an in-person face-to-face format. Research suggests that one of the many reasons students struggle in online courses and online programs is because of a lack of social presence (d’Alessio et al., 2019). At the same time, research also suggests that increasing a sense of social presence—that is, a sense that others are “real” and “there”—can help address feelings of isolation and in turn improve student success in online courses (Oregon et al., 2018; Rotar, 2020). Despite the potential of social presence to improve student retention and overall

success, educational researchers continue to debate the best way to operationalize and measure social presence (Lah & Tasir, 2018; Lowenthal & Dunlap, 2014; Lowenthal & Snelson, 2017; Richardson et al., 2017). Given this problem, the purpose of this study was to investigate the validity of the social presence subscales and questions in the Community of Inquiry questionnaire and ultimately to develop a scale to measure social presence. The following paper presents the results of the study and its implications for future research and practice.

## **Background**

### **The Community of Inquiry Framework**

Social presence theory dates to the work of Short, Williams, and Christie (1976). They were interested in the effect telecommunications media had on communication (Lowenthal, 2010). They defined social presence as the degree of salience—that is, the quality or state of being there—between communicators using a communication medium. However, social presence did not become a popular construct in online learning until Garrison, Anderson, and Archer’s work on the Community of Inquiry during the late 1990s and early 2000s. Garrison et al. (2000) posited that a Community of Inquiry (CoI) consists of a group of learners collaboratively learning through the interaction of three major elements: teaching, cognitive, and social presence. *Teaching presence* was conceptualized as the completion of teaching tasks, such as designing the course, selecting the topics, assigning homework, organizing content, presenting information, facilitating educational processes, developing and updating course content, and assessing and evaluating learning outcomes. *Cognitive presence* was conceptualized as knowledge construction, information sharing, idea connection, feedback provision, and learned skills application. Finally, *social presence*, which is the focus of this paper, was originally defined as the ability to present oneself to others as being a “real” person (Garrison et al., 1999). Garrison et al. conceptualized social presence as consisting of three main categories: emotional expression, open communication, and group cohesion. These were then tweaked by researchers over time depending on the focus of a given study. For instance, Rourke et al. (1999) labeled them as affective, interactive, and cohesive responses when focused on analyzing online course discussions, and then Arbaugh et al. (2008) later renamed them as affective expression, open communication, and group cohesion when focused on developing an instrument to measure students perceptions (Arbaugh et al., 2008). Garrison et al. (2009) later defined social presence as “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities” (p. 352).

### **Definition, History, and Indicators of Social Presence**

Definitions of social presence, even by Garrison, have varied over the years (see Lowenthal & Snelson, 2017). Early on, social presence was thought of as a psychological

concept attached to the communication medium and to some degree a characteristic of the medium itself rather than a characteristic that depended on the social context (Alanazi, 2019). Short et al. (1976), and other proponents of cues filtering-out theories (see Daft & Lengel, 1986, and Sproull & Kiesler, 1986), argued that the type of medium largely determined how people communicated and the subsequent degree of social presence. However, in the 1990s, Gunawardena (1995) challenged this notion by showing that social presence can be developed using text-based communication alone, thus suggesting that social presence was more dependent on the social context and people's communication skills than on any inherent constraints of a communication medium. Presently, there is a broad consensus in the literature that the development of social presence depends not on the medium itself, but on the social context and how a medium is used (Garrison et al., 2000; Gunawardena & Zittle, 1997; Gunawardena, 1995; Lowenthal & Dunlap, 2018; Richardson & Swan, 2003; Richardson et al., 2017; Richardson et al., 2016; Whiteside, 2015). This body of research suggests that the development of social presence depends on a host of different factors besides the communication medium itself.

### ***Role of Social Presence in Online Learning***

Research has shown that social presence fosters social interaction in online learning environments (Kozan & Caskurlu, 2018; Oyarzun et al., 2018; Song et al., 2019). In fact, Cobb (2009) and Kim et al. (2015) found that social presence is key to learners' success and online collaboration with their peers. Others have shown that learners with a strong sense of social presence are more likely to complete their courses with better grades (Gregori et al., 2018; Liu et al., 2009). Findings like these indicate the importance of social presence to learning outcomes.

Conversely a lack of social presence has been shown to be related to poor learning outcomes (Lewis, 2019; McCreery et al., 2015; Song et al., 2019; Tu & McIsaac, 2002) and higher drop-out rates (Bowers & Kumar, 2015; Clay et al. 2008; Goodman et al., 2019; Lee & Choi, 2011; Levy, 2007; Li et al., 2019; Mancini et al., 2018; McClendon et al., 2017; Onah et al., 2014; Park & Choi, 2009). Poor outcomes and high drop rates challenge not only online instructors (Trespalacios & Lowenthal, 2019), but also administrators involved with institutional planning and development.

Given the importance of social presence, researchers and practitioners have been interested in ways to measure and ultimately influence the development of social presence. Early on, Garrison et al. (2000) tried to find ways to better understand and identify social presence in computer conferencing (i.e., online discussions). Working from the literature, they posited that social presence consisted of three previously mentioned categories: emotional expression/*affective expression*, open/interactive communication, and group/community cohesion. They used these categories to develop observable indicators of social presence in online discussions (Rourke et al., 1999). However, using content analysis to analyze online discussions was very time-consuming which led others to develop surveys to instead measure perceptions of social presence (e.g., Hostetter & Busch, 2006; Richardson & Swan, 2001; Swan

& Shih, 2005; Tu, 2002). In 2008, recognizing the need to have a shared and common instrument and to build on the work of earlier researchers, Arbaugh et al. developed the Community of Inquiry Questionnaire (CoIQ).

While this was a positive step forward, researchers like Lowenthal and Dunlap (2014) have pointed out problems with simply combining previous surveys, some of which were based on the earlier work of Gunawardena (1995; Gunawardena & Zittle, 1997) that focused more on immediacy than on social presence. For example, in the CoIQ, some of the items used to measure open/interactive communication (e.g., “I felt comfortable conversing through the online medium”; “I felt comfortable participating in the course discussions”; and “I felt comfortable interacting with other course participants”) focus “too much on one’s comfort level and not enough on one’s ability or one’s actual behavior online as the indicators do” (p. 24). Lowenthal and Dunlap (2014) continued to point out other issues with the survey, however, the items they proposed have not yet been examined. In addition, the validity of the construct of social presence itself remains to be questioned. Several researchers have questioned not only how we define and conceptualize social presence but also how we measure it and its proposed categories and indicators (Lim & Richardson, 2016; Lowenthal & Dunlap, 2014; Lowenthal & Snelson, 2017).

A final issue regards the contributing factors and general structure of the social presence construct. For example, while some posit that social presence is a higher-order construct indicated by certain lower-order constructs (Wertz, 2022), other research suggests that social presence could be considered an outcome variable predicted by certain predisposing factors, in this case affective/emotional expression, open/interactive communication, and group cohesion (see Kreijns et al., 2021). More specifically, Kreijns et al. (2021) note that social presence is likely closely related to certain constructs, such as sociability, yet distinct from those constructs, although this approach has yet to be adequately tested using affective/emotional expression, open/interactive communication, and group cohesion as such predictive factors. It should be noted that this approach has been utilized in other areas of the CoI framework as well, such as prior work exploring how cognitive presence is facilitated by certain factors (i.e., the Practical Inquiry Model; see Moore & Miller, 2022). Therefore, the current research seeks to address this gap in the literature by investigating if the aforementioned factors, which have been suggested to support the development of social presence, might predict social presence using a structural equation modelling approach.

### **Methodology**

In response to this, we sought to answer the following research questions:

- Research Question One (Measurement): To what extent do affective/emotional expression, open communication, group cohesion, and social presence influence responses on their respective items?

- Research Question Two (Structural): To what extent can affective/emotional expression, open/interactive communication, and group cohesion predict social presence?

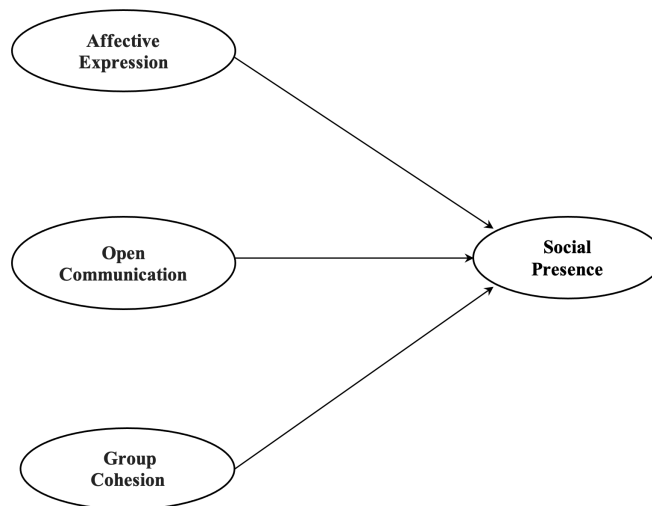
We used an Item Factor Analysis (IFA) and Structural Equation Modelling (SEM) to answer these questions.

### Validity and Reliability

A valid instrument was necessary to measure the four latent constructs (i.e., affective/emotional expression, open communication, group cohesion, social presence; See Figure 1). Lowenthal and Dunlap (2014) proposed three modified scale items. We elected to utilize these items to measure the predicting constructs: affective expression, open/interactive communication, and group cohesion. In addition, we developed items to measure the criterion construct social presence itself and included key words from the social presence definitions, such as "*presence*," "*real*," and "*saliency*," as well as references to the ability of course participants to "*project*" within online environments.

Although most of the previous studies on the social presence used Cronbach alpha coefficients to calculate the reliability estimates of the scales, we used McDonald's *omega* as the reliability coefficient to estimate the reliability of each of the four scales (Dunn et al., 2014; Deng & Chan, 2017; McDonald, 2013). The omega estimate is a commonly used reliability coefficient when using the SEM method (Wirth & Edwards, 2007) as there is "less risk of overestimation or underestimation of reliability" (p. 13). To ensure the reliability of these four scales (i.e., affective expression, interaction intensity, group cohesion, and social presence), we calculated omega estimates to obtain the reliability estimate for each scale.

**Figure 1**  
Structural Model



## Measures

The total number of items included in the instrument was 30. Out of the 30 items, six items measured the *affective expression* construct, seven items measured the *open communication* construct, six items measured the *group cohesion* construct, eight items measured the social presence construct, and three items measured demographic items for gender, age, and ethnicity. The 27 items measuring the four constructs were scored on a five-point Likert scale as follows: *Strongly Disagree* = 1, *Disagree* = 2, *Neither Agree nor Disagree* = 3, *Agree* = 4, and *Strongly Agree* = 5 (See Appendix).

## Data Collection

The 30-item online instrument containing the four scales (affective expression, open communication, group cohesion, social presence) and demographic items was distributed to students taking fully online courses. When data collection was completed and the sample size exceeded the requirement to conduct the statistical analyses (i.e., > 200 participants, Barrett, 2007; Brown, 2015), the data was exported from an online platform and then imported for data cleaning, coding, and analysis using R version 4.1.2 (R Core Team, 2021), along with the multiple R packages such as *lavaan* (Rosseel, 2012), *ggplot2* (Wickham, 2016), *haven* (Wickham & Miller, 2019), and *semPlot* (Epskamp, 2019).

## Sample

The final sample of this study consisted of 413 participants taking *fully* online courses in higher education institutions in the United States. The average age of the participants was  $25.33 \pm 8.36$  years old. The majority of the sample were females (85.23%), and the majority of the sample was White/Caucasian (57.14%). A full description of the sample demographics is provided in Table 1.

**Table 1**

*Sample Description Table*

Variables	Category	N	Percentage
Gender	Females	352	85.23%
	Males	61	14.77%
Ethnicity	White/Caucasian	236	57.14%
	Black/African American	68	16.46%
	Hispanic	32	6.29%
	Asian/Pacific Island	26	7.74%
	Native American/Alaskan Native	7	1.69%
	Others	6	1.45%
	Multiple Ethnicities	38	9.2%

## Data Analysis

Because of the measurement limitations of previous social presence scales and the need for robust measurement models, this study used the IFA approach. To account for the non-normality of the distributions of the observed variables in this measurement model, we employed the Diagonally Weighted Least Squares (DWLS) estimation approach for these categorical responses within the IFA models. We evaluated each measurement model using four fit indices: 1) Comparative Fit Index (CFI), 2) Tucker-Lewis Index (TLI), 3) the Root Mean-Square Error of Approximation (RMSEA), and 4) the Standardized Root Mean Square Residual (SRMR). We also report the results of the Chi-square ( $X^2$ ) statistic test and the Degrees of Freedom (DF) for each model (Kline, 2015). While the authors report the chi-square test statistic, we do not use the statistic to inform our evaluation of model fit due to its "severe limitations" in its assumptions such as "multivariate normality" (Hooper, Coughlan, & Mullen, 2008, p. 2) and the sensitivity to the size of the sample (Bentler & Bonett, 1980; Bentler, 1990).

## Results

### IFA Models

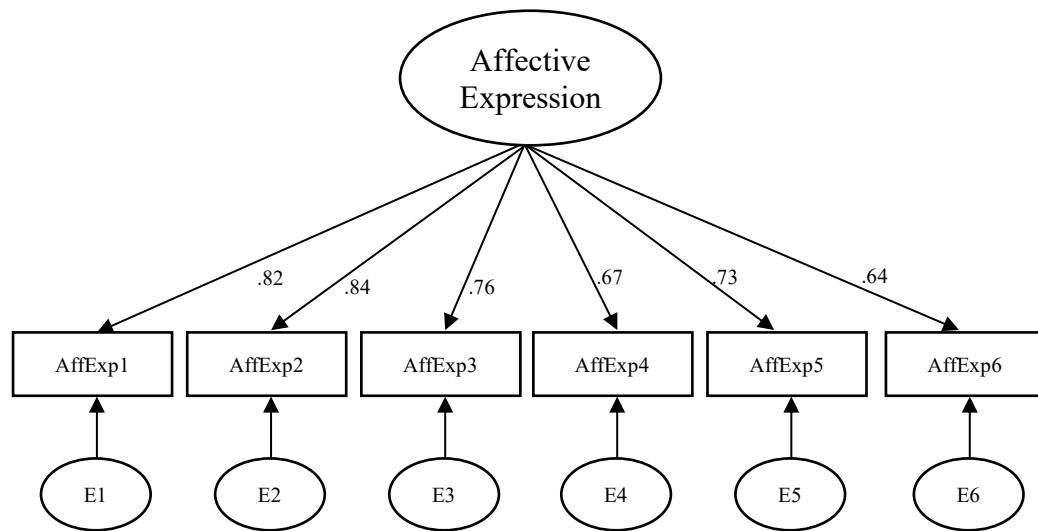
To assure that the individual items of each scale fit well locally within each scale, the researchers conducted four IFA models with the DWLS estimator to investigate the fitness of each model. The models, their fit indices, and the correlations between each pair of scale's items are presented along with figures to depict the IFA models.

### *Affective Expression Scale*

For the affective expression model, the researchers conducted an IFA model to ensure sound evaluation of the scale. When looking at the items AffExp4 ("*I self-disclosed personal information about life outside of class*") and AffExp5 ("*Others self-disclosed personal information in the course*") after investigating the modification indices, one can see that both items take a similar approach in inquiring about the self-disclosure of personal information. Thus, we specified a residual covariance between AffExp4 and AffExp5. The final fit indices of the affective expression scale are as follows: CFI = 0.998, TLI = 0.996, RMSEA = 0.071, SRMR = 0.034, and  $\chi^2(8) = 24.403$ . The standardized factor loadings of the affective expression scale range from .64 to .84 (see the complete table in the *Appendix*). The omega reliability estimate of the affective expression scale was .86. See Table 2 for correlation coefficients and Figure 2 for IFA model below.

**Table 2***Affective Expression Correlation*

	AffExp1	AffExp2	AffExp3	AffExp4	AffExp5	AffExp6
AffExp1	1	0.674	0.500	0.425	0.517	0.483
AffExp2	0.674	1	0.561	0.457	0.509	0.441
AffExp3	0.500	0.561	1	0.512	0.514	0.402
AffExp4	0.425	0.457	0.512	1	0.752	0.394
AffExp5	0.517	0.509	0.514	0.752	1	0.473
AffExp6	0.483	0.441	0.402	0.394	0.473	1

**Figure 2***Affective Expression IFA Model****Open Communication Scale***

For the open communication scale, the researchers conducted another IFA to assure that the scale was valid. The final fit indices of the open communication are as follows: CFI = 0.997, TLI = 0.995, RMSEA = 0.073, SRMR = 0.041, and  $\chi^2(13) = 41.657$ . The residual of Items OpeCom3 ("I felt comfortable participating in online threaded discussions") and OpeCom4 ("I felt comfortable interacting with others") correlated due to similarities in measuring "comfort" in OLEs, which were discussed earlier. The standardized factor loadings of the open communication scale range from .70 to .82 (see the complete table in the *Appendix*). The omega reliability estimate of the open communication scale was .89. See Table 3 for correlation coefficients and Figure 3 for IFA model below.

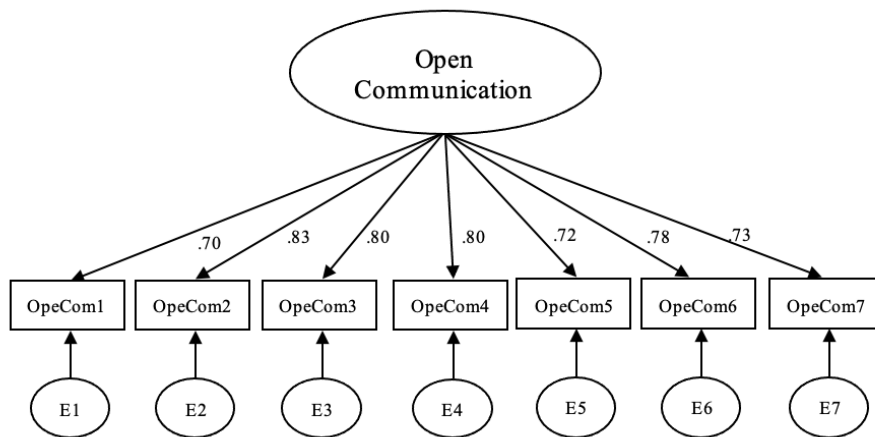
**Table 3**

*Open Communication Correlation*

	OpeCom1	OpeCom2	OpeCom3	OpeCom4	OpeCom5	OpeCom6	OpeCom7
OpeCom1	1	0.578	0.481	0.446	0.351	0.494	0.462
OpeCom2	0.578	1	0.604	0.585	0.465	0.588	0.501
OpeCom3	0.481	0.604	1	0.777	0.534	0.521	0.553
OpeCom4	0.446	0.585	0.777	1	0.589	0.538	0.504
OpeCom5	0.351	0.465	0.534	0.589	1	0.505	0.522
OpeCom6	0.494	0.588	0.521	0.538	0.505	1	0.584
OpeCom7	0.462	0.501	0.553	0.504	0.522	0.584	1

**Figure 3**

*Open Communication IFA Model*



**Group Cohesion Scale**

For the group cohesion model, the authors conducted another IFA to ensure the validity of the scale. Items GrCo5 and GrCo6 of the final model of the group cohesion items ("I referred to other participants by their first name." and "Others addressed me by my first name.") correlated, as they both asked about similar content: the use of participants' first names. The final fit indices of the group cohesion scale were as follows: CFI = .999, TLI = .997, RMSEA = .071, SRMR = .033, and  $\chi^2 (8) = 24.468$ . The standardized factor loadings of the group cohesion scale range from .69 to .92 (see the complete table in the *Appendix*). The omega reliability estimate of the group cohesion scale was .89. See Table 4 for correlation coefficients and Figure 4 for IFA model below.

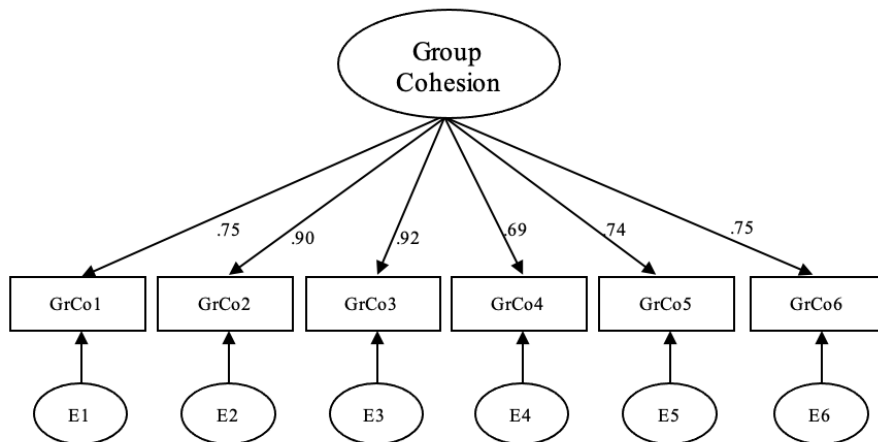
**Table 4**

*Group Cohesion Correlation Table*

	<b>GrCo1</b>	<b>GrCo2</b>	<b>GrCo3</b>	<b>GrCo4</b>	<b>GrCo5</b>	<b>GrCo6</b>
GrCo1	1	0.532	0.575	0.542	0.495	0.509
GrCo2	0.532	1	0.772	0.513	0.589	0.600
GrCo3	0.575	0.772	1	0.535	0.587	0.617
GrCo4	0.542	0.513	0.535	1	0.452	0.421
GrCo5	0.495	0.589	0.587	0.452	1	0.762
GrCo6	0.509	0.600	0.617	0.421	0.762	1

**Figure 4**

*Group Cohesion IFA Model*



***Social Presence Scale***

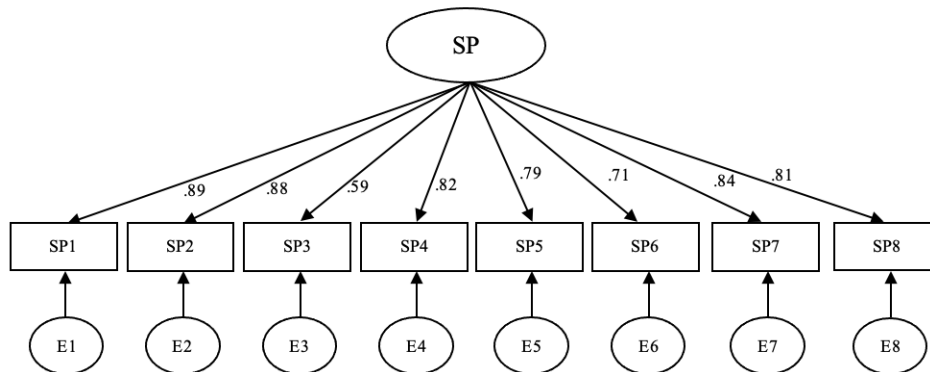
To ensure that the individual items of the social presence scale worked well in the local fit, the researchers conducted another model to generate the fit indices of the social presence scale. When looking at items SP7 ("I could easily project the participants' personal characteristics into the online course.") and SP8 ("I was able to project course participants effectively into the online course."), one can see that the two items question the "projection" of the participants in OLEs. Thus, a residual covariance between SP7 and SP8 was specified. The final fit indices of the final social presence scale were as follows: CFI = .998, TLI = .997, RMSEA = .068, SRMR = .036, and  $\chi^2(19) = 55.473$ , which indicate good model fit. The standardized item loadings of the social presence factor range from .59 to .89 (See the complete table in the *Appendix*). The omega reliability estimate of the social presence scale was .91. See Table 5 for correlation coefficients and Figure 5 for IFA model below.

**Table 5***Social Presence Correlation Table*

	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8
SP1	1	0.762	0.425	0.615	0.565	0.506	0.71	0.665
SP2	0.762	1	0.458	0.636	0.572	0.556	0.691	0.600
SP3	0.425	0.458	1	0.467	0.463	0.430	0.381	0.434
SP4	0.615	0.636	0.467	1	0.663	0.57	0.611	0.614
SP5	0.565	0.572	0.463	0.663	1	0.537	0.573	0.621
SP6	0.506	0.556	0.430	0.570	0.537	1	0.572	0.551
SP7	0.710	0.691	0.381	0.611	0.573	0.572	1	0.761
SP8	0.665	0.600	0.434	0.614	0.621	0.551	0.761	1

**Figure 5**

Social presence IFA model

**Full Measurement Model Results**

The authors conducted a final measurement model to investigate the relationships between the four latent constructs. Overall, the model fit well according to the fit indices: CFI = 0.996, TLI = 0.996, RMSEA = 0.051, SRMR = 0.044, and  $\chi^2(314) = 651.983$ . The results indicate moderate to high correlation coefficients among the four constructs ranging from .75 to .83 correlation coefficients. Overall, the three constructs (i.e., affective expression, open communication, and community cohesion) correlate highly with the social presence construct. Specifically, affective expression correlates positively with open communication ( $r = .79, p < .001$ ), with group cohesion ( $r = .77, p < .001$ ), and with social presence ( $r = .83, p < .001$ ). Open communication correlates positively with group cohesion ( $r = .80, p < .001$ ) and social presence ( $r = .76, p < .001$ ). Finally, group cohesion correlates positively with social presence ( $r = .75, p < .001$ ). See Table 6 for correlation coefficients below.

**Table 6***Constructs' Correlation Table*

	SP	AffExp	OpeCom	GrCo
SP	1			
AffExp	.83	1		
OpeCom	.76	.79	1	
GrCo	.75	.77	.80	1

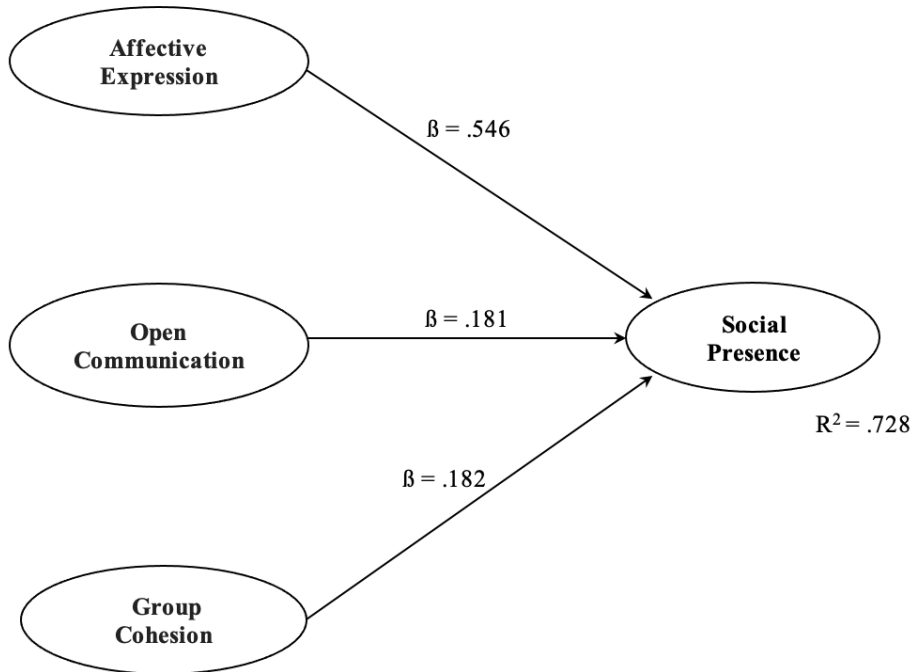
**SEM Results**

To ensure that the three scales developed by previous researchers measure social presence, the authors of this research conducted an SEM to investigate the structural relationships between the three constructs and social presence. The results of these three construct models showed that all the constructs fit well into one structural model jointly predicting social presence. The fit indices are as follows: CFI = .996, TLI = .996, RMSEA = .051, SRMR = .044, and  $\chi^2(314) = 651.983$ . According to Brown (2015) and Kline (2015), the model fits well in comparison to the theorized model. This is a confirmation of extensive documentation published by previous researchers that these are essential elements and indicators of social presence.

Regarding the individual constructs, the results of the SEM indicate that affective expression is the most influential predictor that positively affects social presence ( $\beta = .546, p < .001$ ). This finding means that for a one-unit standard deviation increase in the affective expression indicator, social presence would increase by .546 standard deviations (SDs), which is a relatively sizable effect. In addition, the other two predictors of the model indicate significant, yet objectively smaller effects. For example, the second predictor of the model, open communication, proves to be a significant predictor of social presence ( $\beta = .181, p = .014$ ). For the interpretation of this regression coefficient, we can expect a .181 SD increase in social presence when the open communication indicator increases by one unit of standard deviation, a moderate sized effect. We can conclude that the more interactive the online community is, the higher social presence participants may feel. Finally, the third predictor in the model is community cohesion. This last predictor was also found to be a significant predictor of social presence ( $\beta = .182, p = .006$ ). This indicates a moderate effect of social presence, meaning that when the community cohesion increases by one unit, we can expect social presence to increase by .182 standard deviations. All three indicators positively affect overall social presence in online learning environments. Finally, the three indicators explain 72.8% of the variance in social presence. To summarize, the factors of affective expression, community cohesion, and open communication in the course all significantly influence the level of social

presence in online educational environments. Figure 6 below depicts the structural relationships.

**Figure 6**  
*Social Presence Structural Model*



### Discussions

Due to the lack of research regarding the measurement of social presence scales, particularly in terms of validating the constructs, the current research utilized items strictly pertaining to the definitions of the underlying constructs. To answer the general measurement research question, we used items developed and proposed – but not yet tested – by earlier researchers (Lowenthal & Dunlap, 2014). The results of the social presence IFA model indicated that items which measured the social presence construct fit well together according to the fit indices. These items that measure social presence included keywords from the social presence literature, such as "*presence*," "*real*," and "*salience*," as well as references to the ability of course participants to "*project*" within online environments. In their evaluation, the authors used as benchmarks four model fitness criteria sets developed by pioneering psychometrics researchers (e.g., Brown, 2015; Hu & Bentler, 1999; Kline, 2015; Maydeu-Olivares & Joe, 2014).

Regarding the correlation of the items, each scale's items fit locally well, and all are positively correlated with one another. In addition, most of the correlation values indicated that the items were not very highly correlated, which would mean that the items measure the same concept. Rather, the items moderately correlated in most cases. In addition, the items were not *uncorrelated*, meaning that they measured very different concepts of the constructs. Because

each set of items was supposed to measure a targeted construct, it had to have an adequate level of correlation. Furthermore, in the IFA models, the authors did not allow for cross-loading items, meaning that each item measured its respective construct. In other words, each item loaded on only one unique variable.

### **Affective Expression**

In the structural model, affective expression was the most influential predictor that positively influenced social presence. When evaluating fundamental articles on how social presence was earlier defined by pioneers, such as Rourke et al. (1999) and Garrison et al. (1999), one can see that the emotional element is inherent in the definition of social presence. For example, Rourke et al. (1999) defined social presence as “the ability of learners to project themselves socially and emotionally in a community of inquiry” (p. 4). When Garrison et al. (1999) created categories of social presence, the first category was “*Emotional Expression*” and the first indicator was “*Emotions*” (p. 3). Subsequent researchers (e.g., Akyol & Garrison, 2008; Argo, Dahl, & Manchanda, 2005; Ekman et al., 2012; Gunawardina, 2017; Nasoz, Alvarez, Lisetti, & Finkelstein, 2004; Shen, Yu, & Khalifa, 2010; Tu, 2002) emphasized the emotional aspect as an important element of the social presence construct and as an indicator of social presence, whether through discussing immediacy (e.g., Tu, 2002) or other indicators, such as intimacy, influencing social presence.

Online learners are more likely to feel a high sense of social presence if they indicate a high level of agreement when asked about forming distinct impressions of their course participants; projecting who they are in the online course; expressing emotions; self-disclosing personal information to and from others easily; and using humor in the online course (more on this below). This is because these are critical indicators of the escalation of social presence levels.

### **Open Communication**

Open communication has been associated positively with the level of social presence since the 2000s, and it captured open communication and interaction with other participants through the medium. This indicator is represented through communicating agreement and disagreement, referring to the messages, feeling a sense of comfort, referring to the content another participant posted, and interacting effectively with other participants in the online courses.

### **Group Cohesion**

When looking at this indicator, which refers to the cohesiveness of the online community, it is clear that this factor was a significant predictor in the SEM. Earlier studies (e.g., Eggins & Slade, 1997; Rourke et al., 1999) found that this indicator is

linked to the affective expression indicator (or affective responses, or as was originally labelled, as emotional expression) (Lowenthal & Dunlap, 2014). Eggins and Slade (1997) postulated a connection between humor and critical discourse, in that, the construction of group cohesion frequently involves using conversational strategies such as humorous banter, teasing, and joking. These strategies allow differences between group members to be presented not as serious challenges to the consensus and similarity of the group (p. 14). Thus, group cohesion can be seen as encompassing the development of a sense of collaboration with peers; the use of greetings and salutations; the use of inclusive pronouns such as “we”; becoming a cohesive entity/unit; and referring to other participants by their first name. Therefore, may facilitate online participants’ ability to use humor, disclose personal information, and share interesting personal stories.

### **Conclusion**

The main purpose of this research was to evaluate modified and proposed items of the social presence categories as part of the CoIQ to measure the indicators of social presence, and to develop a scale for social presence itself based on the definitions stated in the literature. The items within the four constructs demonstrate appropriate correlation coefficients with different predicted values (See Appendix). As a result of the analyzed measurement and structural models, emotional expression appeared to be the most presented indicator that depicts and affects the degree of social presence in fully online learning environments, whether those aspects are individually delineated or as a combined whole of social presence. The authors believe that as the potential for further classification within social presence may occur, the measurement tools utilized by future research will show that no matter the definition, social presence within an online learning community remains a vital part of the desired educational outcomes.

## References

- Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks*, 12, 3-22.  
<http://dx.doi.org/10.24059/olj.v12i3-4.1680>
- Alanazi, A. A. (2019). Online Learning Environments: Investigating the Factors Influencing Social Presence (Doctoral dissertation, University of Kansas). Retrieved from  
<https://kuscholarworks.ku.edu/handle/1808/30232>
- Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *Internet and Higher Education*, 11(3-4), 133-136. <https://doi.org/10.1016/j.iheduc.2008.06.003>
- Argo, J. J., Dahl, D. W., & Manchanda, R. V. (2005). The influence of a mere social presence in a retail context. *Journal of Consumer Research*, 32(2), 207-212.  
<https://doi.org/10.1086/432230>
- Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences*, 42(5), 815-824. <https://doi.org/10.1016/j.paid.2006.09.018>
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238–246. <https://doi.org/10.1037/0033-2909.107.2.238>
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588–606.  
<https://doi.org/10.1037/0033-2909.88.3.588>
- Bowers, J., & Kumar, P. (2015). Students' perceptions of teaching and social presence: A comparative analysis of face-to-face and online learning environments. *International Journal of Web-Based Learning and Teaching Technologies*, 10(1), 27-44.  
<http://dx.doi.org/10.4018/ijwlts.2015010103>
- Clay, M. N., Rowland, S., & Packard, A. (2008). Improving undergraduate online retention through gated advisement and redundant communication. *Journal of College Student Retention: Research, Theory & Practice*, 10(1), 93-102.  
<http://dx.doi.org/10.2190/CS.10.1.g>
- Cobb, S. C. (2009). Social presence and online learning: A current view from a research perspective. *Journal of Interactive Online Learning*, 8(3), 241-254.  
<https://www.ncolr.org/jiol/issues/pdf/8.3.4.pdf>
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554-571.  
<http://dx.doi.org/10.1287/mnsc.32.5.554>
- Deng, L., & Chan, W. (2017). Testing the difference between reliability coefficients alpha and omega. *Educational and Psychological Measurement*, 77(2), 185–203.  
<https://doi.org/10.1177/0013164416658325>

- Dunn, T. J., Baguley, T., & Brunsten, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology*, *105*(3), 399-412. <https://doi.org/10.1111/bjop.12046>
- d'Alessio, M. A., Lundquist, L. L., Schwartz, J. J., Pedone, V., Pavia, J., & Fleck, J. (2019). Social presence enhances student performance in an online geology course but depends on instructor facilitation. *Journal of Geoscience Education*, *67*(3), 222-236. <http://dx.doi.org/10.1080/10899995.2019.1580179>
- Eggins, S., & Slade, D. (1997). *Analyzing casual conversation*. Cassell.
- Ekman, I., Chanel, G., Järvelä, S., Kivikangas, J. M., Salminen, M., & Ravaja, N. (2012). Social interaction in games: Measuring physiological linkage and social presence. *Simulation & Gaming*, *43*(3), 321–338. <https://doi.org/10.1177/1046878111422121>
- Epskamp, S. (2019). semPlot: Path Diagrams and Visual Analysis of Various SEM. Packages' Output. R package version 1.1. <https://CRAN.R-project.org/package=semPlot>
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, *2*(2-3), 87-105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Garrison, D. R. (2009). Communities of Inquiry in online learning. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice, & K. Schenk (Eds.), *Encyclopedia of Distance Learning, Second Edition* (pp. 352-355). IGI Global. <http://doi:10.4018/978-1-60566-198-8.ch052>
- Goodman, J., Melkers, J., & Pallais, A. (2019). Can online delivery increase access to education?. *Journal of Labor Economics*, *37*(1), 1-34. <https://doi.org/10.1086/698895>
- Gregori, E. B., Zhang, J., Galván-Fernández, C., & de Asís Fernández-Navarro, F. (2018). Learner support in MOOCs: Identifying variables linked to completion. *Computers & Education*, *122*, 153-168. <https://doi.org/10.1016/j.compedu.2018.03.014>
- Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications*, *1*(2), 147-166.
- Gunawardena, C.N., & Zittle, F.J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, *11*(3), 8-26. <http://dx.doi.org/10.1080/08923649709526970>
- Hostetter, C., & Busch, M. (2006). Measuring up online: The relationship between social presence and student learning satisfaction. *Journal of the Scholarship of Teaching and Learning*, 1-12.
- Hooper, D., Coughlan, J., Mullen, M. (2007). Structural Equation Modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*(1), 53-60. <https://doi.org/10.21427/D7CF7R>

- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. <http://dx.doi.org/10.1080/10705519909540118>
- Kim, Y., Glassman, M., & Williams, M. S. (2015). Connecting agents: Engagement and motivation in online collaboration. *Computers in Human Behavior*, 49, 333-342. <https://doi.org/10.1016/j.chb.2015.03.015>
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford.
- Kreijns, K., Xu, K., & Weidlich, J. (2021). Social presence: Conceptualization and measurement. *Educational Psychology Review*, 1-32, <https://doi.org/10.1007/s10648-021-09623-8>.
- Kovanović, V., Joksimović, S., Poquet, O., Hennis, T., Čukić, I., de Vries, P., ... & Gašević, D. (2018). Exploring communities of inquiry in massive open online courses. *Computers & Education*, 119, 44-58. <http://dx.doi.org/10.1016/j.compedu.2017.11.010>
- Kozan, K., & Caskurlu, S. (2018). On the nth presence for the Community of Inquiry framework. *Computers & Education*, 122, 104-118. <http://dx.doi.org/10.1016/j.compedu.2018.03.010>
- Kozan, K., & Richardson, J. C. (2014). Interrelationships between and among social, teaching, and cognitive presence. *Internet and Higher Education*, 21, 68-73. <https://doi.org/10.1016/j.iheduc.2013.10.007>
- Lah, N. H. C., & Tasir, Z. (2018). Measuring reliability and validity of questionnaire on online social presence: A Rasch model analysis. *Advanced Science Letters*, 24(11), 7900-7903.
- Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. *Educational Technology Research and Development*, 59(5), 593-618. <https://doi.org/10.1007/s11423-010-9177-y>
- Levy, Y. (2007). Comparing dropouts and persistence in e-learning courses. *Computers & Education*, 48(2), 185-204. <https://doi.org/10.1016/j.compedu.2004.12.004>
- Lewis, W. A. (2019). First-time online students' perspectives towards social presence and satisfaction (Doctoral dissertation, Northcentral University).
- Li, B., Yao, S., & Hong, W. (2019). Beginning Chinese as a foreign language online course design: Utilizing multiple digital modes and assessments. In I. Management Association (Ed.), *Computer-assisted language learning: Concepts, methodologies, tools, and applications* (pp. 2107-2145). IGI Global. <https://doi:10.4018/978-1-5225-7663-1.ch101>
- Lim, J., & Richardson, J. C. (2016). Exploring the effects of students' social networking experience on social presence and perceptions of using SNSs for educational purposes. *Internet and Higher Education*, 29, 31-39. <https://doi.org/10.1016/j.iheduc.2015.12.001>
- Liu, S. Y., Gomez, J., & Yen, C. J. (2009). Community college online course retention and final grade: Predictability of social presence. *Journal of Interactive Online Learning*, 8(2), 165-182.

- Lowenthal, P. R., & Dunlap, J. C. (2014). Problems measuring social presence in a community of inquiry. *E-Learning and Digital Media*, 11(1), 19-30.  
<https://doi.org/10.2304/elea.2014.11.1.19>
- Lowenthal, P. R., & Dunlap, J. C. (2018). Investigating students' perceptions of instructional strategies to establish social presence. *Distance Education*, 39(3), 281-298.  
<http://dx.doi.org/10.1080/01587919.2018.1476844>
- Lowenthal, P. R., & Snelson, C. (2017). In search of a better understanding of social presence: An investigation into how researchers define social presence. *Distance Education*, 38(2), 1-19. <https://doi.org/10.1080/01587919.2017.1324727>
- Ludwig-Hardman, S., & Dunlap, J. C. (2003). Learner support services for online students: Scaffolding for success. *The International Review of Research in Open and Distributed Learning*, 4(1). <https://doi.org/10.19173/irrodl.v4i1.131>
- Mancini, M. E., Cipher, D. J., & Ganji, D. (2018). Maximizing retention and progression to graduation in online programs: A case study in "Designing with the end in mind." In *Critical assessment and strategies for increased student retention* (pp. 211-225). IGI Global. <http://dx.doi.org/10.4018/978-1-5225-2998-9.ch013>
- Maydeu-Olivares, A., & Joe, H. (2014). Assessing approximate fit in categorical data analysis. *Multivariate Behavioral Research*, 49(4), 305-328.  
<https://doi.org/10.1080/00273171.2014.911075>
- McClendon, C., Neugebauer, R. M., & King, A. (2017). Grit, growth mindset, and deliberate practice in online learning. *Journal of Instructional Research*, 6, 8-17.  
<https://doi.org/10.9743/JIR.2017.2>
- McCreery, M. P., Vallett, D. B., & Clark, C. (2015). Social interaction in a virtual environment: Examining socio-spatial interactivity and social presence using behavioral analytics. *Computers in Human Behavior*, 51, 203-206. <https://doi.org/10.1016/j.chb.2015.04.044>
- McDonald, R. P. (2013). *Test theory: A unified treatment*. Psychology Press.  
<https://doi.org/10.4324/9781410601087>
- McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, 7(1), 64-82. <https://doi.org/10.1037/1082-989X.7.1.64>
- Moore, R. L., & Miller, C. N. (2022). Fostering Cognitive Presence in Online Courses: A Systematic Review (2008-2020). *Online Learning*, 26(1),  
<https://doi.org/10.24059/olj.v26i1.3071>.
- Nasoz, F., Alvarez, K., Lisetti, C. L., & Finkelstein, N. (2004). Emotion recognition from physiological signals using wireless sensors for presence technologies. *Cognition, Technology & Work*, 6(1), 4-14. <https://doi.org/10.1007/s10111-003-0143-x>
- Onah, D. F., Sinclair, J., & Boyatt, R. (2014). Dropout rates of massive open online courses: Behavioural patterns. *6th International Conference on Education and New Learning Technologies* (pp. 5825-5834). University of Warwick Press.  
<http://wrap.warwick.ac.uk/65543>.

- Oregon, E., McCoy, L., & Carmon-Johnson, L. (2018). Case analysis: Exploring the application of using rich media technologies and social presence to decrease attrition in an online graduate program. *Journal of Educators Online*, 15(2).  
<http://dx.doi.org/10.9743/jeo.2018.15.2.7>
- Oyarzun, B., Stefaniak, J., Bol, L., & Morrison, G. R. (2018). Effects of learner-to-learner interactions on social presence, achievement and satisfaction. *Journal of Computing in Higher Education*, 30(1), 154-175. <https://doi.org/10.1007/s12528-017-9157-x>
- Park, J. H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Journal of Educational Technology & Society*, 12, 207-217.
- R Core Team (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org>
- Richardson, J., Swan, K., Lowenthal, P., & Ice, P. (2016, April). Social presence in online learning: Past, present, and future. In P. Kirby & G. Marks (Eds.), *Global Learn* (pp. 477-483). Association for the Advancement of Computing in Education (AACE).
- Richardson, J., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks*, 7, 68-88. <http://dx.doi.org/10.24059/olj.v7i1.1864>
- Richardson, J. C., Maeda, Y., Lv, J., & Caskurlu, S. (2017). Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis. *Computers in Human Behavior*, 71, 402-417. <https://doi.org/10.1016/j.chb.2017.02.001>
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1-36. <https://doi.org/10.18637/jss.v048.i02>
- Rotar, O. (2020). A missing element of online higher education students' attrition, retention and success: an analysis through a systematic literature review.  
<https://eprints.lancs.ac.uk/id/eprint/144549>
- Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education*, 14(2), 50-71.
- Sanchez, B.Y. (2020). History, research, and theory to practice: Scaffolding framework for graduate online courses. <http://dx.doi.org/10.22158/fet.v3n3p9>
- Seaman, J.E., Allen, I. E., & Seaman, J. (2018). *Grade Increase: Tracking online education in the United States*. Babson Survey Research Group.
- Seckman, C. (2018). Impact of interactive video communication versus text-based feedback on teaching, social, and cognitive presence in online learning communities. *Nurse Educator*, 43(1), 18-22. <https://doi.org/10.1097/NNE.0000000000000448>
- Shen, K. N., Yu, A. Y., & Khalifa, M. (2010). Knowledge contribution in virtual communities: accounting for multiple dimensions of social presence through social identity. *Behaviour & Information Technology*, 29(4), 337-348. <https://doi.org/10.1080/01449290903156622>
- Short, J. A., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*.

- Wiley.
- Song, H., Kim, J., & Park, N. (2019). I know my professor: Teacher self-disclosure in online education and a mediating role of social presence. *International Journal of Human-Computer Interaction*, 35(6), 448-455. <https://doi.org/10.1080/10447318.2018.1455126>
- Song, D., Rice, M., & Oh, E. Y. (2019). Participation in online courses and interaction with a virtual agent. *International Review of Research in Open and Distributed Learning*, 20(1). <https://doi.org/10.19173/irrodl.v20i1.3998>
- Sproull, L., & Kiesler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science*, 32(11), 1492-1512. <https://doi.org/10.1287/mnsc.32.11.1492>
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous learning networks*, 9(3), 115-136. <http://dx.doi.org/10.24059/olj.v9i3.1788>
- Traver, A. E., Volchok, E., Bidjerano, T., & Shea, P. (2014). Correlating community college students' perceptions of community of inquiry presences with their completion of blended courses. *Internet and Higher Education*, 20, 1-9. <https://doi.org/10.1016/j.iheduc.2013.09.001>
- Trespalacios, J., Lowenthal, P. (2019). What do they really like? An investigation of students' perceptions of their coursework in a fully online educational technology program. *Australasian Journal of Educational Technology*, 35(5), 60-78. <https://doi.org/10.14742/ajet.4364>
- Tu, C. H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-learning*, 1(2), 34-45.
- Tu, C. H. (2000). On-line learning migration: From social learning theory to social presence theory in a CMC environment. *Journal of Network and Computer Applications*, 23(1), 27-37. <https://doi.org/10.1006/jnca.1999.0099>
- Tu, C. H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education*, 16(3), 131-150. [https://doi.org/10.1207/S15389286AJDE1603\\_2](https://doi.org/10.1207/S15389286AJDE1603_2)
- Wertz, R. E. (2022). Learning presence within the Community of Inquiry framework: An alternative measurement survey for a four-factor model. *Internet and Higher Education*, 52, 100832, <https://doi.org/10.1016/j.iheduc.2021.100832>.
- Whiteside, A. L. (2015). Introducing the Social Presence Model to explore online and blended learning experiences. *Online Learning*, 19(2). <http://dx.doi.org/10.24059/olj.v19i2.453>
- Wickham, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York.
- Wickham, H., & Miller, E. (2017). haven: Import and Export 'SPSS', 'Stata' and 'SAS' Files. R package version 1.1.0. <https://CRAN.R-project.org/package=haven>
- Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and future directions. *Psychological Methods*, 12(1), 58. <https://doi.org/10.1037/1082-989X.12.1.58>

## Appendix

Item Code	Item Text	Std. all
<b>Affective expression Scale</b>		
AffExp1	I formed distinct impressions of some course participants.	0.82
AffExp2	I projected who I am to other course participants.	0.84
AffExp3	I expressed emotions in this course.	0.76
AffExp4	I self-disclosed personal information about life outside of class.	0.67
AffExp5	Others self-disclosed personal information in the course.	0.73
AffExp6	We used humor in this course.	0.64
<b>Open communication Scale</b>		
OpeCom1	I expressed agreement or disagreement with others or the content of others' messages.	0.7
OpeCom2	I complimented others or the content of their messages.	0.83
OpeCom3	I felt comfortable participating in online threaded discussions.	0.8
OpeCom4	I felt comfortable interacting with others.	0.8
OpeCom5	I received answers to the questions I posed.	0.72
OpeCom6	I directly referred to the content of others posts.	0.78
OpeCom7	Others communicated effectively using online communication tools (e.g. threaded discussions, email, and instant messaging).	0.73
<b>Group Cohesion Scale</b>		
GrCo1	I was able to develop a sense of collaboration with my peers.	0.75
GrCo2	I used greetings and salutations.	0.9
GrCo3	Others used greetings and salutations.	0.92
GrCo4	I addressed the group using inclusive pronouns such as "we".	0.69
GrCo5	I referred to other participants by their first name.	0.74
GrCo6	Others addressed me by my first name.	0.75
<b>Social Presence Scale</b>		
SP1	I was able to feel other participants' personality in the online course.	0.89
SP2	I thought other people could feel my presence in the online course.	0.88
SP3	We felt the presence of the instructor in the online course.	0.59
SP4	I felt that other participants were present in the online course.	0.81
SP5	I perceived participants as 'real' people in online course.	0.79
SP6	The course participants were salient in the online course.	0.71
SP7	I could easily project the participants' personal characteristics into the online course.	0.84
SP8	I was able to project course participants effectively into the online course.	0.81