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Unlocking The Black Box: Validating an Online Learning Experience Model for Digital Training Effectiveness in Vietnamese Enterprises

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Abstract. Regular training is crucial for the firm to preserve the staff's quality. In the present day, due to the demands of work and personal commitments, participating in in-person training sessions has become a burdensome task for employees. That is why the inclination towards embracing online training is seen as an appropriate resolution to fulfill the requirements of both employers and workers. Due to its suitability for those involved in both learning and practical application, supported by appropriate qualities, the online training format is becoming more and more popular. This study analyzes digital training effectiveness for employees in Vietnamese enterprises using the online learning experience COI model encompassing teaching, social and cognitive presences. Analysis of survey data from 1507 trainees reveals significant interrelationships between these components, underscoring the need for instructional design and peer support.

Keywords. Internal training, e-learning, teaching presence, social presence, cognitive presence

1. Introduction

The increasing adoption of online training models by educational institutions and businesses highlights the need for effective evaluation frameworks to assess their impact on learners. Many people have used models like the Technology Acceptance Model (TAM), which is based on the Theory of Reasoned Action (TRA) and the Unified Theory of Acceptance and Use of Technology (UTAUT and UTAUT 2). These models mostly look at how people expect to accept and use online training, such as effort expectations, social influence, and facilitating conditions (Davis, 1989; Venkatesh et al., 2003). However, these models must not sufficiently capture learners' nuanced experiences and interactions within online training environments. To address these gaps, the research team proposes employing the Community of Inquiry (COI) Framework (Garrison et al., 2000) as a more fitting analytical tool for assessing online training services. The COI Framework looks at how teaching presence (TP), social presence (SP), and cognitive presence (CP) interact with each other. It provides a broad view of how well online learning environments affect student outcomes. The objectives of this study are twofold:

- Empirically test the influence of teaching and social presence on cognitive presence within online training environments, addressing a significant gap in current research.
- Offer actionable recommendations for businesses and educational institutions to enhance their online training offerings, focusing on improving learner satisfaction and effectiveness based on the COI Framework analysis.

This study aims to make a small but valuable contribution to the field by directly filling in the research gap about how learners interact and perceive online training settings. It will do this by showing how TP and SP help CP, improving the quality and effectiveness of online learning experiences overall (Garrison et al., 2010; Hoskin, 2012; Hilliard & Stewart, 2019; Orman et al., 2019).

2. Literature Review

2.1. Community of Inquiry Framework (COI)

The Community of Inquiry (CoI) framework, rooted in the foundational work of Dewey (1938) and Peirce (1955) and further developed by Garrison, Anderson, and Archer (2000), offers a comprehensive approach to examining online learning environments. This framework shows three essential parts of an excellent online learning experience: cognitive presence (how well students can make sense of things through discussion and reflection), social presence (how well students can project themselves socially and emotionally as real people), and teaching presence (how well teachers plan, facilitate, and direct cognitive and social processes to achieve meaningful learning outcomes). According to subsequent research (Anderson et al., 2001; Garrison et al., 2000), the interaction of these elements is crucial for fostering a rich educational experience in online settings. Many studies worldwide have applied the CoI analysis framework to evaluate student learning effectiveness in an online learning system. The CoI model assumes that learning occurs in the environment through the interaction of these three core elements. This adaptation of the CoI framework bridges the gap between pedagogy, technology, and learner needs (Campbell & Cleveland-Innes, 2005; Garrison et al., 2000, 2004; Jackson et al., 2013; Shea et al., Bidjerano, 2009b; Swan et al., 2008). In the following, the term e-learning will be used to refer to e-learning conducted online or by blended learning, and the term CoI will refer to the CoI regulatory framework developed by Garrison et al. associates (2000). Components of the CoI framework have been applied in many studies of online training. According to Swan et al. (2009), the collaborative constructivist approach to learning advocates collaboration and participation, and the online CoI framework explicitly encompasses these elements. Therefore, the online CoI model is potentially relevant to the application of emerging interactive e-learning technologies, especially since one of its key strengths is its focus on how students learn through interaction (Hoskins, 2012).

2.2. The relationship between the CoI framework and online training activities at enterprises

Since CoI was first applied to online training by Garrison et al. (2000), it has been extensively researched and refined across many fields, and tools to evaluate CoI have also been developed (Arbaugh et al., 2008). There is growing interest in the CoI framework (Anagnostopoulos et al., 2005; Arnold & Ducate, 2006; Shea, 2006). Effective promotion of learning using CoI has been reported in fields such as business (Chen et al., 2017), foreign languages (Arnold & Ducate, 2006), and information systems (Heckman & Annabi, 2005). Empirical evidence shows that the CoI framework positively impacts student satisfaction, higher-level learning, and retention rates when online courses are developed with current considerations in mind (Akyol & Garrison, 2011; Boston et al., 2009; Hoskins, 2012). The research results of Lori, Phil, Randy, and Frank (2009), Kim, J. B. (2019) confirmed the CoI analysis framework's suitability for assessing learners' cognitive levels during online learning. Garrison and colleagues (2010) affirm that COI is a practical survey tool to explore the cause-and-effect relationship between instructor capacity and learners' positive cognitive level.

There are still some things that need to be done to fully apply and validate the CoI framework in the specific setting of online training for businesses, even though it has been used a lot in other fields and situations to show that it works to improve student satisfaction, engagement, and learning outcomes (Akyol & Garrison, 2011; Boston et al., 2009). The evolving nature of online educational technologies and the unique demands of corporate training environments necessitate re-examining and extending the CoI framework to ensure its relevance and applicability. The Community of Inquiry (CoI) framework provides a valuable lens for understanding the relationship between online training activities and developing a supportive learning environment in businesses. Stenbom et al. (2016) introduced the Relationship of Inquiry framework, an adaptation of the CoI framework, to conceptualize one-to-one online coaching, emphasizing cognitive, social, teaching, and emotional presence (Stenbom et al., 2016). This adaptation can be applied to online business training to enhance the learning experience and support employee development. The impact of maintaining online training activities for employees at businesses can be multifaceted and influential. Research has shown that training significantly impacts various aspects of employee performance, productivity, and organizational outcomes. For instance, studies such as Motlokoa et al. (2018) and Zia-Ur-Rehman et al. (2020) have highlighted the positive impact of training on employee performance, job satisfaction, and productivity. These findings suggest that maintaining online training activities can enhance employee satisfaction and performance within businesses. Additionally, studies like Singh and Mohanty (2010) and Gambo (2015) show that the impact of training on employee productivity has been a topic of interest. These studies have indicated a positive relationship between training practices and employee productivity, emphasizing the potential for online training to enhance employees' skills and performance, ultimately contributing to increased business productivity. Another crucial factor that training activities influence is employee retention. Research, such as Beynon et al. (2014) and Sultan et al. (2020), has demonstrated the impact of training on employee retention in small and medium enterprises. This result suggests that maintaining online training activities can potentially reduce employee turnover and retain skilled employees within businesses. Furthermore, the impact of training on business performance has been explored in studies such as O'Regan et al. (2010) and Panagua et al. (2020), which have investigated the relationship between training, profitability, and business performance. These studies suggest that effective training, including online training, can positively influence business performance and profitability. However, it is essential to consider the potential challenges and limitations associated with online training. Studies such as Yeum, M. et al. (2020), Hashem et al. (2022), Hoe et al. (2021) have indicated that the impact of online training on employee engagement and performance may not always be statistically significant. This result highlights the need for careful consideration of the design and implementation of online training activities to ensure their effectiveness. Enterprise training activities are crucial for enhancing employees' skills and knowledge to meet the organization's objectives (Rozmi et al., 2021). The study

highlights the importance of training to ensure that employees can perform their tasks effectively and contribute to the overall success of the enterprise (Rozmi et al., 2021). This result aligns with the teaching presence component of the CoI framework, which emphasizes the role of the instructor or facilitator in designing and guiding learning activities to achieve specific learning outcomes (Lu et al., 2019). Additionally, Chuenchaikit et al. (2022) suggested that a needs assessment approach can help develop training programs for community enterprises. This approach aligns with the social presence aspect of the CoI framework, which emphasizes the importance of building a supportive and cohesive community of learners. By understanding the specific needs and challenges of community enterprises, training courses can be tailored to enhance facilitation techniques and create a supportive learning environment within these enterprises (Chuenchaikit et al., 2022). Pepin (2018) talks about how inquiry-based pedagogy allows students to think critically about society and learn about many different subjects simultaneously. This result fits with the cognitive presence part of the CoI framework. Cognitive presence focuses on exploring, constructing, and resolving understanding through sustained communication and reflection (Lu et al., 2019). This study aims to fill these gaps by proving the CoI framework works in enterprise online training and expanding its use to include a more in-depth look at how cognitive, social, and teaching presences affect how well employees learn and how happy they are with their jobs. Specifically, the research seeks to explore the dynamic interactions between these presences in the corporate learning environment, an area less covered in existing literature. By doing so, the study not only reaffirms the foundational principles of the CoI framework but also enriches it by incorporating the unique aspects of online corporate training, such as the emphasis on practical skill acquisition, performance improvement, and alignment with organizational goals. Moreover, while the CoI framework has been instrumental in advancing our understanding of the online learning process, the literature calls for further empirical evidence to support the framework's theoretical propositions, particularly in corporate training (Garrison et al., 2010). This study answers that call by giving real-world information about the connections between the CoI dimensions and learning outcomes in a business setting. It helps to improve and confirm the CoI framework. In summary, this study validates its components by focusing on the CoI framework's application in online training at enterprises. It proposes an extension that captures the unique characteristics of the corporate learning environment. This approach contributes to theoretical advancements in the field of online education but also offers practical insights for designing and implementing more effective online training programs in business contexts.

2.3. Research hypothesis and model

The research model is based on the COI framework of Garrison et al. (2010) and Hilliard and Stewart (2019), with components shown in Table 1. The COI framework is not only considered an effective assessment tool in online learning, but it can also apply assessment to other training methods (Hoskins, 2012) because the core of the analytical framework is to evaluate learners' perceptions through interaction in the learning environment.

Table 1. COI framework components

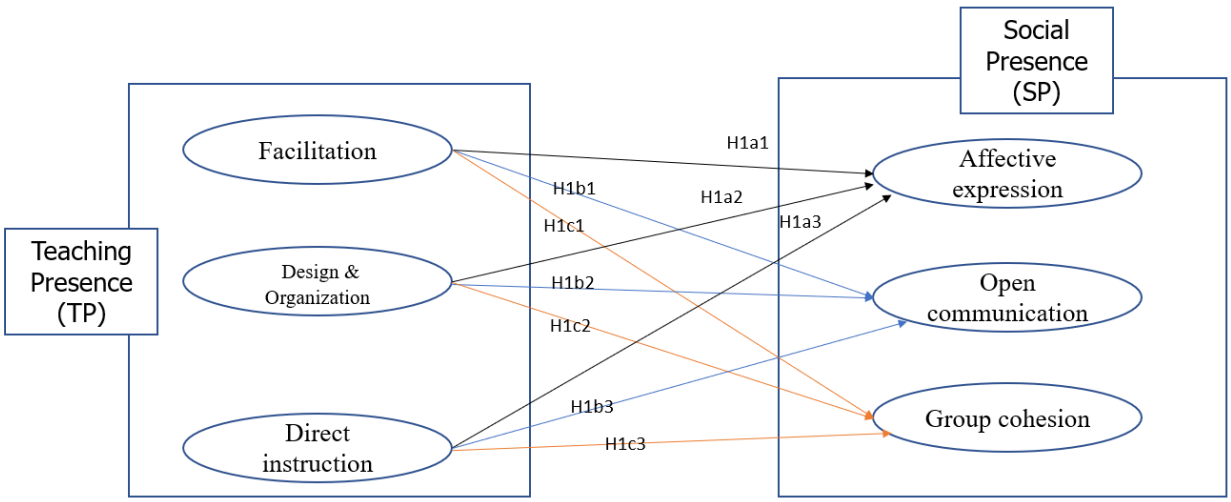
Variable	**Items**	**Code**
Teaching Presence (TP)	Design & Organization	TP1 – TP4
	Facilitation	TP5 – TP10
	Direct instruction	TP11 – TP13
Social Presence (SP)	Affective expression	SP1 – SP3
	Open communication	SP4 – SP6
	Group cohesion	SP7 – SP9
Cognitive Presence (CP)	Triggering event	CP1 – CP3

	Exploration	CP4 – CP6
	Integration	CP7 – CP9
	Resolution	CP10 – CP12

Based on previous research results, the survey subjects of these studies are usually students at universities, confirming the positive relationship between teaching presence, social presence, and cognitive presence (Garrison et al., 2010; Hoskins, 2012; Hilliard & Stewart, 2019). In this study, the research team hopes to explore in more detail the relationship between each component of the three research variables in the COI framework and employees participating in the internal training process at the enterprise. TP is an essential element in the COI mold, including CP and SP (Garrison et al., 1999). TP refers to the design, facilitation, and direction of educational experiences (Jia et al., 2022). It includes the selection and organization of course content and the design and development of learning activities (Jia et al., 2022). TP is essential in online learning environments, where instructors must actively participate and support students (Geng et al., 2019).

On the other hand, SP refers to the ability of participants in a learning environment to express themselves through emotional expression, open communication, and collaboration (Jia et al., 2022). It involves creating community and promoting interpersonal connections (Jia et al., 2022). SP is essential to creating a supportive and engaging learning environment (Richardson & Swan, 2019). TP and SP are closely interconnected within the COI framework. Research has shown that higher levels of TP can enhance SP (Geng et al., 2019). For example, instructors who actively engage with learners, provide timely feedback and create opportunities for interaction can foster a sense of community and increase learners' social presence. Conversely, the lack of TP can hinder the development of SP (Geng et al., 2019). The relationship between TP and SP can also influence learners learning and satisfaction. Studies have found that SP positively influences learners' perceived learning effectiveness and satisfaction with online courses (Richardson & Swan, 2019). Additionally, TP indirectly affects learner satisfaction by enhancing SP (Richardson & Swan, 2019). This result suggests that instructors (instructors) who effectively facilitate online courses and promote SP can contribute to learners' overall satisfaction and perceived learning outcomes. (Richardson & Swan, 2019). Based on previous research results on the relationship between TP and SP in the COI framework, the research team proposes hypothesis H_1 with the following content:

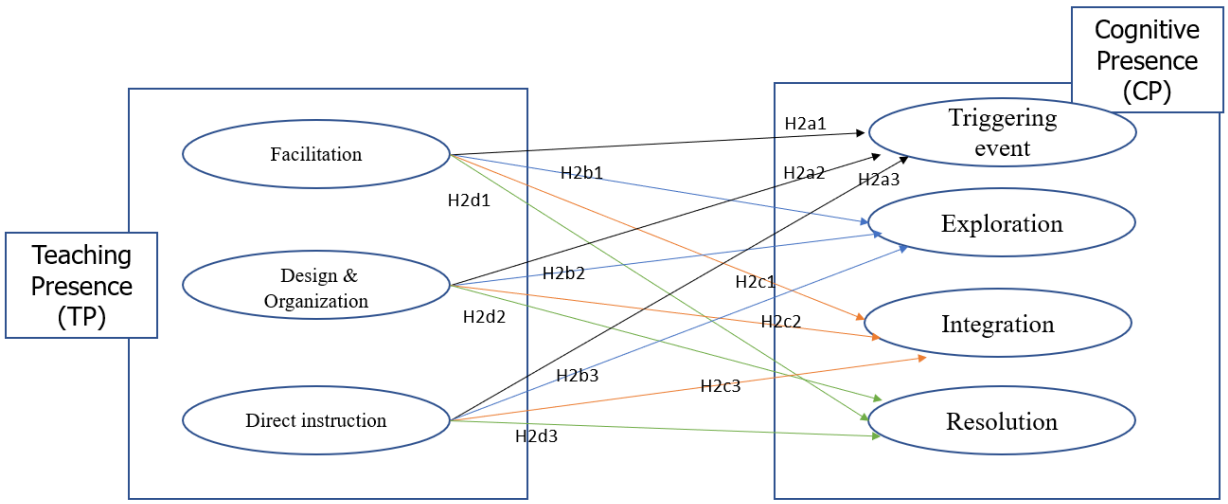
H_1: TP components have a positive influence on SP components



TP components refer to the design, facilitation, and direction of cognitive and social processes to achieve meaningful and rewarding learning outcomes (Kim et al., 2023). It includes various aspects such as instructional design, organization, and direct instruction (Akyol & Garrison, 2019). The role of

TP in online learning environments has been widely studied, especially its impact on CP. The CP factor refers to how learners construct and validate meaning through interactions with teachers, other learners, and learning content (Kim et al., 2023). It involves questioning, reasoning, connecting, challenging, and problem-solving (Tesfamicael, 2022). CP is a crucial component of the learning process and is closely related to developing critical thinking skills and a deep understanding of the subject matter (Yudhiantara, 2022). Many studies have shown that TP has a significant positive effect on CP. A study by Akyol and Garrison (2019) found a significant positive relationship between TP and CP. Similarly, another study by Silva et al. (2021) found that instructors' perceptions of TP predicted learners' perceptions of CP (Silva et al., 2021). These findings suggest that effective teaching methods, such as explicit instructional design and facilitation, can enhance learners' cognitive engagement and promote learning experiences. Furthermore, TP was shown to predict the effects of CP significantly. In a meta-analysis of 19 empirical studies of the COI framework, Martin and colleagues (2022) found that TP was a significant predictor of CP. This result indicates that the presence of effective teaching strategies and teaching supports can contribute to the development of learners' cognitive engagement and critical thinking skills. Furthermore, there are a variety of factors that can affect the complex relationship between TP and CP. For example, using instructional media resources as part of course design can moderate the relationship between learners' perceptions of TP and their own CP (Silva et al., 2021). Additionally, teaching styles and instructor characteristics may impact how TP affects CP (Costley, 2019). Therefore, educators must consider these factors and design effective teaching strategies that promote learners' cognitive engagement and meaningful learning experiences. Based on previous research results on the relationship between TP and CP in the COI framework, the research team proposes hypothesis H2 with the following content:

H_2: TP components have a positive influence on CP components

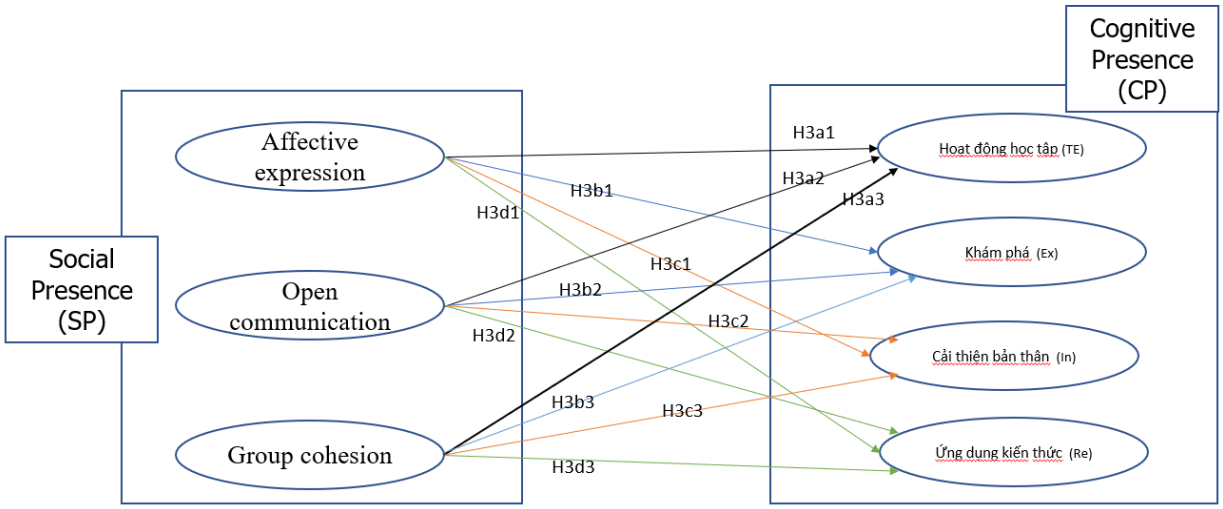


SP and CP are two vital elements of the Community of Inquiry (COI) framework, a theoretical model that examines the quality of online learning experiences (Kilis & Yildirim, 2019). The SP factor refers to the degree to which learners feel connected and engaged with others in an online learning environment (Yildirim & Seferoğlu, 2021). It involves open communication, group cohesion, and belonging (Yildirim & Seferoğlu, 2021). On the other hand, the CP element refers to the fact-finding process, including discourse and reflection aimed at constructing meaning and confirming understanding (Giannousi & Kioumourtzoglou, 2016). Several studies have explored the relationship between SP and CP. One study found that SP predicted CP positivity, indicating that higher levels of SP may lead to higher levels of CP (Sutskova et al., 2022). Another study also found a positive relationship between SP and CP, suggesting that SP plays an essential role in the development of CP

(Costley, 2019).

Additionally, research has shown that TP, another element of the COI framework, can impact both SP and CP (Sun et al., 2015). Furthermore, other factors may moderate the relationship between SP and CP. For example, one study found that self-efficacy mediated the effect between SP and CP (Jia et al., 2022). These findings suggest that SP and CP are interconnected and can influence each other through various mediating factors. It is important to note that the relationship between SP and CP may vary depending on the context and specific characteristics of the online learning environment. For example, one study found that the impact of SP on CP was higher in online learning environments than in face-to-face learning environments (Yildirim & Seferoğlu, 2021). These findings highlight the complex relationship between SP and CP and the need for further research in different educational contexts. Based on previous research results on the relationship between SP and CP in the COI framework, the research team proposes hypothesis H3 with the following content:

H_3: SP components have a positive influence on CP components



3. Methodology

3.1. Sample

Usually, the sample size is determined by N = 5*number of observed variables. After qualitative analysis, the scale will be adjusted to finalize the survey's number of qualitatively observed variables. However, to increase the representativeness of the research sample, the research team expects to increase the number of observations to about 1,500. The participants who answered the questionnaire were employees at more than 20 companies in the Northern and Southern regions of Vietnam. These are two geographical regions with a large number of businesses and a variety of business fields.

The research was conducted at businesses that deployed internal training through the LMS system, specifically Blackboard or Moodle software. Recently, especially during the COVID-19 pandemic prevention period, many people have become familiar with online learning and conference support applications. Businesses have also gradually switched to an online training model for the organization's personnel to ensure internal training progress in the new situation. Survey participants are employees participating in short-term online training courses on the online learning management system (LMS); the minimum study duration of these courses must be 80 hours (office hours). This is because this is the amount of time needed to record appropriate assessment results according to the COI framework (Garrison et al., 2010). The questionnaire inherited content from the research results of Garrison et al. (2000); (Arbaugh et al., 2008); Shea, P., and Bidjerano, T. (2009); Heilporn, G., and Lakhal, S. (2020); Smadi, O. et al. (2021). This questionnaire is divided into two parts: Part 1 includes personal

information of employees participating in the training course, such as personal information, work unit information, course name, and work position; Part 2 addresses the content to measure learners' feelings about three components: teaching, social, and cognitive. The 5-level Likert scale (with 1: Completely dissatisfied and 5: Completely satisfied) was used in the questionnaire. Participants answering the questionnaire will receive the content through the unit's human resources department. Each representative enterprise's human resources department will compile the results of the responses and send them to the research team. The number of respondents participating was 1628. After collecting and checking, 121 were eliminated due to providing inconsistent information or refusing to answer more than ten questions without stating a reason. Ultimately, 1507 completed questionnaires were used. The content of answering the questionnaire is a mandatory part of the employee's course. If not done, the employee will not be certified as having completed 100% of the course (training) content on the system. The courses employees attend on the system are mandatory, according to business regulations. Based on data collected through survey questionnaires, quantitative research is used to re-evaluate the scales and test the theoretical model with hypotheses. In this study, linear structural equation modeling (SEM) is used. Steps in the quantitative analysis include exploratory factor analysis (EFA), which is performed to synthesize observed variables of the scales for multivariate analysis and to test the scale's reliability. (through Cronbach's Alpha reliability coefficient); Confirmatory factor analysis (CFA) to retest the reliability and validity of the scales; Analyze the SEM linear structural model to retest the theoretical basis and hypotheses; Control variable analysis: a linear structural model to test the theoretical basis and hypotheses. IBM SPSS AMOS software was used to evaluate the CFA model and verify the SEM linear structural model.

4. Research Findings

The gender structure of the survey population is relatively even, with 782 people being female and 725 males. The age group 18 to 35 accounted for 62% of the survey participants' total age, while the age group over 35 accounted for 38%. Education level: More than 78% of respondents have a university degree or higher, and nearly 22% have a university degree or less. The results of determining the concentration level and variation of measurement scales in the research model are expressed through the mean, median, and standard deviation. The mean and median are close to the value of 4 (on a scale of 1 to 5). This result reflects the level of agreement (right skew) of the scale values of each concept group. The standard deviation, a measure of the difference between each observed value and the average value, is also in the range of 0.71 to 1.22. Thus, the variation of the measurement scales is not significant, or, in other words, the survey values are stable. During the official data testing (with n = 1507), the scales of the concept group continued to be preliminary evaluated through Cronbach's alpha reliability coefficient and the EFA exploratory factor analysis method. Cronbach's alpha results show that the scales are reliable (Cronbach's alpha coefficient > 0.7, and all scales in the group have a variable-total correlation coefficient > 0.3). Thus, all scales that meet the requirements will continue to be tested for EFA factor analysis.

The EFA method determines the relationship and convergence of scales within the same concept group (Russell, 2002). PCA (principal components analysis) with Promax matrix rotation (Kappa = 4) was used on all 34 scales as part of the EFA analysis process. Scales with eigenvalues > 1 will be retained for grouping. Larsen and Warne (2010) note that scales with factor loadings < 0.5 should be eliminated. The results of the EFA show that the data is convergent because the factor loading value is more significant than 0.5 and the total variance extracted is 62,787. The results also show that the scales are split into ten factors that match the initial theoretical basis. Based on this test result, the components in the research model are suitable for further CFA testing. The confirmatory factor analysis (CFA) method was used to evaluate the scale. The critical model combines various factors related to software applications and enterprise business performance. CFA results show that the model is compatible with X2 = 454.60 (p = 0.000), GFI = 0.862, CFI = 0.921, and RMSEA = 0.069.

Table 2. Index to evaluate the degree of fit of the data with the established CFA model

RMSEA (Root mean squared residual)	0.069
GFI (Goodness-of-fit)	0.862
IFI (Incremental fit index)	0.796
CFI (Comparative fit index)	0.921
PGFI (Parsimonious goodness-of-fit index)	0.687
PNFI (Parsimonious normed fot index)	0.721
PCFI (Parsimonious comparative fit index)	0.736

The results also show that the correlation coefficients of the concepts are all less than 1, confirming the discriminant value between the concepts. The results also showed that the scales met the requirements for composite reliability (pc ≥ 0.75) and extracted variance (≥ 0.50). Table 3 presents the statistical indicators of the scale.

Table 3. Indicators of the scale

Variables	**Items**	**Pc**	**Pvc (%)**
Teaching Presence	13	0.908	51.0
Social Presence	9	0.928	51.2
Cognitive Presence	12	0.911	53.1

Thus, the indicators show that the level of fit of the data with the established model is at an acceptable level and ready to perform SEM model analysis. The research model has a total of 3 concept groups, including teaching presence (TP), social presence (SP), and cognitive presence (CP). The results of the linear structure analysis of the theoretical model show that the model has a CMIN/df value of 1.261 (p = 0.000), indicating that the model is suitable for market data. In addition, other indicators such as TLI = .926, CFI = .928, IFI = 0.827, GFI = 0.886, and RMSE = 0.0157 all meet the requirements. Thus, this model is suitable for data collected from the market.

In the SEM analysis part, the purpose is to estimate (standardize) the relationship between concepts in the research model. The results of the estimation (normalization) of the main parameters are presented in Table 4. This result shows that all relationships are statistically significant (p < 5%). In addition, this result also implies that the measurement scales of the concepts in the theoretical relationship value model exist because "each measurement has a relationship with other measurements as expected. theoretically" (Churchill, 1995).

Table 4. SEM results

Hypotheses	**Relationship**	**Estimated value**	**Standard deviation**	**Critical value**	**p-value**
H1	TP => SP	0.255	0.72	3.578	0.001
H2	TP => CP*	0.192	0.57	2.771	0.026
H3	SP => CP**	0.207	0.70	5.702	0.019
Chi-square / df = 1.261, CFI = .928, TLI = .926, IFI = .827, GFI = .886, RMSEA = .0157 * R2 = 0.32; ** R2 = 0.29					

Data are analyzed to ensure appropriateness and discrimination before testing the linear relationship between concepts in the research model. Using SPSS software, principal components analysis (PCA) was performed to evaluate 34 scales of three conceptual groups. The Kaiser–Mayer–Olkin (KMO) test

results are the basis for evaluating the appropriateness of the scales in the research model. The KMO value must be at least 0.6, and the total variance extracted must be greater than 0.5 to ensure suitable conditions for conducting factor analysis. The analysis results of the two conditions show that the scales have meaning and are suitable for factor analysis. The factor loading value is specified to exceed 0.5 (Hair, Black, Babin, Anderson, & Tatham, 1998). The SEM method is used to explain the relationships in the research model. For the entire model, statistical results show Chi-square/df = 1.261, CFI =.928, TLI =.926, IFI =.827, GFI =.886, and RMSEA =.0157 (Table 4.8). The research model proposes three hypotheses about the relationships between three groups of concepts: teaching presence, social presence, and cognitive presence.

Hypothesis H_1 has stated: "TP components have a positive influence on SP components" The estimation results show that the relationship between the factors of teaching presence (TP) and social presence (SP) is 0.255, with a standard deviation of se = 0.72. This estimate has a statistical significance level of p = 0.001 (Table 4). Thus, this hypothesis is accepted.

Based on the test results, the hypothesis of two issues, teaching presence and social presence, affects learners' cognitive presence. Hypothesis H_2: "TP components have a positive influence on CP components." Hypothesis H_3: "SP components have a positive influence on CP components." The estimated values of these two relationships are 0.192 (se = 0.57) and 0.207 (se = 0.70), respectively, both of which are accepted ($p < 0.05$). The research objective is to apply the COI analysis framework to compare learners' assessment results for online training environments. Experimental results have shown the relationship between the components of teaching presence, social presence, and the cognitive presence of learners in the online environment. The research results have provided additional suggestions to improve the effectiveness of online training, especially training programs for students. The components of teaching presence and social presence positively impact each other. However, the Direct Instruction (DI) scale hurts the two scales of Open Communication (OC) and Group Cohesion (GC). This differs from previous research by Garrison (2010) and Hilliard and Stewart (2019). In addition, when considering the relationship between social and cognitive variables, the results show that the group cohesion (GC) scale does not influence the components of the cognitive variable.

Table 5. Evaluate research hypotheses

Hypotheses		**Result**
H1	TP components have a positive influence on SP components	Accepted
H2	TP components have a positive influence on CP components	Accepted
H3	SP components have a positive influence on CP components	Accepted

In the research model, in addition to three conceptual groups, teaching presence, social presence, and cognitive presence, the study also adds four control variables; each variable will be divided into two characteristics:

Working position - WP	- Services such as: Sales, Marketing, HR, Finance, etc. - Techniques such as: Production, maintence, IT, etc.
Age - Ag	- 18-35 years old - over 35 years old
Gender - Gen	- Male - Female

The study uses three control variables to evaluate whether there are differences between each group of characteristics in the relationship between the teaching presence, social presence, and cognitive presence of learners. The authors use dummy variables in the regression model. To measure the impact of these dummy variables on the relationship between the independent and dependent variables, the method used is covariance analysis, using the method of multiplying dummy variables with independent variables to create variables. New. With a regression function of the form:

$Y = \beta0 + \beta1X + \beta2DX + u$

D is a dummy variable, and X is teaching presence or social presence (an independent variable). Then, the coefficient β2 will indicate the impact of the dummy variable on the regression relationship in the model. The results of the analysis are presented in Table 6.

Table 6. The influence of control variables

	1. Workplace (0: Service 1: Technical)		
Relationship	Estimated value	Standardized estimated value	Sig.
TP => CP	0.527	0.522	0.016
SP => CP	0.426	0.419	0.022
	2. Age (0: 18 – 35; 1: > 35)		
Relationship	Estimated value	Standardized estimated value	Sig.
TP => CP	0.156	0.150	0.015
SP => CP	0.126	0.118	0.018
	3. Gender (0: Male; 1: Female)		
Relationship	Estimated value	Standardized estimated value	Sig.
TP => CP	0.006	0.003	0.241
SP => CP	0.002	0.001	0.359

Table 6 shows the results of the analysis that show how workplace, age, and gender have different effects on the relationship between students' teaching presence (TP), social presence (SP), and cognitive presence (CP) in an online learning environment.

- Workplace (WP)
  - TP effect on CP: The significant coefficient (Sig < 0.05) indicates that the workplace type influences how teaching presence affects cognitive presence. Specifically, the positive and significant estimated values suggest that teaching presence substantially impacts cognitive presence for learners in job positions: Service (as sales, marketing, HR, finance, etc.) compared to those in Technical (as production, maintenance, IT, etc.).
  - SP effect on CP: Like with TP, the workplace significantly impacts the connection between social and cognitive presence. Learners in the service sector are more affected by social presence and cognitive presence than their technical counterparts.
- Age (Ag)
  - TP effect on CP: The significant effect (Sig < 0.05) indicates that age groups differentially experience the impact of teaching presence on cognitive presence. The positive coefficients show that older learners (over 35) are more influenced by teaching presence than younger learners (18–35).
  - SP effect on CP: The relationship between social and cognitive presence also varies by age, with older learners again showing a more substantial impact. This suggests that facilitating social interactions and establishing a social presence in the learning environment are particularly important for enhancing the cognitive presence of older learners.
- Gender (Gen)
  - Both teaching and social presence had a non-significant effect on cognitive presence across genders (Sig > 0.05). This means there is no statistical difference between how

male and female students think teaching and social presence affect their cognitive engagement in learning.

The analysis underscores the nuanced ways different groups of learners experience and benefit from online learning environments. Workplace and age emerge as significant factors influencing the relationships between teaching, social, and cognitive presence, suggesting that these variables should be carefully considered when designing and facilitating online courses to maximize learning effectiveness. The findings indicate that tailored strategies may be necessary to address learners' unique needs and preferences from various professional backgrounds and age groups. Conversely, gender does not appear to significantly differentiate learners' experiences regarding the impacts of teaching and social presence on cognitive presence, suggesting that gender-specific strategies may not be essential in this context.

5. Conclusion

This research used the Community of Inquiry (COI) framework to examine how well online training environments work for businesses. It showed exciting details about how teaching, social, and cognitive presence change over time. The findings underscore the critical influence of teaching and social presence on enhancing cognitive presence among learners, thus facilitating deeper engagement and learning outcomes in online settings. The study emphasizes the significance of instructors delivering thorough, interactive, and engaging content as essential to fostering learner satisfaction and motivation for ongoing engagement in online learning. Furthermore, the appropriate selection of online teaching tools that offer convenience, effective information sharing, and flexibility emerged as essential for enhancing the learning experience and supporting learners' progress. The research also sheds light on enterprises' need to elevate their digital literacy and proficiency in online learning platforms, aligning with broader digital transformation goals. This competency is vital for employees to leverage digital technologies and fully adapt to evolving workplace demands.

Moreover, the study advocates redesigning training programs to include more interactive online and offline exchanges between instructors and learners to bolster the learning experience. Significantly, the study uncovers an intense desire among learners for a learning management system that is user-friendly, efficient, and aesthetically pleasing, with a traditional classroom feel that supports high interactivity and personal knowledge creation. This insight is pivotal for management and training departments aiming to refine online training strategies and tools. However, the research encounters limitations, particularly in its scope of generalizability across different industries and cultural contexts. The study's focus on the Vietnamese market suggests a need for further exploration into how the COI framework and its findings apply globally, especially in diverse enterprise environments. The study also shows that more research could be done on the cause-and-effect connections between COI components. This result could lead to changes to the framework that make it more useful in a broader range of situations.

In conclusion, this study advances our understanding of the critical factors influencing learner engagement and satisfaction in online training environments; it also opens avenues for additional research. Future investigations could explore the impact of cultural and industry-specific factors on the effectiveness of the COI framework and the integration of emerging technologies in online training platforms to enhance learner experiences further. These efforts will be critical in refining and adapting online training models to meet the evolving needs of learners and organizations alike.

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