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STUDENT PERCEPTIONS OF TEACHING PRESENCE IN AN ONLINE ACADEMIC READING MODULE

An Action research study

Aaron Orszag

Understanding students' perceptions of teaching presence in online learning environments is crucial for designing effective teaching. This action research project took place over four years with four different cohorts and examined how teaching presence, a key dimension of the Community of Inquiry (CoI) framework, was affected by three pedagogical factors: embedded support, learning environment layout, and teacher feedback against a base model. The study involved first-year bachelor's students in education enrolled in a mandatory language course focusing on academic literacies. Embedded within this course was an e-learning module designed to develop students' academic reading skills. The aim of the action research was to determine whether student perceptions of teaching presence significantly increased with the introduction of each of the pedagogical factors. The research also investigated how students' confidence in their academic ability (CAA), confidence in English (CE), and working mode (WM, individual or group work) affected their perceptions of teaching presence in the module. Confirmatory factor analysis, measurement invariance, comparison of means, and regression analysis were used to test different variables. The results indicate that embedded support seems to be the most crucial pedagogical factor affecting students' perceptions of teaching presence. There was no significant difference observed in the effect of students' CAA, CE, and WM on their perception of teaching presence across all four cohorts. However, in the 2021 cohort, students who completed the e-learning module individually reported significantly higher perceived teaching presence than did those who worked in a group. These students appeared to form groups based on perceived CAA rather than self-rated CE, but this finding was not observed across the other three cohorts. The results highlight the impact of different pedagogical factors and student choices on teaching presence, which has important implications for designing effective online courses.

Keywords: teaching presence, online learning, pedagogical design, academic reading, community of inquiry

Tehokkaan opetuksen suunnittelun kannalta on ratkaisevan tärkeää ymmärtää, miten opiskelijat havaitsevat opetuksellisen läsnäolon verkko-oppimisympäristöissä. Tässä nelivuotisessa ja neljän eri kohortin toimintatutkimushankkeessa selvitettiin, miten kolme pedagogista tekijää, eli integroitu tuki, oppimisympäristön järjestelyt ja opettajan antama palaute verrattuna perusmalliin, vaikuttivat opetukselliseen läsnäoloon, joka on keskeinen ulottuvuus tutkivan yhteisön (Community of Inquiry, CoI) mallissa. Tutkimukseen osallistui ensimmäisen vuoden kasvatustieteen kandidaattiopiskelijoita, jotka suorittivat pakollista akateemisten tekstitaitojen kurssia. Kurssiin sisältyi verkko-opetusmoduuli, jonka tarkoituksena oli kehittää opiskelijoiden akateemista lukutaitoa. Toimintatutkimuksen tavoitteena oli selvittää, lisäksi kunkin pedagogisen tekijän käyttöönotto merkittävästi opiskelijoiden havaintoja opetuksellisesta läsnäolosta. Tutkimuksessa selvitettiin myös, miten opiskelijoiden luottamus akateemisiin kykyihinsä (CAA) ja englannin kielen taitoonsa (CE) sekä heidän käyttämänsä työskentelytapa (WM, yksilö- tai ryhmätyöskentely) vaikuttivat heidän havaintoihinsa opetuksellisesta läsnäolosta moduulissa. Muuttujia testattiin konfirmatorisen faktorianalyysin, mittausinvarianssin, keskiarvovertailun ja regressioanalyysin avulla. Tulokset osoittavat, että integroitu tuki näyttää olevan tärkein opiskelijoiden havaintoihin opetuksellisesta läsnäolosta vaikuttava tekijä. Minkään kohortin osalta ei todettu merkitsevää eroa opiskelijoiden CAA:n, CE:n ja WM:n vaikutuksessa heidän havaintoihinsa opetuksellisesta läsnäolosta. Vuoden 2021 kohortissa verkko-opetusmoduulin yksilöllisesti suorittaneet opiskelijat kuitenkin raportoivat havainneensa opetuksellista läsnäoloa huomattavasti enemmän kuin ryhmässä työskennelleet opiskelijat. Nämä opiskelijat näyttivät muodostavan ryhmiiä pikemminkin koetun CAA:n kuin itsearvioitun CE:n perusteella, mutta tätä havaintoa ei tehty kolmessa muussa kohortissa. Tulokset tuovat esiin erilaisten pedagogisten tekijöiden ja opiskelijoiden valintojen vaikutukset opetukselliseen läsnäoloon, millä on merkittäviä implikaatioita toimivien verkkokurssien suunnitteluun.

Asiasanat: opetuksellinen läsnäolo, verkko-opetus, pedagoginen suunnittelu, akateeminen lukeminen, tutkiva yhteisö

Introduction

The Community of Inquiry (CoI) is a prominent theoretical framework for designing and analysing online learning environments. According to this model, learning is facilitated through three factors: teaching, social, and cognitive presence (Garrison et al., 2010). Teaching presence is defined as the support of social and cognitive presences to achieve educational outcomes, social presence refers to the ability of learners to express their personalities and interact within a learning community, and cognitive presence is the ability of learners to construct meaning through dialogue (Garrison et al., 2010). It is important to note that presence does not refer to physical presence but to an individual being perceived as there to help or guide (Song et al., 2019). Combining these two definitions one can define teaching presence as students' perceptions of the pedagogical design of the course to support their social and cognitive development. Of the three presences, teaching presence plays a central role in the CoI because it supports the other two presences (Domenech-Betoret et al., 2017; Shen et al., 2013). According to Garrison (2017), teaching presence is based on design and

organisation, facilitation, and direct instruction. Design and organisation are the structure and logical progression of the course, facilitation provides meaning and understanding for each individual student, and direct instruction refers to correcting misconceptions and providing timely academic expertise for the students. Despite the assumed significance of teaching presence in the CoI, further research is needed to explore this concept in different contexts, including the use of assessment and student perceptions of teaching presence (Garrison, 2017). Some researchers have proposed that a fourth dimension, learning presence, should be added to the CoI (Ma et al., 2017; Shea et al., 2014). Learning presence is defined as the behaviour, motivation, emotions, and strategies for successful learning (Shea & Bidjerano, 2012). However, this distinction between teaching and learning presence would compromise the basic principles that the CoI was founded on (Garrison, 2017). This debate suggests that further research into teaching presence is needed.

A review of the recent literature indicates that the research focuses on verifying the use of CoI in different contexts and modifying and validating different items and constructs rather than on comparing how groups of students differ in terms of context, institutional setting, major, or stage of studies. Two studies (Ma et al., 2017; Wertz, 2022) found that learning presence and teaching presence were separate constructs. Ma et al. (2017) found that teaching and social presence influenced learning presence, while Wertz (2022) only mentions that learning presence should be added to the CoI. Neither study analysed how different groups viewed the CoI even though they had the chance to compare institutions, years at university, and major. Two studies (Heilporn & Lakhali, 2020; Wertz, 2022) found that a two-variable construct of teaching presence consisting of course design and facilitation was best because facilitation and direct instruction were highly correlated. Heilporn and Lakhali (2020) collected data from two universities and found them invariant, which means that the two groups viewed the questionnaire's questions the same. However, they did not conduct a comparison of means (e.g., t test, ANOVA) on the two universities. One study by Lau et al. (2021) compared gender and major with teaching presence and found no significant difference between these factors, but they did not test for invariance. Heilporn and Lakhali (2020) have called for more multi-group analysis on the CoI which tests for invariance and could provide researchers and teachers with a better understanding of teaching presence. This action research, conducted over four years, aims to investigate how different pedagogical factors, embedded support, learning environment layout, and teacher feedback affect student perceptions of teaching presence in an online academic reading module. An additional aim was to investigate whether working mode (group or individual work), confidence in academic ability, and confidence in English affect teaching presence.

E-learning Design

Course background

The English language e-learning module at the centre of this study focused on reading an academic article written in English. It was part of a compulsory multilingual academic literacy course taught in Finnish, English, and Swedish at the University of Jyväskylä, which was also integrated with the students' home department course. As a learning environment, the academic literacy course used Moodle 3.5 for the 2018 cohort and Moodle 3.9.7 for the 2021 cohort, with the e-learning module embedded into the Moodle workspace. The

students had one month to complete the e-learning module, but they were able to request more time.

Base design: Cohort 2018

The base model of the e-learning module was designed in such a way that the students had the choice to work either in a group or individually. The teacher encouraged students who were less confident in their English skills or their academic ability to work in a group. The teacher introduced the module, explained how long it would take, and gave the students the option to skip certain activities. Cho and Heron (2015) pointed out that if a course is too structured, competent learners will feel a lack of control and therefore experience dissatisfaction. The module consisted of mini-learning modules (MLM) focusing on the following: identifying academic articles, finding key information in an academic article, and paraphrasing and summarising. Each MLM was based on the cyclical phases in Zimmerman's (2013) framework of self-regulated learning (SRL): forethought, performance, and self-reflection. SRL is defined as an individual's active use of metacognition, motivation, and behaviour in their learning (Zimmerman, 1989, 2008). Garrison and Arkyol (2015) suggested that since the CoI makes the students reflect, process, and reflect again, it offers a good model for promoting SRL. Zimmerman (2013) also distinguished two types of learners, *proactive* and *reactive*. Proactive learners use more forethought than reactive learners, who, in turn, use self-reflection after a performance to learn. This means that proactive learners are goal-oriented and more confident in their learning due to a perceived similar experience and thus are able to use more self-regulation in their learning. Proactive learners also have high self-efficacy (Zimmerman, 2013). In contrast, reactive learners tend to have lower self-efficacy because of not having had a perceived similar experience and thus would use self-reflection to increase their self-efficacy/self-regulation in the future. Therefore, they would need observations and emulation activities with the help of social interaction from the teacher or other students. Cho et al. (2017) highlight that understanding and developing learners' self-regulation would have a positive effect on teaching presence.

In the course, performance activities were all mandatory assignments, and the self-reflection activities were only available after the students completed the performance activity. The self-reflection activities were designed following a multimodal approach, allowing students to reflect on their answers through a written text or a video with teacher comments. All the material was designed using the Cognitive Affective Theory of Learning with Media (Moreno & Mayer, 2007). No feedback was given to the students during these MLMs except after the final summary. This was done because too much teacher support has been shown to restrict students' metacognition (Larkin, 2009). It was also assumed that assessing every single performance activity would be unsustainable for the teacher. The CoI teaching presence questionnaire was integrated into the e-learning module after the final summary and data were collected before teacher feedback on the final summary to ensure a high response rate and to see how students perceive teaching presence without teacher feedback.

Embedded support: Cohort 2019

Based on students' feedback and analysis of the data from the CoI questionnaire from the 2018 cohort, embedded support was added. This support first meant labelling the SRL

cyclical phases as *think* (forethought), *act* (performance), and *check* (self-reflection). According to Lim et al. (2020), it is important for students to be aware of their learning to succeed at university. It was assumed that these labels would help students better understand the SRL process and their own learning. Second, support videos were added. These were think-aloud videos by the teacher to demonstrate academic reading strategies. Neebe (2017) found that such think-aloud videos increased students' attention to strategies and helped them continue when faced with a challenging task. The videos also provided observation opportunities for students, which is the first phase in SRL and can lead to a higher sense of self-efficacy (Ahm et al., 2017; Zimmerman, 2013). Finally, videos can also increase teacher credibility and persuasion power (Won et al., 2017). In the videos, the teacher demonstrated the process of academic reading, using an academic article written in a language the teacher did not know well (Swedish). It was assumed that if the teacher had a similar learning experience as the students, this would increase the teacher's credibility and demonstrate that a student can also complete the task. Third, an overview video of the e-learning module was added to the beginning of the module to help students understand the goals and completion methods of the e-learning module. In the previous year, the e-learning module was only explained in the first class of the course but not in the module. Fourth, an example of a summary (an authentic text written by a student in a similar course) was added with teacher comments in the text. Alternatively, students could watch a video of the teacher analysing and evaluating the summary. The last addition was face-to-face support for students who wanted it. As in the previous year, the questionnaire was integrated into the e-learning module at the end, and data were collected before teacher feedback on the final summary.

Learning environment layout: Cohort 2020

For the 2020 cohort, the layout of the e-learning module was changed. Instead of showing all the activities in Moodle, they were hidden from the students but linked to in a course outline table with suggested deadlines also showing links to register for face-to-face teacher support in Zoom. These deadlines were not mandatory but were intended to give students a time frame for completing the e-learning module. The data were collected the same way as in the previous two years to enable the researcher to see how course layout as a single factor influenced teaching presence. This was also the first time running the e-learning module during the COVID-19 pandemic.

Teacher feedback: Cohort 2021

For the 2021 cohort, face-to-face support was dropped as no student was using it, but students were encouraged to email the teacher with their questions. The data for this year were collected after teacher feedback on the final summary to analyse if the feedback had an impact on teaching presence.

Methods

Participants

The participants were first-year students at a Finnish university, studying in a Finnish-language education BA program. Out of 608 students enrolled in the course over four years, 282 students participated in the study by completing the survey, which means a response rate of 46.38%. See Table 1 for the yearly and total response rate.

Table 1 Yearly and Total Response Rate

Cohort	Number of students completing the module	Number of students completing the survey	Response rate (%)
2018	119	80	67.2
2019	161	84	52.1
2020	173	69	39.8
2021	155	49	31.61
Total	608	282	46.38

Data collection methods

The CoI questionnaire based on the Community of Inquiry Survey Instrument (draft v14 (n.d.)) was reverse translated from English into Finnish and then back to English by professional translators to ensure an accurate Finnish translation. Only the first two dimensions of the CoI questionnaire – design and organisation along with facilitation – were used in this study to measure teaching presence. There were ten items altogether, four for design and organisation, labelled tp1–tp4 and six for facilitation, labelled tp5–tp10. The students rated these items on a Likert scale from 1 to 5 with 1 being *strongly disagree* to 5 being *strongly agree*. In addition to measuring teaching presence, the independent variables were cohort, confidence in academic ability (CAA) as well as confidence in English (CE) – both labelled as not confident or confident and then converted to 1 for not confident and 2 for confident – and working mode (individual or group), which was converted to 1 for individual and 2 for group. CAA and CE were not collected for the second year.

Data analysis

The data were analysed in RStudio (2022.07.1 build 554) running R 4.2.1. To conduct a confirmatory factor analysis (CFA), a sufficiently large sample size is needed. According to Wolf et al. (2016), the sample size is based on latent variables, items, and loadings. The more latent variables a study has, the larger the sample size. However, using a higher number of items and a higher loading of those items on the latent variables allows for using a lower sample size. Based on Wolf et al.'s (2016) research, a minimum sample size of two latent variables with 10 indicators would require a sample size of 160 for a loading of .50, 130 for a loading of .65, and 90 for a loading of .8. Wertz (2022) used the same two latent factors as this

study and had loadings from .69 to .88 to indicate that 90 to 130 participants were needed to conduct a similar CFA.

According to Maydeu-Olivares (2017), before conducting a CFA one has to determine if the data is normal or nonnormal. After this step, there are many estimators that a researcher can use to conduct a CFA (Maydeu-Olivares, 2017). The estimators ML or MLF can be used for normally distributed data and MLM, MLMV, and MLR for non-normal distribution. To determine the goodness of fit for the CFA model, a model should be above 0.95 for CFI and TLI and below 0.08 for RMSEA and 0.06 for SRMR (Hu and Bentler, 1999). However, Levesque et al. (2004) suggested that an RMSEA of 0.05 or less is a very good fit and that an RMSEA between 0.05 and 0.08 is a reasonable fit.

A test of measurement invariance (MI) for cohort, confidence in English, confidence in academic ability, and the working mode was conducted. MI tests a construct across groups to ensure that the different groups interpret the items the same. It consists of three tests: configural, metric, and scalar invariance. According to Putnick and Bornstein (2016), once these tests have been passed, even with partial scalar invariance, one can compare the group means of latent factors. They also emphasised that when testing MI, there is no consensus on the best-fit indices or cutoff values. They mentioned that a significance in χ^2 is traditionally used, but now most researchers use the criterion of a $-.01$ change in CFI. This study used the $-.01$ change in CFI. MI groups were then tested using a combination of one-way ANOVA, Turkey's HSD, and t tests. Regression analysis was also used to test if confidence in English and confidence in academic ability affected the choice of working mode. Finally, Moodle statistical data on click counts for teaching feedback and "check activities" was collected to see if students were reading teacher feedback and clicking on the check activities.

Results

Descriptive statistics

All the items had an increase in their means over all four years. However, from 2019 to 2020 there was a lower mean for the indicator tp1 in design and organisation, as well as in all the facilitation indicators. This was also the first time the e-learning module was conducted during the COVID-19 pandemic. All the indicators were higher in 2021. (See Table 2 for an overview of the individual means of each indicator per year.) Most of the students (77%) completed the e-learning module individually, with only 23% completing the module as a group over the four years. However, in the 2021 cohort, 55% completed the module as a group, and 45% did it individually. It is also important to note that not all the students in the overall population clicked on the check activities. On average, 89% of the students clicked on the check activities. What is more interesting is that on average only 35% of the overall population of the students checked the teacher's feedback. See Table 3 for more detailed information by year, the working mode, the percentage of students who clicked on the check activities and looked at teacher feedback.

Table 2 Item Means and SD for Each Cohort

	2018	2019	2020	2021
tp1	3.29 (1.03)	3.85 (0.92)	3.72 (0.97)	3.80 (0.93)
tp2	3.22 (0.97)	3.76 (0.89)	3.78 (0.94)	3.82 (0.86)
tp3	2.84 (1.13)	3.67 (0.91)	3.77 (0.93)	3.84 (0.90)
tp4	3.28 (1.26)	3.93 (0.85)	4.39 (0.75)	4.47 (0.65)
tp5	2.59 (0.98)	3.06 (0.88)	3.00 (0.97)	3.29 (0.98)
tp6	2.96 (1.00)	3.57 (0.92)	3.33 (0.89)	3.53 (1.02)
tp7	3.01 (1.20)	3.44 (1.03)	3.19 (0.96)	3.37 (1.00)
tp8	3.00 (1.06)	3.38 (0.97)	3.29 (0.88)	3.59 (0.84)
tp9	3.21 (1.12)	3.58 (1.02)	3.32 (1.02)	3.63 (1.03)
tp10	3.08 (1.12)	3.48 (1.07)	3.04 (1.02)	3.59 (1.00)

Table 3 Percentages of Work Mode, Clicked-on Check Activity, and Checked Teacher Feedback

	2018	2019	2020	2021
Working mode ^a				
Group <i>N</i> (%)	16 (20)	12 (14)	9 (13)	27 (55)
Individual <i>N</i> (%)	64 (80)	72 (86)	60 (87)	22 (45)
Clicked on check activity (%) ^b				
PDF/Video 1		80	76	
PDF/Video 2	No data collected	93	89	No data collected
PDF/Video 2	No data collected	93	88	No data collected
PDF/Video 4		100	95	
Checked teacher feedback (%) ^c	No data collected	30	45	30

^aPercentage is calculated by the individuals who responded to the questionnaire.

^bPercentage is calculated in Moodle with the overall population. These percentages are just estimates and include both teacher and students who viewed the text/video.

^cPercentage is calculated in Moodle by the Turnitin activity and calculated with the overall population that completed the final assignment.

Marida's test

Marida's test was tested on items tp1–tp10 to see if the data was normal or non-normal. The test resulted in a skewness of $p = 0.00$ and a kurtosis of $p = 0.00$, which indicates that the data is non-normal, and a robust or non-normal distribution estimator should be used. The MLM estimator was decided on because the data were complete.

Confirmatory factor analysis

The validity of the instrument was tested with confirmatory factor analysis (CFA) in two stages using the MLM estimator. The first CFA using a two-factor model with design and

organisation and facilitation produced a model with a CFI of 0.96, TLI 0.94, RMSEA 0.07, and SRMR 0.04, which is not a reasonable fit because of the TLI. Looking at the modification index, tp4 was removed. This item was removed because it was easier to distinguish for students than the other items in the design and organisation factor. The second CFA produced a CFI of 0.97, TLI 0.96, RMSEA 0.07, and SRMR 0.03, which is a reasonable fit (Figure 2). Based on the items, latent variables, and loadings, the sample size of 282 is appropriate. Table 4 shows the means and standard deviations of the latent variables.

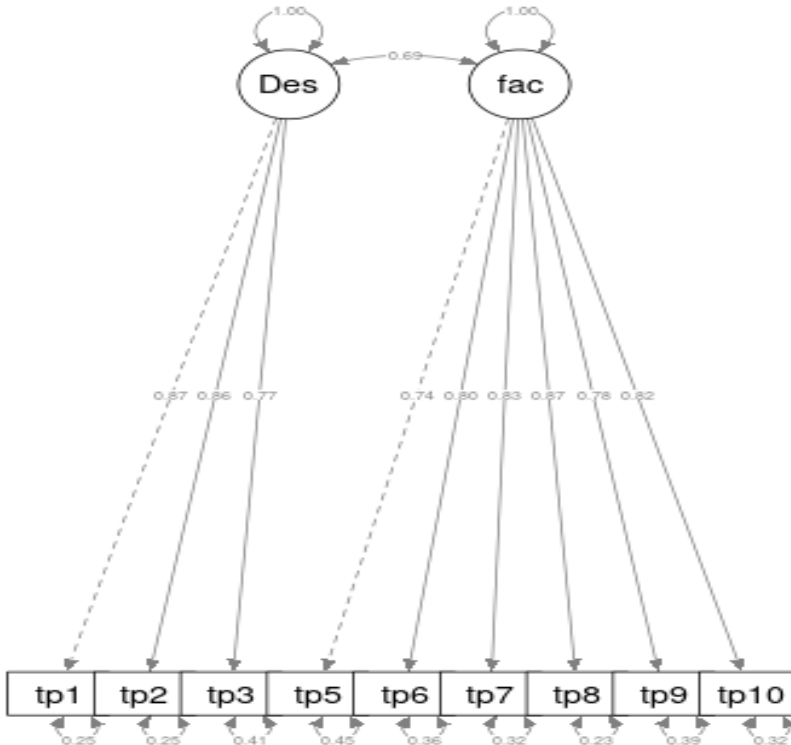


Figure 1 CFA

Table 4 Means (SD) of the Variables Per Cohort

	2018	2019	2020	2021
Design	3.11 (0.93)	3.75 (0.79)	3.76 (0.83)	3.82 (0.83)
Facilitation	2.96 (0.90)	3.42 (0.82)	3.20 (0.77)	3.56 (0.86)
Teaching Presence	3.05 (0.80)	3.59 (0.71)	3.48 (0.71)	3.68 (0.80)

Measurement invariance

A multi-group analysis was done to test measurement invariance for cohort, confidence in academic ability, confidence in English, and working mode. Confidence in academic ability, confidence in English, and working mode were all able to achieve scalar invariance. Cohort was only able to achieve partial scalar invariance because the ΔCFI was below the cutoff of -0.01 . Based on this result, it was identified that tp3 and tp10 had to be freed to have partial scalar invariance (Table 5).

Table 5 Test of Measurement Invariance

Group	Model fit indices				Model comparison			
	$\chi^2(df)$	CFI	RMSEA	SRMR	$\Delta\chi^2(\Delta df)$	ΔCFI	$\Delta RMSEA$	$\Delta SRMR$
Cohort								
Configural	125.59 (104)	0.98	0.05	0.04				
Metric	147.73 (125)	0.97	0.05	0.07	21.67 (21)	0.00	-0.00	0.02
Scalar	200.54 (146)	0.94	0.07	0.08	68.81 (21)***	-0.02	0.02	0.01
Partial Scalar (free tp3 and tp10)	170.54 (140)	0.97	0.05	0.07	24.62 (15)	-0.00	0.00	0.00
Academic Ability								
Configural	66.52 (52)	0.98	0.05	0.04				
Metric	72.04 (59)	0.98	0.04	0.05	5.06 (7)	0.00	-0.00	0.00
Scalar	73.39 (66)	0.98	0.04	0.05	7.03 (9)	0.00	-0.00	0.00
English Ability								
Configural	71.79 (52)	0.97	0.06	0.04				
Metric	80.75 (59)	0.97	0.06	0.06	8.83 (7)	-0.00	-0.00	0.01
Scalar	84.83 (66)	0.98	0.05	0.06	2.89 (7)	0.00	-0.00	0.00
Working Mode								
Configural	94.30 (52)	0.96	0.07	0.04				
Metric	101.30 (59)	0.96	0.07	0.04	5.56 (7)	0.00	-0.00	0.00
Scalar	119.88 (66)	0.95	0.07	0.05	21.49 (7)**	-0.00	0.00	0.00

*** $p \leq 0.000$, ** $p \leq 0.001$

Mean tests on invariance groups

Based on the measurement invariance tests, a one-way ANOVA test was used to determine the difference between cohorts with design and organisation, facilitation, and teaching presence as latent variables. There was a significant difference between the cohort and design and organisation, $F(3,278) = 11.59$, $p = 0.00$, the cohort and facilitation $F(3,278) = 6.28$, $p = 0.00$, and the cohort and teaching presence $F(3,278) = 8.90$, $p = 0.00$. Post-hoc testing using Tukey's HSD was then used to test the difference between the cohorts and these latent variables. There was a significant difference in design and organisation between the 2018 cohort and the 2019 cohort $p = 0.00$, 95% CI [0.30, 0.98], cohort 2018 and cohort 2020 $p = 0.00$, 95% CI [0.28, 1.000], and cohort 2018 and cohort 2021 $p = 0.00$, 95% CI [-1.09, -0.30]. For facilitation, there was only a significant difference between cohort 2018 and cohort 2019 $p = 0.00$, 95% CI [0.10, 0.78] and cohort 2018 and cohort 2021 $p = 0.00$, 95% CI [-0.98, -0.19]. For teaching presence, there was a significant difference between cohort 2018 and cohort 2019 $p = 0.00$, 95% CI [0.20, 0.81], cohort 2018 and cohort 2020 $p = 0.02$, 95% CI [0.03, 0.68], and cohort 2018 and cohort 2021 $p = 0.00$, 95% CI [-0.98, -0.26].

Next, *t* tests were used to determine if there was a significant difference between confidence in academic ability, confidence in English, and working mode with design and organisation, facilitation, and teaching presence (see Table 6 for means and standard deviations). There was no significant difference between students with no confidence in their academic ability and students with confidence in their academic ability between design and organisation $t(118.69) = 1.06, p = 0.29$, facilitation $t(115.17) = 0.86, p = 0.38$, and teaching presence $t(118.86) = 1.03, p = 0.31$. There was also no significant difference between students with no confidence in their English and confidence in their English with design and organisation $t(193.01) = 1.87, p = 0.06$, facilitation $t(185.98) = -0.92, p = 0.35$, and teaching presence $t(188.91) = 1.54, p = 0.12$. There was also no significant difference between those who worked individually or in a group with design and organisation $t(102.73) = 0.22, p = 0.82$, facilitation $t(96.37) = 0.33, p = 0.73$, and teaching presence $t(96.153) = 0.31, p = 0.75$.

Table 6 Means (SD) of Independent Variables for All Cohorts

	Design	Facilitation	Teaching presence
Academic ability (confident)	3.62 (0.88)	3.28 (0.74)	3.45 (0.77)
Academic ability (not confident)	3.47 (0.94)	3.16 (0.88)	3.32 (0.83)
English ability (confident)	3.63 (0.89)	3.25 (0.81)	3.44 (0.77)
English ability (not confident)	3.39 (0.95)	3.14 (0.95)	3.26 (0.86)
Working mode (individual)	3.60 (0.89)	3.27 (0.85)	3.44 (0.77)
Working mode (group)	3.53 (0.90)	3.23 (0.92)	3.38 (0.86)

2021 cohort analysis

A final analysis was conducted on the 2021 cohort because there was a sizable increase in students working in a group than independently compared to the previous cohorts (See Table 7 for means and standard deviations). In the 2021 cohort, 27 participants worked in a group (55%) and 22 worked individually (45%). In the previous three cohorts on average, 84% worked independently and 16% worked in a group. Those that completed the module independently for the 2021 cohort had significantly higher perceptions of teaching presence than did those that completed it in a group $t(80.49) = 15.77, p = 0.00$.

Based on the *t* test result, a multiple linear regression was used to test if confidence in academic ability or confidence in English could predict working mode for the 2021 cohort. The regression was significant, $R^2 = 0.14, F(2,46), p = 0.02$. It was found that confidence in academic ability $\beta = -0.41, p = 0.01$ did have significance to predict working mode but confidence in English $\beta = 0.05, p = 0.70$ did not. This indicates that those not confident in their academic ability formed groups in the 2021 cohort. Based on these results, multiple linear regression was tested through all four cohorts to see if confidence in English or confidence in academic ability had a correlation with working mode. However, no correlation was found $R^2 = 0.10, F(2,195), p = 0.34$.

Table 7 Means (SD) of Independent Variables for the 2021 Cohort

	Design	Facilitation	Teaching presence
Academic ability (confident)	3.91 (0.78)	3.64 (0.81)	3.78 (0.74)
Academic ability (not confident)	3.75 (0.86)	3.51 (0.89)	3.63 (0.85)
English ability (confident)	3.86 (0.81)	3.61 (0.81)	3.74 (0.77)
English ability (not confident)	3.77 (0.85)	3.51 (0.90)	3.64 (0.85)
Working mode (individual)	4.21 (0.54)	3.87 (0.72)	4.04 (0.57)
Working mode (group)	3.49 (0.89)	3.31 (0.89)	3.40 (0.86)

Discussion

The three main pedagogical factors – support, layout, and teacher feedback – were analysed to see whether they influenced teaching presence when compared to the base model. Although the study found a significant difference between embedded support, layout, and teacher feedback against the base model design, there was no significant difference between the effects of embedded support, layout, and teacher feedback, which suggests that teachers faced with time and resource constraints could focus more on embedded support. Cancino and Avila (2021) found that instructional material that was meaningful and that prompted self-regulation was rated the highest when students were asked about their e-learning engagement. In addition, Wang et al. (2022) found that learner–content interaction was perceived as the most engaging compared to learner–learner interaction and learner–instructor interaction. This also seems to be the case in this study where the support was embedded into the activities to help students at certain points. These findings demonstrate that embedded support seems to have the strongest impact on teaching presence in this study.

Surprisingly, teacher feedback did not significantly affect teaching presence when compared with embedded support. Research shows teacher feedback is an important aspect of learning and thus can be expected to enhance learning with embedded support. The reason why teacher feedback did not have a significant effect on teaching presence could be explained by students not being proactive, Moodle showing the grade before teacher feedback, and the timing of the feedback being too late for the students. Winstone et al. (2017) found that many students are not proactive in using feedback and that if a student receives a good grade, they will ignore the feedback. This seems to be the case in this study, with only 35% of the participants checking teacher feedback on the final summary. Moreover, the students were able to see the grade before receiving the feedback, and once they saw that they had passed the assignment, they might have assumed they do not need to improve. Brinkworth et al. (2008) highlighted that the timing of the feedback is often an issue, but the feedback in the module was given within two weeks. However, Brinkworth et al. (2008) also mention that students typically expect immediate feedback on their assignments. Students in this study might have been expecting feedback within one week or even instantly, which could explain the low number of students reading it. The fact that the “check activities” were immediately available after completing the performance tasks could also contribute to the timing issue of the feedback. This could be one reason teacher feedback did not have a strong impact on

teaching presence. It should be noted that direct instruction was not included in this study as a variable although it could have answered the question of feedback timing. On the other hand, it would still not have answered the question if students considered the grade the only feedback that they needed.

Another reason that teacher feedback might not have affected student perceptions of teaching presence could relate to the working modes in the e-learning module. In the first three cohorts, only 16% worked in a group, but in the 2021 cohort, 55% of the participants worked in a group. The reason for this change may have been the higher emphasis on group work in the overall course for the 2021 cohort. This rise in group work might have contributed to teacher feedback not significantly affecting teaching presence from the 2020 cohort to the 2021 cohort. Group work might be creating some role confusion for students. Shea et al. (2014) found that teaching presence, as measured by the CoI, can cause students confusion about the role of the teacher and learner. This current study found that participants who did the e-learning module individually in the 2021 cohort rated teaching presence significantly higher than those who did it as a group. This could be because individual learners had a clearly defined student role, compared to students who did the module as a group, where the roles of being a student and teacher are often blurred. However, it is not a simple case of limiting the e-learning module to only individual work because some individuals might not have the self-efficacy to start working, thus making group work important. Pajares (1996) found that those with higher self-efficacy put more effort into a task and spend more time overcoming obstacles than do those with low self-efficacy, who give up on a task more easily. In the Finnish context, Räsänen et al. (2020) found that university students who reported higher self-regulation did not require student support, but those that had low self-regulation needed peer support to help them develop their self-regulation. These findings point to the importance of group work for some students. If participants did the e-learning module as a group, the role of the teacher and student could have become confused. If one student learned more from another student than from the teacher, they may not have been aware of the teaching presence. This could indicate that those working in groups supported other students more than did the teacher who facilitated the learning in groups. This finding may be linked to the call for learning presence to be added to the CoI and highlights why more research is needed.

As stated above, the lack of students reading teacher feedback and working in a group might have resulted in significantly lower perceptions of teaching presence than what was found among those that worked alone. In addition, group interaction could also affect student perceptions of teaching presence. According to Garrison and Akyol (2015), there is a difference between self-regulation and co-regulation, which are independent of each other. Students who work in groups tend to focus more on co-regulation rather than self-regulation (Garrison & Akyol, 2015; Saab et al., 2012). This may have been the case for students who worked in a group during the e-learning module. Another reason for the lack of individual development might be a lack of discussion during potential conflicts within the group. If group members are unfamiliar with each other, they might not interact when there is a conflict due to a fear of stress (Robinson, 2013). This lack of conflict could limit metacognitive interaction because conflict is thought to be needed for co-regulation to affect self-regulation (Haataja et al., 2022). Garrison (2017) pointed out that self-regulation and co-regulation need monitoring and managing. The fact that the students who formed groups in the 2021 cohort had lower perceived confidence in their academic ability might

also mean that they had lower SRL as well as lower monitoring and managing skills at this point in their studies. Furthermore, low SRL might limit constructive conflict in the group. Garrison (2022) proposed that developing and supporting shared metacognition, which he defines as monitoring and managing one's SRL and co-regulation, might improve students' metacognitive awareness. This study indicates that students working in groups might need additional teacher support on shared metacognition, or more specifically, monitoring and managing their SRL and co-regulation.

Conclusion

In conclusion, based on the three factors tested in this study, embedded support seems to play a prominent role in increasing perceived teaching presence when compared to learning environment layout and teacher feedback. Embedded support needs to focus on the development of metacognitive awareness and learning strategies related to the learning process. Teacher feedback did not significantly contribute to teaching presence, which might be linked to the lack of student proactivity, the timing of the feedback, or the nature of working in a group. Whether the students work through the e-learning module individually or as a group might also affect teaching presence. Although there was no significant difference when comparing students who worked alone with those who worked in groups through all the cohorts, the working mode had an effect on the 2021 cohort. This change was the result of more students working in a group than in the previous three cohorts. The 2021 cohort students seem to form groups based on a perceived lack of confidence in their academic ability. However, forming groups because of a lack of confidence was not observed when analysing all four cohorts. Considering that the participants are first-year students at university, and this was their first assignment, they are still developing their metacognition. Although teachers can provide more tailored support for students, it is important to understand that students might contribute their development to other students than the teacher because of role confusion within the CoI and not consider the teacher who facilitated the learning in groups. This e-learning module was very flexible in how students could complete it and demonstrates that different options chosen by the students can influence teaching presence.

Limitations

Since this study was conducted using action research, there are some limitations. Only two of the three teaching presence variables were used instead of the whole CoI questionnaire. Even though using the whole CoI questionnaire would have given a deeper and more comprehensive analysis of the learning environment, this study still provides insights into how to improve teaching presence. The other limitation is the factors chosen, that is embedded support, learning environment layout, and teacher feedback. These were chosen based on the literature and feedback from the students. However, there could be other factors influencing teaching presence that were not investigated in this action research. In addition, this study only focused on a specific e-learning module embedded in a course. Participants may have focused on the overall course rather than only on the e-learning module when answering the questionnaire.

Further research

Further research is needed to investigate the ways in which shared metacognition affects teaching presence, with a particular focus on group work. There seems to be a lack of

information in the available literature on the CoI in terms of whether the main assignments/tasks were done in groups, individually, or mixed for each study. Although the CoI encourages community, there seems to be a lack of information on whether participants are contributing to the overall course community individually or working with a pair/group first before contributing to the overall community. Many studies combined different courses with the brief comment that teaching methods were similar. As shown in this study, however, working in a group or individually might influence perceptions of teaching presence. A systematic or meta-analysis review of group work and teacher feedback on teaching presence would provide deeper insights into this aspect. Additionally, further research on how to encourage students to read and interact with teacher feedback is also needed within the CoI.

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