The Community of Inquiry Perspective on Teachers' Role and Students' Evaluations of Online Project-Based Learning

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Abstract
The role of teachers is an important element of online project-based learning courses. Based on the Community of Inquiry framework, this study examined how students' perceptions of teaching presence, through social presence and cognitive presence, were related to their evaluations of online project-based learning. A 16-week online project-based legal education course was implemented. During the course, students engaged in two small group activities and created two final products. Survey data were collected twice from 38 and 41 students in two course phases. Results from partial least squares analyses revealed that teaching presence was directly related to students' evaluations in the early stage of the course and indirectly related to students' evaluations, through the effects of social presence, in the entire course. Practical implications for teachers and suggestions for further studies are provided.

Keywords: Online project-based learning; teacher role; student evaluation; teaching presence; social presence

Guo, P., Saab, N., Ren, D., & Admiraal, W. (2022). The Community of Inquiry perspective on teachers' role and students' evaluations of online project-based learning. *Online Learning, 26*(4), 259-280. DOI: 10.24059/olj.v26i4.3193

Clinical legal education is a prevailing teaching method in university legal education. This method is practice oriented, aiming to develop students' practical legal skills by solving real client problems. However, while understanding legal theory is very important, law educators have not reached a consensus on how to teach it. Teaching legal theory places high requirements on students' critical thinking ability, especially at the graduate level. For example, many different theories and legal provisions may be applicable to the same case, leading to different solutions. All these pose challenges to legal theory education but teaching legal theory could be supported by the pedagogy of project-based learning (PjBL). Rooted in the idea of active construction, PjBL encourages learners' investigation and construction of knowledge (Reis et al., 2018), improves deep understanding of discipline concepts (Barak & Dori, 2005; Costa-Silva et al., 2018; Torres et al., 2019), and develops diverse cognitive strategies (Heo et al., 2010; Hou et al., 2007; Stozhko et al., 2015; Wu et al., 2013). However, research on PjBL related to law education is scarce. To better understand this methodology, student evaluations of PjBL have been examined in the current study.

The application of PjBL in an online environment has grown in popularity in postsecondary education (Çakiroğlu & Erdemir, 2019; Shih & Tsai, 2017; Usher & Barak, 2018). Some researchers claim that online PjBL contributes to perceived learning and student satisfaction because high-quality interactivity and communication among learners can be achieved (Gomez-Pablos et al., 2017; Lou & Kim MacGregor, 2004). However, this is inseparable from the role of instructors, especially in the online environment (Garrison & Arbaugh, 2007). To make a successful learning experience in online PjBL where learners' social and cognitive interactions play a key role, it is suggested that both the organization (i.e., course design) and guidance (i.e., facilitation and direction) of teaching should be carefully considered (Garrison et al., 2000; Garrison & Arbaugh, 2007). Although previous studies have found a positive relationship between teaching and student perceptions of online learning in general (Arbaugh, 2008; Choo et al., 2020), in online PjBL the association between teaching, students' interaction and their evaluations is not clearly revealed yet.

In the present study, we aimed to investigate graduate law students' evaluations of online PjBL and how they are related to the role of the teacher. To achieve this goal, PjBL was implemented in an online legal education course at a Chinese university. The findings might provide teachers with guidance concerning instruction in an online PjBL environment and contribute to the development of future online PjBL curricula.

Project-Based Learning

Project-based learning (PjBL) refers to a learner-centered instructional and learning approach (Helle et al., 2006) where students acquire and apply knowledge and eventually construct new information by completing real-world projects. Most importantly, a shared artifact is developed by students based on an authentic driving question (Blumenfeld et al., 1991; Helle et al., 2006). For example, in Papastergiou (2005), student teachers created educational websites for primary schools as artifacts. To develop the final product, learners usually work in small groups (Chen & Yang, 2019; Krajcik et al., 2008) where they collaboratively define problems, exchange ideas, collect and analyze data, and present results (Blumenfeld et al., 1991; Kokotsaki et al., 2016; Lee et al., 2016). It is believed that the integration of PjBL with collaborative learning contributes to effective learning, especially among students with varying levels of prior knowledge (Al-Rawahi & Al-Mekhlafi, 2015; Lou & Kim MacGregor, 2004). Moreover, the use of educational technologies is another important feature of PjBL (Krajcik & Shin, 2014). In the studies of Chua (2014) and Chua et al. (2014), students developed small agricultural dryers in groups during an engineering project. The results of Chen and Yang's (2019) review study showed that PjBL, integrated with scaffolding information technology, has a positive influence on students' effective

learning. In Guo et al. (2021), 24 groups of college students participated in an online mental health project and, using an instant messaging app, and thereafter discussed and wrote a film analysis report as the final product. The results showed that students' engagement in the project was positively related to their academic performance.

The Role of Teachers in Online PjBL

The role of instructors is an essential element of PjBL curricula (Du et al., 2009; Gomez-Pablos et al., 2017). In online PjBL, the role of instructors is predominant in four areas: instruction, facilitation, management, and technical support (Çakiroğlu & Erdemir, 2019; Maor, 2003). Specifically, the basic task of teachers is to design the course and give lectures on the essential content knowledge that provides students with fundamental information about the course. Moreover, different from teacher-centered instruction, teachers utilizing PjBL usually act as facilitators (Bell, 2010; Tseng et al., 2013) who provide students with feedback on projects (Quintana & Quintana, 2020) and assist them to fully understand the tasks that they cannot grasp on their own (van Rooij, 2009). However, teachers normally provide such assistance only when students ask for help. PjBL can be characterized by little direct supervision and significant autonomy (Xu & Liu, 2010). For example, Stefanou et al. (2013) found that, compared to students in problem-based courses, learners who participated in PjBL perceived significantly higher instructor support for their autonomy. Based on the survey and interview results about teachers' beliefs of English as Foreign Language (EFL) learners' autonomy, Meisani and Rambet (2017) concluded that instructors should promote student autonomy in PjBL education. Regarding the managerial role, the survey results of teachers' experience of implementing PjBL with digital technologies have revealed that most instructors encouraged learners to participate in learning activities and monitored and recorded their work (Gomez-Pablos et al., 2017). Likewise, Çakiroğlu and Erdemir (2019) revealed that an important administrative role of instructors is to help students concentrate on their projects. Maor (2003) also found that teachers encouraged ongoing student discourse. To this end, improved rules, and instructions about high-quality interactions were given by teachers. As for the support for ICT, Maor (2003) revealed that although most students were good at using technologies, teachers still provided necessary guidance on specific technical issues. Similarly, Shadiev et al. (2015) reported that online instructors assisted students with how to reply to others' comments and upload documents. For new and unfamiliar technology, teachers provided learners with in-time support and solutions (Çakiroğlu & Erdemir, 2019).

Students' Evaluations of Online PjBL

Several studies have reported students' evaluations of learning experience and the effectiveness of online PjBL. In general, learners perceived that online PjBL is an interesting and helpful learning method that advanced their learning outcomes, such as content knowledge, collaboration skills, and learning motivation (Balash et al., 2019; Shih & Tsai, 2017; Zhang et al., 2009). For example, Al-Rawahi and Al-Mekhlafi (2015) reported that English learners' writing skills significantly improved after they participated in online PjBL with group members compared to students who worked alone and offline. Moreover, learners believed that online collaborative PjBL was a good way to develop communication and interaction with others. Tsai et al. (2019) revealed several advantages of PjBL integrated with video lectures for student learning of building information modeling. Students perceived that being involved in the process of PjBL gave them the opportunity to be close to a real project and allowed them to gradually learn the modeling. Their modeling skills also improved and they had a deeper understanding of the concept of civil engineering. Besides, tutorial videos were helpful for students' understanding of the complex part of modeling as they could watch the video repeatedly. Also, students were more patient and motivated in the learning process.

By the analysis of semi-structured student interviews, Shadiev et al. (2015) found that learners actively exchanged information and collaborated with each other in synchronous and asynchronous PjBL, which promoted cross-cultural understanding. Moreover, most teachers and students expected to participate in online collaborative PjBL in the future. When it comes to the specific leadership method in online collaborative PjBL, Yilmaz et al., (2020) found that both shared and vertical group leadership approaches contributed to students' learning motivation, skills of self-regulated learning, and collaboration with group members. Specifically, shared leadership was more useful to promote group trust while vertical leadership was helpful to improve group interaction.

Despite these benefits, PjBL is not without criticism. Zhang et al. (2009) reported student perceptions of their first experience of online collaborative PjBL. Interviews with students revealed that while students were satisfied with online PjBL overall, they still expressed frustration over the lack of physical connection with teachers and peers. Some students felt that PjBL was complicated and time consuming and preferred to receive direct instruction from teachers rather than to explore the task by themselves. In the study of Al-Rawahi and Al-Mekhlafi (2015), online collaborative PjBL implemented in an EFL course was not significantly related to students' attitude towards English learning. The reason might be that many learners thought online PjBL was not useful and wasted time, especially when they perceived difficulties in getting responses from online group members.

Community of Inquiry Framework

One of the most frequently adopted theoretical frameworks for understanding online collaborative learning in higher education is the Community of Inquiry (CoI) framework (Garrison et al., 2000; Garrison & Arbaugh, 2007). This framework consists of three key elements (social presence, cognitive presence, and teaching presence) that interact with each other to advance student learning. Social presence indicates students' ability to see themselves as "real people" in a virtual environment and to interact with others socially and affectively (Garrison et al., 2000). Cognitive presence is defined as the extent to which "learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (Garrison et al., 2001, p. 11). As for teaching presence, Garrison et al. (2000) pointed out that teachers have two main roles in online teaching, as designers of educational activities and facilitators of student learning. Anderson et al. (2001) added an additional role of the online instructor, as the expert who provides students with direct instruction. Thus, three components of teaching presence were proposed by Anderson et al. (2001), namely instructional design and organization, discourse facilitation, and direct instruction.

The three components of CoI framework intercorrelate with each other (Arbaugh, 2008; Armellini & De Stefani, 2016; Garrison & Anderson, 2003). However, teaching presence usually plays a central role in an online community of inquiry (Garrison et al., 2010) and influences social presence and cognitive presence (Cleveland-Innes et al., 2019; Garrison et al., 2000). From the theory, Garrison et al., (2000) claimed that teaching presence appears before students' interactions occur (e.g., instructional design and organization) and provides specific direction and defined parameters to students' social and cognitive interactions. Many studies have found that teaching presence is positively related to social presence and cognitive presence (Akyol & Garrison, 2008; Archibald, 2010; Garrison et al., 2010; Shea et al., 2010). For example, large-scale studies, such as Shea and Bidjerano (2009), with more than 2000 online students and Joo et al. (2011), with around 800 online learners, have found that teaching presence predicted both social and cognitive presences. In another study, Ke (2010) investigated the relationship between the three presences in online courses for adult learners. Both quantitative and qualitative results showed that students' social and cognitive presences

were significantly influenced by the design, facilitation, and teaching features of the course. These results indicated that social and cognitive presences emerge in an online environment where effective teaching presence appears.

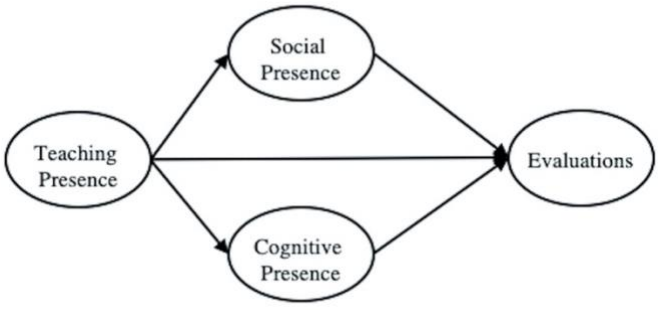
The classical review study of Garrison and Arbaugh (2007) pointed out that a large body of previous studies reported positive relationships between student learning outcomes and social, cognitive, and teaching presences. Recent studies have reported similar results (Abdous & Yen, 2010; Akyol & Garrison, 2008; Arbaugh, 2008; Baker, 2010; Choo et al., 2020). For example, Boston et al. (2009) investigated whether the three presences influenced learners' willingness to re-enroll an online course. The analysis of more than 28000 students' survey data revealed that social presence significantly accounted for students' rate of re-enrollment. Sidiropoulou and Mavroidis (2019) found that graduate students' learning style, such as understanding of information, was positively related to cognitive presence. Shea et al. (2005) investigated the significance of teaching presence in online asynchronous courses. The analysis of survey data of more than 2000 students from 32 colleges revealed that students' perceptions of teaching presence, including instructional design and directed facilitation, were positively related to students' sense of learning community. In addition, Joo et al. (2011) examined how computer learners' perceptions of presences influenced their satisfaction with online learning experience and intention to complete the course. Results from structural equation modeling analyses found that teaching presence had direct positive effects on student satisfaction and indirect positive effects on it through the mediating effect of cognitive presence. However, none of the three presences had effects on students' continuation intention and motivation for the course.

Research Questions

The present study aimed to provide more insights into graduate law students' evaluations of online PjBL and how they are related to the role of teachers based on the CoI framework. Thus, the specific research questions and a hypothesized research model examined (Figure 1) are as follows.

1. What is the relationship between students' perceptions of teaching presence and their evaluations of online PjBL in the first phase of the course?
2. What is the relationship between students' perceptions of teaching presence and their evaluations of online PjBL in the whole phase of the course?
3. Are these relationships mediated by students' perceptions of social presence and cognitive presence during the course?

Figure 1
Hypothesized Research Model



Method

Research Context and Sample

This study was based on a 16-week online course of property law for first-year master's law students in a Chinese university. During the course, as shown in Table 1, the teacher gave online lectures and students participated in two group activities and developed two artifacts (i.e., a case analysis report and a course paper) in small groups. These two final products focused on providing solutions to both practical and theoretical legal problems from the real world. Students mainly studied the chapter assigned by themselves and applied the content knowledge they learned to the report. After presenting the report in class, they further worked on it with teacher feedback and created the course paper based on the report. Thus, they achieved the most important result of PjBL: new knowledge construction. In summary, the course activities represented a project-based approach as they were authentic and reflected the "loop" of PjBL: learning and applying existing knowledge, and then constructing new knowledge via the development of final products.

Table 1

Overview of the Course Setup

Schedules	**Main course activities**	
	Course teacher	**Students**
Before week 1	Coordinated students in grouping	Divided themselves into groups of three
Weeks 1 to 4	Gave lectures on chapter 1 to 6	Attended lectures
	Assigned one chapter from chapter 7 to each group	Group activity 1: collaboratively wrote a case analysis report based on the chapter assigned
Weeks 5 to 10	Continued to give lectures	Attended lectures
	Gave feedback on each groups' presentation	Presented the report in class
Weeks 11 to 15	Continued to give lectures	Attended lectures Group activity 2: Collaboratively wrote a course paper based on the report
Weeks 16	Gave feedback on each groups' course paper	Asked questions etc.

Four types of ICT tools were adopted to scaffold the course, of which WeChat was the main tool for the completion of projects and the development of final products (see Table 2).

Table 2

Overview of the Tools Adopted in the Course

Tools		**Main purposes (for course teacher and students)**
A video conferencing software		To give lectures and presentations
A mobile app		To access course materials To complete weekly quizzes To submit group assignments
WeChat	The public WeChat group for the course	To inform course schedules, share extra materials, and ask and answer questions etc.
	The private WeChat group for each student group	To discuss the development of final artifacts
	Personal WeChat account	To ask and answer questions in private
E-mail		To ask and answer questions in private

Forty-two students (Mage = 23.48) attended the course, including six males. Twelve of them majored in law and the rest were non-law majors at the undergraduate level. Surveys were conducted after the group activity of case analysis report (i.e., phase 1) and after the group activity a paper was written (i.e., the whole phase). In each phase, 38 and 41 students answered the survey, respectively.

Measures

Although some researchers have claimed that teaching presence consists of three components (e.g., Anderson et al., 2001), findings from Shea et al. (2005) revealed that the components of facilitating discourse and direct instruction could be incorporated into one component (i.e., directed facilitation). As noted, the role of the teacher in this online PjBL course was not focused on instruction but facilitation. Therefore, two factors of teaching presence, instructional design and organization (IDO) and directed facilitation (DF), were measured by 4 items and 7 items based on the work of Arbaugh et al. (2008) and Shea et al. (2005). The items "The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn" and "Instructor actions reinforced the development of a sense of community among course participants" were excluded because some students reported that they did not understand these two items. A sample item of IDO and DF was "The instructor clearly communicated important course topics" and "The instructor provided feedback in a timely fashion" respectively.

Social presence (SP) and cognitive presence (CP) were measured by 9 items and 12 items, respectively, based on the work of Arbaugh et al. (2008). A sample item of SP and CP was "Online discussions help me to develop a sense of collaboration" and "Problems posed increased my interest in course issues."

Two variables of students' evaluations of PjBL, namely perceived benefits and satisfaction, were measured by 5 and 6 items based on the work of Parmelee et al. (2009) and So and Brush (2008). A sample item of perceived benefits and satisfaction was "This group activity assisted me in learning new knowledge and skills" and "In general, I am satisfied with this group activity" respectively.

All measures adopted a 6-point Likert-type rating scale from 1 = very much disagree to 6 = very much agree. The reliability and validity of each variable were examined in each measurement model in the Results section (see Table 3 and Table 4). An overview of the variables and the corresponding items can be found in the Appendix.

Analyses

To answer the three research questions, partial least squares (PLS) analyses with SmartPLS 3.0 were performed to examine model 1 for phase 1 and model 2 for the whole phase with students' perceived benefits and satisfaction as the dependent variable, students' perceptions of social presence and cognitive presence as the mediating variables, and students' perceptions of teaching presence (IDO and DF) as the independent variables.

The data analyses were conducted in two steps. First, the measurement model was estimated to determine the reliability and validity of each variable. Second, each structural model was examined to test the potential relationship between each variable.

Results

Measurement Model

To evaluate the reliability and validity of the measurement model using PLS, several indicators should be reported (Hair et al., 2011; Urbach & Ahlemann, 2010). Regarding reliability, indicator loadings of each item should be higher than 0.70, Cronbach's alpha (CA) of each variable should not be lower than 0.60, and the composite reliability (CR) should be

greater than 0.70. As for validity, the average variance extracted (AVE) should be greater than 0.50 to meet the standard of convergent validity. To test the discriminant validity, the square root of each variable's AVE should be greater than the correlation of the variable to other variables.

The results of model 1 for phase 1 and model 2 for the whole phase are presented. Results show adequate CA, CR, and AVE of model 1 (see Table 3). In model 2, items 1 and 4 of cognitive presence and item 3 of perceived benefits were left out due to the low factor loading. After removing these items, results show adequate CA, CR, and AVE of model 2 (see Table 4). Hence, the reliability and validity of the measurement model in phase 1 and the whole phase are supported.

Table 3

Means, Standard Deviations, Reliabilities and Correlation of Variables (Model 1, N = 38)

Variables	Number of items	Mean	SD	CA	CR	Correlation of Variables and AVE					
						1	2	3	4	5	6
IDO	4	5.651	.445	.874	.913	.851					
DF	7	5.478	.556	.935	.948	.836	.849				
SP	9	4.883	.896	.952	.960	.411	.494	.852			
CP	12	5.237	.697	.957	.963	.698	.814	.592	.827		
Benefits	5	5.000	.877	.954	.965	.273	.127	.568	.320	.919	
Satisfaction	6	4.899	.861	.926	.943	.356	.292	.622	.470	.836	.858

Note: Diagonal elements in the correlation of variables matrix are the square root of the AVE.

Table 4

Means, Standard Deviations, Reliabilities and Correlation of Variables (Model 2, N = 41)

Variables	Number of items	Mean	SD	CA	CR	Correlation of Variables and AVE					
						1	2	3	4	5	6
IDO	4	5.640	.481	.854	.901	.833					
DF	7	5.348	.613	.920	.934	.759	.819				
SP	9	5.100	.731	.939	.949	.377	.486	.820			
CP	10	5.163	.621	.945	.953	.643	.714	.773	.817		
Benefits	4	5.281	.744	.888	.924	.188	.395	.711	.560	.869	
Satisfaction	6	5.289	.693	.947	.958	.244	.431	.767	.546	.749	.890

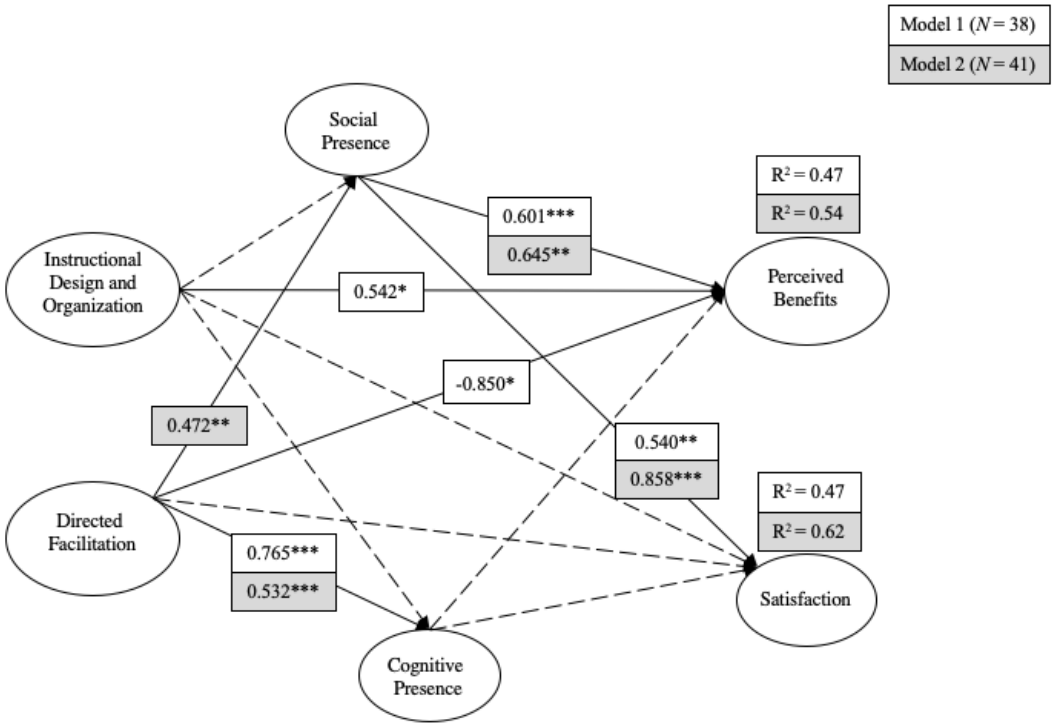
Note: Diagonal elements in the correlation of variables matrix are the square root of the AVE.

Structural Model

The structural models for model 1 and model 2 were estimated with bootstrapping with 5000 subsamples. Figure 2 depicts the R2 values and the path coefficients for both models. As shown, the R2 for benefits were 0.47 for model 1 and 0.54 for model 2, suggesting the model explained 47.0% and 54.0% of the variance of students' perceived benefits of PjBL in two phases. The R2 for satisfaction were 0.47 for model 1 and 0.62 for model 2, showing that the model explained 47.0% and 62.0% of the variance of students' satisfaction with PjBL in two phases. Table 5 presents the results of the path coefficients for model 1 and model 2.

Figure 2

Structural Model with Significant Relationships



Regarding the direct effects, on the one hand, DF positively influenced CP (Path 4: $\beta = 0.765$, $p < 0.001$ for model 1; $\beta = 0.532$, $p < 0.001$ for model 2) in both models. SP positively impacted on perceived benefits (Path 9: $\beta = 0.601$, $p < 0.001$ for model 1; $\beta = 0.645$, $p < 0.01$ for model 2) and satisfaction (Path 10: $\beta = 0.540$, $p < 0.01$ for model 1; $\beta = 0.858$, $p < 0.001$ for model 2). The paths from IDO to SP, CP, and satisfaction (Path 1, 2, and 8), the paths from CP to perceived benefits and satisfaction (Path 11 and 12), and the path from DF to satisfaction (Path 8) are found to be statistically insignificant. On the other hand, some paths were only significant for one model. DF was found to positively influence SP only in model 2 (Path 3: $\beta = 0.472$, $p < 0.01$). The path from IDO to perceived benefits was found to be positively significant for model 1 (Path 5: $\beta = 0.542$, $p < 0.05$). Surprisingly, DF was found to negatively influence perceived benefits in model 1 (Path 7: $\beta = -0.850$, $p < 0.05$).

Regarding the indirect effects, SP mediated the relationship between DF and perceived benefits (Path 17: $\beta = .305$, $p < 0.05$) and satisfaction (Path 18: $\beta = .405$, $p < 0.05$) in model 2 rather than in model 1 (Path 17 and 18). For IDO and perceived benefits, no mediation influence was observed by SP and CP in model 1 and model 2 (Path 13 and 15). For IDO and satisfaction, no mediation influence was observed by SP and CP in both models (Path 14 and 16). In addition, CP had no mediation influence on DF and perceived benefits (Path 19) and DF and satisfaction (Path 20).

Table 5
Results of Path Coefficients for Model 1and Model 2 (direct and indirect)

Path	Relationship	B	
		Model 1 (N = 38)	**Model 2 (N = 41)**
Direct effects			
	IDO→SP	-.008 (.026)	.019 (.119)
	IDO→CP	.059 (0.259)	.239 (1.803)
	DF→SP	.501 (1.636)	.472** (2.979)
	DF→CP	.765*** (4.120)	.532*** (3.949)
	IDO→Perceived benefits	.542* (2.012)	-.289 (1.542)
	IDO→Satisfaction	.355 (1.214)	-.157 (.800)
	DF→Perceived benefits	-.850* (2.514)	.253 (0.992)
	DF→Satisfaction	-.571 (1.589)	.293 (1.301)
	SP→Perceived benefits	.601*** (3.556)	.645** (3.281)
	SP→Satisfaction	.540** (2.701)	.858*** (5.055)
	CP→Perceived benefits	.278 (1.320)	.067 (.241)
	CP→Satisfaction	.367 (1.657)	-.226 (.913)
Indirect effects			
	IDO→SP→Perceived benefits	-.005 (.027)	.012 (.116)
	IDO→SP→Satisfaction	-.004 (.026)	.016 (.120)
	IDO→CP→Perceived benefits	.016 (.178)	.016 (.232)
	IDO→CP→Satisfaction	.022 (.217)	-.054 (.793)
	DF→SP→Perceived benefits	.301 (1.504)	.305* (2.205)
	DF→SP→Satisfaction	.270 (1.263)	.405* (2.456)
	DF→CP→Perceived benefits	.213 (1.175)	.036 (.212)
	DF→CP→Satisfaction	.281 (1.511)	-.120 (.807)

Note: ∗ p < .05, ∗∗ p < .01, ∗∗∗ p < .001. T statistics are in parenthesis.

Discussion

The aim of the current study was to investigate the potential relationship between graduate law students' evaluations of online project-based learning and teachers' role in an online course. For this purpose, a hypothesized research model was built based on the three components of Community of Inquiry framework (teaching, social, and cognitive presences) and examined through partial least squares analyses in the first and the whole phase of the course.

The Direct Role of Teaching Presence

Regarding the first two research questions, instructional design and organization played a different role in students' perceived benefits of PjBL in different phases of the course. In the first four weeks, it showed a positive influence on students' perceived benefits of the case analysis activity. This result is in line with Shea et al. (2005) who found that effective instructional design and organization matters regarding students' perceived benefits of learning with others. This means the more and clear course-related parameters that learners perceived, such as the course timeline and the design and administration of course activities (Anderson et al., 2001), the more they felt that working on a case analysis report with group members was helpful to their knowledge learning. In the first day of the class, all students received a document that explained how and when to complete group activities, and specific assessment criteria for their final products. These detailed instructions provided students' knowledge construction with appropriate guidance and "a specific direction" (Garrison & Arbaugh, 2007, p. 163) that makes learning effective. This result demonstrated the importance

of good design and organization of the course in the early stage of a learning process (Lee et al., 2016).

However, from the perspective of the entire course, the course setting had no impact on students' perceived benefits of the course paper activity. This might be related to the nature of instructional design and organization, namely, to assist learners to get familiar with important course settings in the early stage of the course and sometimes even before the course starts (Anderson et al., 2001; Ke, 2010) to help them to be quickly involved in learning. Thus, after students were familiar with the parameters of the course and course activities, which usually happened in the later stages of a course, they no longer perceived benefits from that.

Second, directed facilitation also had different effects on students' perceived benefits of PjBL in the two course phases. Surprisingly, it was found that students were more likely to report a lower sense of benefits of writing the case analysis report with peers when they reported stronger feelings of teacher's guidance and feedback. This may be due to the mismatch between the content and direction of the teacher's facilitation and students' efforts to complete the report. In the first four weeks, the instructor mainly gave lectures on the introduction of property law (corresponding to the first 6 chapters in the textbook), whereas students worked on the report based on chapter 7. Therefore, some irrelevant information explained by the teacher might be seen as unhelpful or even obstructive to the completion of the report. This might further lead to the problem reported by Zhang et al. (2009) that students would not listen to what the instructor teaches but do their own things.

Considering the whole course, however, teachers' guidance and feedback had no effects on students' perceived benefits of writing the course paper. Two reasons may explain this. First, the teacher followed the idea of PjBL and acted as a facilitator rather than a direct answer-provider for students' group activity. Thus, she did not join in private student discussion groups but mainly answered questions and provided help in the public discussion group. The lack of interactions with the instructor might induce students' insecurity and uncertainty as reported by Zhang et al. (2009) as Chinese students are used to communicating with others through social context cues (Tu, 2001). Second, the teacher observed that only a few groups proactively asked questions to her in private while most students did not look for help for the group activity. This infrequent engagement in help-seeking among novice PjBL students was also found by Harburg et al. (2018).

Furthermore, neither of the two factors of teaching presence were directly related to students' satisfaction with online PjBL. These results differ from previous studies that investigated the relationship between teaching presence and student satisfaction (e.g., Akyol & Garrison, 2008; Choo et al., 2020; Ke, 2010). For example, Arbaugh (2008) reported that teaching presence was positively associated with student delivery medium satisfaction in online MBA courses. This result may be related to the findings of Zhang et al. (2009) that students felt uncomfortable and concerned without a real teacher being around to supervise them in online PjBL.

The Indirect Role of Teaching Presence

As for the third research question, results showed that social presence was positively related to students' perceived benefits and satisfaction in both phases of the course, consistent with the results of previous studies (Arbaugh, 2008; Benbunan-Fich & Arbaugh, 2006; Richardson & Swan, 2003; Williams et al., 2006). For example, Ching and Hsu (2013) reported that learners' participation in peer feedback was positively related to their PjBL experience. The interview results of Zhang et al. (2009) revealed that students believed that collaborative learning among peers for meaningful aims allowed them to learn more and better in online PjBL. The results might be explained by the findings of Dooley and Wickersham (2007) who claimed that, in small online learning groups, students can engage in high-quality discourse

and express their own opinions. Furthermore, the results also supported by the claim of Picciano (2002) that social presence is more important when educational activities focus on collaborative knowledge construction (in this study, PjBL) rather than information acquisition.

Furthermore, the indirect effects of directed facilitation on student learning via social presence indicates that the most important role of teachers in online PjBL does not rely on facilitation but the promotion of student communication and interaction that advances student effective learning. This is consistent with the findings of Morales et al. (2013) who noted that effective learning can be achieved through peer mentoring and collaboration with minimal teacher instruction in a virtual learning environment. This is also confirmed by students' interview in Zhang et al. (2009) that it is better to let students work on the projects themselves and ask for teachers' help only if they encounter problems. Moreover, this result supported the claim of Anderson et al. (2001) and Garrison and Akyol (2013) that it is the teaching presence rather than the teacher presence that is of importance, which can be extended to students and achieved by their collaboration.

Implications for Practice

The findings of this study offer two implications for instructors on the design and implementation of online PjBL courses. The first important implication is that teachers should pay attention to the design and organization of curriculum-related parameters, particularly in the early stage of the course. Table 6 presents several indispensable elements that we think are crucial when developing and implementing an online PjBL course. We believe that a clear and detailed description of these elements can help students quickly start the project, reduce their sense of confusion and anxiety, and improve their perceptions of learning effectiveness. Moreover, the findings of the present study also implied that the most important role of teachers in online PjBL is not as direct instructors but learning facilitators who encourage students to interact with peers. Possible strategies for teachers to do so are, for example, to score the frequency and quality of students' group interaction and regularly raise questions for learners to think and discuss (Gašević et al., 2015). In short, teachers should enthusiastically promote student interactions with group members to advance effective student learning.

Table 6

Overview of Important Elements for the Setup of Online Project-Based Learning Courses

Elements to be considered	Main Aspects to be Elaborated
Pedagogy (i.e., project-based learning)	Definition
	Hallmarks (e.g., artifacts; collaboration)
	Significance/effects
Projects and artifacts	Significance of projects
	Artifact type1 (i.e., physical objects; documents; multimedia)
	Assessment criteria for artifacts
	Examples
Other educational activities	Schedules
	Procedures
	Assessment criteria
Course materials	In-class resources (e.g., textbooks; handout)
	Extracurricular resources (e.g., extra reading materials)
Schedules	Course duration
	Weekly tasks
ICT tools	What tools and how to use
	Purpose of each tool

Note: 1. Based on Guo et al. (2020).

Limitations and Future Directions

To address the limitations of this study, the following strategies could improve future research. First, the presence variables could be measured in-depth. For instance, the measurement of social and cognitive presences could be conducted based on the sub-categories of the presences as in previous studies (Shea et al., 2010). In doing so, a clearer relationship between students' online learning experience and perceived learning could be depicted. Second, since more and more educational studies are implemented online, it is recommended to collect recorded data of student learning too (Galikyan & Admiraal, 2019) to get a more detailed image of student online learning (Deane et al., 1998). Third, a mixed-method approach of explanatory sequential design (Creswell, 2012; Leavy, 2017) could be adopted. This means that quantitative data are collected and analyzed first, followed by the collection and analysis of qualitative data to gain a deeper interpretation of the results. For example, quantitative information like the performance of students' final artifacts could be collected in future studies to reveal their actual academic achievement in online PjBL. Based on the results of artifact grading, interviews with students and teachers could be conducted to assess why students succeeded or failed in some way in developing the final products and how they see the positive and challenging aspects of online PjBL. Last, the small sample of master law students limits its generalizability to other educational contexts. To increase the generalizability, it would be helpful to conduct future research with large samples from different disciplines (e.g., MOOCs) to fully understand online PjBL.

Concluding Remarks

Based on the results of this study, it can be concluded that teaching presence can have both direct and indirect effects on students' evaluations of online project-based learning. Specifically, both instructional design and organization and direct facilitation were directly related to students' perceived benefits in the early stage of the course, in a positive and negative way, respectively. Furthermore, based on the entire course, instructors' direct facilitation could positively influence students' interactions with group members, thereby indirectly affecting students' perceptions of effective learning and satisfaction with online project-based learning. These findings can serve as guidelines on how to better develop online project-based learning courses and help teachers to adjust their role in the learning process so as to better assist students to benefit from online project-based learning.

Declarations

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

The authors received approval from the ethics review board of ICLON, Leiden University Graduate School of Teaching, Leiden University, the Netherlands for this study.

The authors received fundings from China Scholarship Council (Grant/Award Number: 201706310134) and National Human Rights Education and Training Base of Southeast University (Grant/Award Number: 2018YFC0830200)

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Appendix

Overview of the Measurements and their Constituent Items

Variable	Item
Instructional Design and Organization	The instructor clearly communicated important course topics (e.g., provided clear overview of the course). The instructor clearly communicated important course goals (e.g. provided a clear and accurate course overview). The instructor provided clear instructions on how to participate in course learning activities (e.g., provided clear instructions on how to complete course assignments successfully). The instructor clearly communicated important due dates/time frames for learning activities.
Directed Facilitation	The instructor was helpful in guiding me towards understanding course topics in a way that helped me clarify my thinking. The instructor helped to keep me engaged and participating in productive dialogue. The instructor helped keep the course participants on task in a way that helped me to learn. The instructor encouraged course participants to explore new concepts in this course. The instructor helped to focus discussion on relevant issues in a way that helped me to learn. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives. The instructor provided feedback in a timely fashion.
Social Presence	I felt comfortable participating in the course discussions (e.g., group discussions and other course activity discussions). I felt comfortable interacting with other course participants. I felt comfortable conversing through the online medium. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. Online or web-based communication is an excellent medium for social interaction. Getting to know other course participants gave me a sense of belonging in the course. I was able to form distinct impressions of some course participants. I felt that my point of view was acknowledged by other course participants. Online discussions help me to develop a sense of collaboration.
Cognitive Presence	Online discussions were valuable in helping me appreciate different perspectives. Reflection on course content and discussions helped me understand fundamental concepts in this class. Combining new information helped me answer questions raised (by the teacher and fellow students) in course activities. Learning activities helped me construct explanations/solutions. Problems posed (by the teacher and fellow students) increased my interest in course issues. Brainstorming and finding relevant information helped me resolve content related questions. I felt motivated to explore content related questions. Course activities piqued my curiosity. I can apply the knowledge created in this course to my work or other non-class related activities.

Overview of the Measurements and their Constituent Items

	I utilized a variety of information sources to explore problems posed (by the teacher and fellow students) in this course.
	I have developed solutions to course problems that can be applied in practice.
	I can describe ways to test and apply the knowledge created in this course.
Perceived Benefits	This group activity assisted me in learning new knowledge and skills.
	This group activity assisted me in understanding other/different points of view.
	This group activity assisted me in better understanding course materials.
	This group activity assisted me in learning more knowledge.
	This group activity assisted me in improving my thinking ability.
Satisfaction	This group activity assisted me in effectively using my study time.
	In general, this group activity was a useful learning experience.
	In general, this group activity met my learning expectations.
	In general, I am satisfied with this group activity.
	If this group activity will be offered in other courses in the future, I would like to take it.
	I am willing to recommend this group activity to others.