Chapter 5

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

5.1 Introduction

Clinical legal education is a prevailing teaching method in Chinese university legal education. This method is practice-oriented, aiming to develop students' practical legal skills by solving real client problems. However, while the understanding of legal theory is very important, law educators have not reached a consensus on the way of teaching legal theory. The education of legal theory puts forward high requirements on students' critical thinking ability, especially at the graduate level. For example, the same case may be applicable to many different legal provisions and different theories will lead to different solutions. All of these pose challenges to legal theory education. The teaching of 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 (e.g. Heo et al., 2010; H.-T. Hou et al., 2007; Stozhko et al., 2015; S.-Y. Wu et al., 2013). However, research on PjBL implemented in law education is scarce, especially in the Chinese context. In order to better understand this methodology, students' 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 (e.g. Çakiroğlu & Erdemir, 2019; Shih & Tsai, 2017; Usher & Barak, 2018). Some researchers claimed 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). That is to say, 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). Despite previous studies have found that

teaching elements were positively related to students' perceptions of online learning (Arbaugh, 2008; Choo et al., 2020), research does not clearly reveal the association between teaching, students' interactions, and their evaluations of online PjBL.

In the present study, we aim to investigate graduate law students' evaluations of online PjBL and how it is 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 the guidance of instruction in an online PjBL environment and contribute to the development of future online PjBL curricula.

5.2 Theoretical framework

5.2.1 Project-based learning

Project-based learning (PjBL) refers to a learner-centered instructional and learning approach (Helle et al., 2006). During this process, students acquire and apply knowledge and eventually construct new information by completing real-world projects. Most importantly, there will be a shared artifact developed by students based on an authentic driving question (Blumenfeld et al., 1991; Helle et al., 2006). In order 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; S. J. Lee et al., 2016). It is believed that the integration of PjBL with collaborative learning contributes to effective learning, especially among students with different 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). 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.

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 usually lies in four aspects, namely 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, during PjBL teachers 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. That is to say, PjBL can be characterized by little direct supervision and much 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 autonomy support from the teacher. Based on the survey and interview results about teachers' beliefs of EFL learners' autonomy, Meisani and Rambet (2017) concluded that instructors should promote students' 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 administrator role of instructors is to lead students to concentrate on their projects. Maor (2003) also found that teachers made efforts to keep students' discourse going. To this end, improved rules and instructions on 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 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 the new technology that students were not familiar with, teachers provided learners with in-time support and solutions (Çakiroğlu & Erdemir, 2019).

Students' evaluations of online PjBL

A number of 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 (e.g. Balash et al., 2019; Shih & Tsai, 2017; K. 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 the 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 their understanding of cross-culture. 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 approach contributed to students' learning motivation, skills of self-regulated learning, and collaboration with group members. In specific, shared leadership was more useful to promote group trust while vertical leadership was helpful to improve group interaction.

However, it does not mean that students and teachers have no complaints about online PjBL. K. Zhang et al. (2009) reported students' perceptions of their first experience of online collaborative PjBL. Interviews with students revealed

that overall students were satisfied with online PjBL as it was interesting and they could decide what to do and how to do it by themselves, but they still perceived frustration due to the lack of physical connection with teachers and peers. Besides, some students felt that PjBL was complicated and time-consuming and they preferred 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 their time, especially when they perceived difficulties to get responses from online group members.

5.2.2 Community of Inquiry framework

One of the most frequently adopted theoretical frameworks for the understanding of students' 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, i.e. 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 socially and affectively interact with others (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, namely the designer of educational activities and the facilitator for student learning. Anderson et al. (2001) added one more role of the online instructor, i.e. 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, facilitating discourse, 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, Cleveland-Innes, 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 happen (e.g. instructional design and organization) and provides specific direction and defined parameters to students' social and cognitive interactions. Regarding existing research, many studies have found that teaching presence was positively related to social presence and cognitive presence (e.g. Akyol & Garrison, 2008; Archibald, 2010; Garrison, Cleveland-Innes, 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 (e.g. 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 and continue the course. Structural equation modeling analyses found that teaching presence directly predicted student satisfaction as well as through the effects of cognitive presence rather than social presence. Besides, no presences had effects on students' intended effort for the course.

5.2.3 Research questions

The present study aims to provide more insights into graduate law students' evaluations of online PjBL and how it is related to the role of teachers based on the CoI framework. Thus, the specific research questions and a hypothesized research model examined (Figure 5.1) 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?

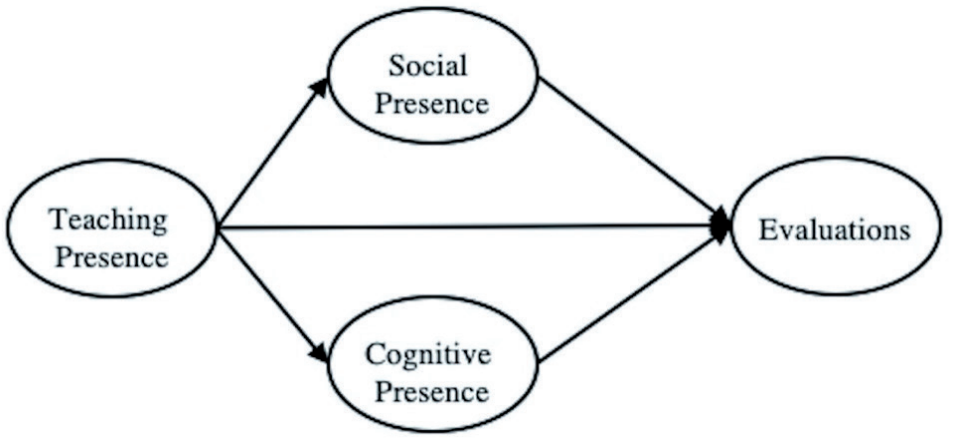

Figure 5.1. *Hypothesized research model*

5.3 Method

5.3.1 Research context and sample

This study was based on a 16-week online course of property law for first-year master students of law in a Chinese university. As shown in Table 5.1, during the course, 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. Besides, various ICT tools were adopted to scaffold the course (see Table 5.2).

Forty-two students (M_{age} = 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 of course paper (i.e. the whole phase). Thirty-eight and forty-one students answered the survey in each phase, respectively.

Table 5.1. *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 • Assigned one chapter from chapter 7 to each group	• Attended lectures • Group activity 1: collaboratively wrote a case analysis report based on the chapter assigned
Weeks 5 to 10	• Continued to give lectures • Gave feedback on each groups' presentation	• Attended lectures • 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.

Table 5.2. *Overview of the tools adopted in the course*

Tools		Main purposes (for course teacher and students)
A video conferencing software A mobile app		• To give lectures and presentations • 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

5.3.2 Measures

Although some researchers have claimed that teaching presence consists of three components (e.g. Anderson et al., 2001), an empirical study of Shea et al. (2005), with a sample of more than 2000 online learners, revealed only two variables of teaching presence, namely instructional design and organization, and directed facilitation. Besides, as aforementioned, the role of the teacher in this online PjBL course was not focused on instruction but facilitation. Therefore, two factors of teaching presence, i.e. 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", respectively.

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 5.3 and Table 5.4). An overview of the variables and the corresponding items can be found in the Appendix 2.

5.3.3 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 (i.e. IDO and DF) as the independent variable.

The data analysis was 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.

5.4 Results

5.4.1 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 the 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 the 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 5.3). In model 2, item 1and item 4 of cognitive presence and item 3 of perceived benefits were left out due to the low factor loading. After that results show adequate CA, CR, and AVE of model 2 (see Table 5.4). Hence, the reliability and validity of the measurement model in phase 1 and the whole phase are supported.

Table 5.3. *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
1. IDO	4	5.651	.445	.874	.913	**.851**					
2. DF	7	5.478	.556	.935	.948	.836	**.849**				
3. SP	9	4.883	.896	.952	.960	.411	.494	**.852**			
4. CP	12	5.237	.697	.957	.963	.698	.814	.592	**.827**		
5. Benefits	5	5.000	.877	.954	.965	.273	.127	.568	.320	**.919**	
6. 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 5.4. *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
1. IDO	4	5.640	.481	.854	.901	**.833**					
2. DF	7	5.348	.613	.920	.934	.759	**.819**				
3. SP	9	5.100	.731	.939	.949	.377	.486	**.820**			
4. CP	10	5.163	.621	.945	.953	.643	.714	.773	**.817**		
5. Benefits	4	5.281	.744	.888	.924	.188	.395	.711	.560	**.869**	
6. 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.

5.4.2 Structural model

The structural models for model 1 and model 2 were estimated with bootstrapping with 5000 subsamples. Figure 5.2 depicts the R^2 values and the path coefficients for both models. As shown, the R^2 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 R^2 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 5.5 presents the results of the path coefficients for model 1 and model 2.

Regarding the direct effects, on the one hand, in both models, DF positively influenced CP (Path 4: $\beta = 0.765$, $p < 0.001$ for model 1; $\beta = 0.532$, $p < 0.001$ for model 2). 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 only found to

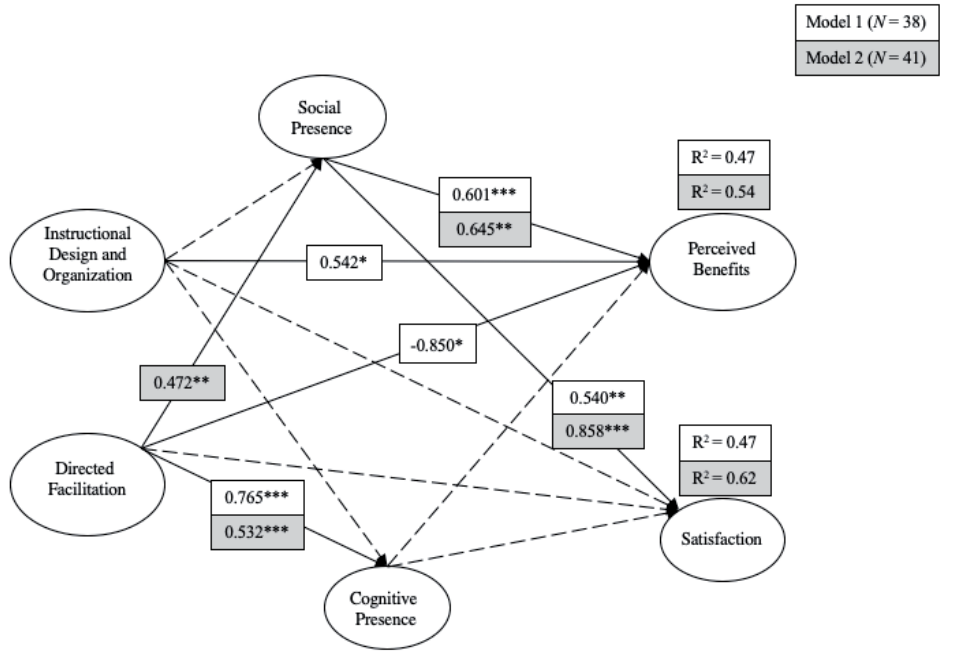

Figure 5.2. *Structural model with significant relationships*

positively influence SP 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: $\beta = -0.850$, $p < 0.05$).

With regard to 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 5.5. *Results of path coefficients for model 1and model 2 (direct and indirect)*

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

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

5.5 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 (i.e. teaching, social, and cognitive presences) and examined through partial least squares analyses in the first and the whole phase of the course.

5.5.1 The direct role of teaching presence

Regarding the first two research questions, first, 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 (T. Anderson et al., 2001), the more they felt that working on a case analysis report with group members were helpful to their knowledge learning. In the first day of the class, all students received a document that explained when they needed to complete and how to complete the group activities and specific assessment criteria for their final products. Thus, these detailed instructions might provide students' knowledge construction with appropriate guidance and "a specific direction" (Garrison & Arbaugh, 2007, p. 163) that makes the learning effectively. This result demonstrated the importance of good design and organization of the course in the early stage of a learning process (S. J. 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 (T. Anderson et al., 2001; Ke, 2010) so as to help them to be quickly involved in learning. Thus, after students were familiar with the parameters of the course and course activities, which happened usually in the later stages of a course, they no longer perceive 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 less 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 (i.e. chapters 1 to 6 in the textbook), whereas students worked on the report that based on the knowledge from 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 K. Zhang et al. (2009) that students would not listen to what the instructor teaches but do their own things.

Taking a look from the whole course, however, teachers' guidance and feedback had no effects on students' perceived benefits of writing the course paper. There might be two reasons: 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 K. Zhang et al. (2009) as Chinese students are used to communicating with others through social context cues (Tu, 2001). Besides, 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).

Third, none of the two factors of teaching presence were directly related to students' satisfaction with online PjBL. These results are different 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 K. Zhang et al. (2009) that students felt uncomfortable and concerned without a real teacher being around to supervise them in online PjBL.

5.5.2 The indirect role of teaching presence

As for the third research question, first, the results showed that social presence was positively related to students' perceived benefits and satisfaction in both phases of the course, consistent with the results from previous studies (e.g. 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 K. Zhang et al. (2009) revealed that students believed that collaborative learning with 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) that in small online learning groups students have the opportunity to engage in high-quality discourse and have the opportunity to 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 (e.g. PjBL in this study) 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 lie in itself but the promotion of student communication and interaction that advances student effective learning. This is consistent with the findings of Morales et al. (2013) 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 K. Zhang et al. (2009) that it is better to let students themselves to work on the projects 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 of importance, which can be extended to students and achieved by their collaboration.

5.5.3 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 5.6 presents several indispensable elements that we think are crucial when develop and implement 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 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 (e.g. Gašević et al., 2015). In short, teachers should make efforts on highly promoting student interactions with group members in order to advance effective student learning.

Table 5.6. *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 type[1] (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. According to Guo et al., (2020)

5.5.4 Limitations and future directions

Future research should be improved from the following aspects to address the limitations of this study. First, the presence variables are suggested to 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 (e.g. Shea et al., 2010). In doing so, a more clear 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 (e.g. Galikyan & Admiraal, 2019) so as 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 quantitative data are collected and analyzed first, followed up with 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 in order to reveal their actual academic achievement in online PjBL. Based on the results of the grading of artifacts, interviews with students and teachers could be conducted to figure out why students succeeded or failed in some way in developing the final products and how do 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) in order to fully understand online PjBL.

5.6 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. In specific, 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.