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THE EFFECTS OF SELF-EFFICACY ON LEARNERS' PERCEPTIONS OF COGNITIVE PRESENCE IN ONLINE COLLABORATIVE LEARNING ACTIVITIES

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Abstract

The applications of web2.0 platforms provide online learning opportunities to focus more on community collaborations as well as the knowledge construction. Cognitive presence (CP) is one of the most critical elements of community of inquiry, and ideal learning outcomes would require deeper stages of cognitive presence (integration and resolution stages), that usually difficult to achieve. Past research on CP felt short in investigating the influences of individual differences, including the effects of learners' internal motivation on higher-order thinking. We consider Self-efficacy is one of such as it emphasizes a combination of learners' motivation and cognition. This study intends to explore the influence of learners' online learning self-efficacy on CP, as well as to explore the relationship between learners' CP and learning

achievements.

An experiment was conducted to verify the above issues. Participants were 8th graders from a vocational school. They were required to complete their learning tasks through online collaboration by Facebook and Google Cloud. Questionnaires were applied to measure learners' CP and self-efficacy after study. Results show that phase's distribution of learners' CP in this study is satisfying, and there are significant correlations between CP and self-efficacy as well as CP and learning achievements. Therefore, this study suggests that instructors should take different strategies for students with different self-efficacy and take some strategies which can enhance self-efficacy.

Keywords

Self-Efficacy, Cognitive Presence, Community of Inquiry, Online Collaborative Learning

1. Introduction

From the perspective of socio-constructivism theory, collaborative learning has always been advocated (Wang, Chen, Mercer, & Kirschner, 2017). In collaborative learning, knowledge should be constructed in social interactions within learners, who are the main undertakers of learning (Dillenbourg, 1999; Fischer, Bruhn, Gräsel, & Mandl, 2002; Liu & Yang, 2014). With the progress of science and technology, collaborative learning can occur not only in traditional classrooms, but also in online and blended learning environments with the help of digital media and communication tools.

Web 2.0 tools have a strong advantage in being able to share information, allowing users to create their own content and communicate with others through various pipelines (Cormode & Krishnamurthy, 2008; Balakrishnan, 2015; Abodoli, Aris, Ahmad, & Rosli, 2015). Some researchers who have attempted to add Web2.0 tools such as Wiki pages, Google Docs and Facebook into learning（Wang, 2016; Lin & Yang, 2013; Abodoli et al., 2015; Hoic, Dlab, & Mornar, 2016）have found that these tools can assist teaching and improve learning outcomes (Alexander, 2006; Boulos, Maramba, & Wheeler, 2006).

This study attempts to combine collaborative learning with Web2.0 tools to create a new learning approach called online collaborative learning. This learning approach focuses on social collaboration and knowledge construction in the online learning process, emphasizing learner-centered learning.

Darabi, Arrastia, Nelson, Cornille, and Liang（2011） argued that online learning

should pay attention to the level of knowledge construction that learners can attain through deep and sustainable interaction. Online collaborative learning is a way of online learning. Therefore, it is necessary to understand the cognitive situation during the learning process. Cognitive presence as one of the core elements of community of inquiry（CoI） (Garrison, Anderson, & Archer, 2001), focuses on the degree of cognitive construction in learning. Yang, Quadir, Chen, and Miao (2016); and Choy and Quek (2016) showed that learners' cognitive presence correlates with objective learning outcomes and can be used to predict learning performance. Therefore, this study chooses cognitive presence to understand the status of cognitive construction in online collaborative learning process.

Past researches have pointed out that deep phases of cognitive presence were difficult to reach (Darabi et al., 2011; Celentin, 2007; Kanuka, Rourke, & Laflamme, 2007; Kovanović, Gašević, oksimovi, Hatala, & Adesope, 2015). Studies which tried to discuss this issue often focused on the influence of different teaching strategies (Garrison & Cleveland-Innes, 2005), and some researchers have pointed out that the personality characteristics were ignored in those discussions (Joksimovic, Gasevic, Kovanovic, Adesope, & Hatala, 2014； Kovanović et al., 2015; Cho, Kim, & Choi, 2017).

In online learning, learners should take more responsibility for learning than face-to-face learning（Cho, Deme, & Laffey, 2010）. This is especially true for online collaborative learning, which advocates active learning. Nevertheless, previous studies on cognitive presence have often ignored learners' intrinsic motivations (Joksimovic et al., 2014; Cho et al., 2017; Shea & Bidjerano, 2010, 2012).

Self-efficacy (Se) as one of core factors of self-regulation learning, is one of learners' intrinsic motivations in online learning (Yang, Tsai, Kim, Cho, & Laffey, 2006; Tseng & Tsai, 2010; Pellas, 2014). Therefore, this study regards self-efficacy as an intrinsic motivation, and will try to explore the relationship between it and cognitive presence in online collaborative learning. Owing to the fact that this study regards cognitive presence as the subjective perception of learners' cognitive construction, it also tried to verify the relationship between cognitive presence and objective learning outcomes.

2. Background

2.1 Online Collaborative Learning

Online collaborative learning in this study means combing collaborative learning with the online environment, which uses Web2.0 tools. Learners create learning products online

collaboratively in this study.

Collaborative learning refers to learners learning in groups for common learning goals (Dillenbourg, 1999; Zheng guards, Zhao Chengling & Liu Zhiying, 2009). It is rooted in socio-constructivism, which argues that knowledge should be constructed in social interaction; and that learners should be the subject of learning, making a contribution to content for accessing meaning (Dillenbourg, 1999; Fischer et al., 2002; Liu & Yang, 2014). Educators play the role of facilitators in collaborative learning, and students need to rely on themselves to construct knowledge and understanding (Wang, 2016). Many past studies show that the collaborative learning process can help learners acquire much information and complete the construction of knowledge, as well as train their ability in social communication in the learning process (Schellens & Valcke, 2005； Kuo, Hwang, & Lee, 2012). In addition to the traditional face-to-face learning environment, collaborative learning can also take place in online and blended learning environments (Wang et al., 2017) by using digital media and communication tools.

With the development of science and technology, more and more Internet technologies have begun to integrate into teaching, changing the environment of online learning; Web2.0 tool is one of them. The most distinctive feature of Web2.0 tools is that they allow users to create and change content, which facilitate the sharing, development and publishing of information (Abdelmalak, 2015). Tools using Web2.0 technology include social network tools such as Facebook and MySpace; collaboration tools, such as Wiki pages and Google Docs. Web2.0 tools have users being the message senders, rather than just readers. Therefore combining learning with these tools can change the traditional knowledge transmission pattern from teachers to students and develop a learner-centered learning environment (Sigala, 2007; Liu Jian & Yang Shuqing, 2014). Many researchers who tried to apply these tools into learning (Wang, 2016; Lin & Yang, 2013; Abodoli et al., 2015; Hoic et al., 2016) found that these tools can assist teaching and improve learning outcomes (Alexander, 2006; Boulos, Maramba, & Wheeler, 2006).

This study attempts to combine collaborative learning with online co-construction environment created by Web2.0 tools to create an online collaborative learning approach. Learners can communicate and collaborate with others through Web2.0 tools anytime and

anyplace, to build learning communities for achieving common goals of learning. According to Abdoli et al. (2015), the combination of effective Web2.0 tools with socio-constructivism, allowed students to control their learning experience and construct their own knowledge.

The ultimate goal of online collaborative learning is that learners can learn at a high level through interaction, collaboration and deep reflection. Darabi et al. (2011) indicated that online learning should pay attention to the level of knowledge construction and learning that learners can attain through deep and sustainable interactions. Online collaborative learning as a way of online learning asks learners to explore learning through mutual dialogues, so it is necessary to understand the cognitive situation during learning process. In order to help understand knowledge construction in learning process, this research chooses cognitive presence of community of inquiry (CoI) as learners' subjective assessment of their cognitive construction level in online collaborative learning.

Online collaborative learning emphasizes learner-centered learning, and teachers become facilitators and instructors The study of Johnson (1981), Bernard et al. (2009) and Schrire (2006) indicated that learner-centered dialogues could lead to deeper learning than teacher-centered dialogues. Online collaborative learning is task-driven, which leads to a full exchange of views among learners, thus deepening the understanding and mastery of knowledge (Zhang Hongbo, 2009).

In online collaborative learning, learners need to shoulder more responsibilities than face-to-face learning (Cho, Deme, & Laffey, 2010). Wang (2016) also indicated that in project learning using Wikis as a tool, learners needed to become more active; learning attitude and participation were particularly important in that case (Balakrishnan, 2015). Characteristics of students and learning strategies taken would affect learning results (Solimeno, Mebane, Tomai, & Francescato, 2008). The factors which influence learners' cognitive construction, such as intrinsic motivation, are worth exploring in online collaborative learning which advocates active learning and emphasizes the deep construction of knowledge.

2.2 Cognitive Presence

The community of inquiry (CoI) is one of the best theoretical frameworks to describe the online learning process, and is often used to understand students' learning experience in online learning. It can describe the inquiry process for achieving deep and meaningful

learning (Arbaugh et al., 2008; Garrison & Akyol, 2015; Cho et al; and 2017). Cognitive presence, is one of the core elements of CoI (Darabi et al. Garrison et, 2011; al., 2001; Kovanovi et al., 2015), refers to the level of meaning construction through learners' dialogues and reflections. It can be seen as a measure of learners' critical and creative thinking (Shea & Bidjerano, 2013).

Cognitive presence focuses on the degree of cognitive construction in the learning process (Akyol & Garrison, 2011), which is closely related to learning outcomes. Vaughan and Garrison (2005) argued that cognitive presence was the main driver for successful learning. The study of Garrison and Akyol (2015) suggested that there was an association between cognitive presence and perceived learning outcomes. The study of Choy and Quek (2016) divided learning outcomes into two parts: subjective outcomes and objective outcomes. His finding argued that there was a significant correlation between cognitive presence and two kinds of learning outcomes.

In online learning environments, measuring learning outcomes in different ways may lead to different results (Koriat & Bjork, 2005; Rhodes & Castel, 2008). Gaytan and McEwen (2007) suggested that the evaluation of online learning outcomes should be different from traditional ways which relied only on standard test scores, the quality of learners' work produced in the process of learning should also be considered (Choy & Quek, 2016). Therefore, this study uses achievement test score and learners' work produced during learning process as objective learning outcomes to verify the relationship between them and cognitive presence.

Methods of measuring cognitive presence are divided into two types (Joksimovic et al., 2014): qualitative methods—based on the use of quantitative content analysis of online discussion; quantitative methods—based on the use of cognitive presence questionnaires. Qualitative methods try to analyze learners' discussions objectively, and quantitative methods try to analyze learners' subjective perception of cognitive construction. This study chooses the quantitative method to get learners' subjective assessment of cognitive presence in online collaborative learning.

Garrison et al. (2001) divided cognitive presence into four phases: triggering events, exploration, integration, and resolution. In the integration and resolution phases, learners will

repeat personal reflection and dialogues with the outside world in order to develop the construction of knowledge (Garrison et al., 2001), which promotes learners to higher level of thinking (Meyer, 2003). They are very important for learners to reach; ideal learning outcomes in CoI refer to deep phases of cognitive presence. But it was difficult for learners to reach the two phases in online learning during past research (Darabi et al., 2011; Garrison et al., 2001; Celentin, 2007; Kanuka, Rourke, & Laflamme, 2007; Kovanovi al. 2015; C et, Garrison & Arbaugh, 2007). Previous studies have focused on the design and use of instructional strategies (Darabi et al., 2011; Garrison & Cleveland-Innes, 2005; Olesova, Slavin, & Lim, 2016).

Recent research have pointed out that those discussions ignored the impact of the personal characteristics of learners (Joksimovic et al., 2014; Kovanovi C et al., 2015; Cho et al., 2017), such as Joksimovic et al. (2014) which showed that students' individual differences in motivation, metacognition and so on would affect online learning's success; but had rarely been discussed in previous researches on CoI. They chose psychological features and found it did affect personal cognitive presence.

Intrinsic motivation as one of the personal characteristics of learners is rarely mentioned in the discussion of cognitive presence (Cho et al., 2017), Joksimovic et al. (2014) and Kovanovi et al. C (2015) also mentioned the same problem. Online collaborative learning advocates active learning: trying to build a learner-centered learning environment, requiring learners to actively manage their own learning. Self-efficacy (self-efficacy, Se) as one of the core factors of self-regulation in learning, is one of the intrinsic motivations of learners in online learning (Yang et al., 2006; Tseng & Tsai, 2010; Pellas, 2014). Therefore, this study will take self-efficacy as the internal motivation of learners, and explore its impact on cognitive presence in online collaborative learning.

2.3 Online Learning Self-efficacy

Bandura (1997) defined self-efficacy as the subjective judgment and confidence level of one's own ability to achieve certain outcomes in a specific environment. Self-efficacy is not necessarily an accurate assessment of one's actual level of competence, and is concerned about the belief in what one can do rather than what one have. In this sense, self-efficacy is the strength of conviction (Shea & Bidjerano, 2010; Bandura, 2007). It would not only affect

choices of people's behaviors, like choice of initiation and persistence, but also processes of behaviors, such as making effort and attitudes to dilemmas (Bandura, 1997; Lee, Lin, & Lin, 2007; Multon, Brown, & Lent, 1991).

Self-efficacy is a kind of personal characteristic (Joo, Lim, & Kim, 2013), mainly affected by performance accomplishments, vicarious experience, verbal persuasion and physiological states, so it may change with the situation at hand. According to Lin, Liang, Yang, and Tsai (2013), learners in online and traditional learning environments had similar sources of self-efficacy.

Online collaborative learning environment requires learners to be more active in their participation. According to Hoskins and Hooff (2005) learners' motivation was the necessary prerequisite for successful online learning. The study of Tseng and Tsai (2010) explored the relationship between learners' intrinsic motivation and self-efficacy and found that they were closely related. Yang et al. (2006) believed that self-efficacy is one of the motivations of learners. In online learning environment, students with high self-efficacy will be more willing to participate in activities, and complete tasks persistently.

Bandura (1988) pointed out that the reason why self-efficacy can influence learners' motivation level was that it was closely related to learners' efforts in learning processes and persistence in dilemmas. Learners with high self-efficacy in online group learning were more likely to persist than those with low self-efficacy when faced difficulties (Robinson, 2013). The study of Lin, Hung, and Lee (2015) explored the effect of self-efficacy on online learning training effects and found that it will influence learners' motivation of making efforts. Garrison et al. (2001) believed that entering deep phases of cognitive presence was challenging, because learners may encounter more difficulties. Therefore, learners with different self-efficacy levels will have different levels of effort and persistence, which is likely to affect their level of cognition.

Compared to traditional learning, online learning has higher levels of autonomy, which requires learners to have a higher level of self-regulation (Cho et al., 2017; Artino & Stephens, 2009). The study of Bernard et al. (2004) showed that self-efficacy is closely related to self-regulation ability. It was considered to be one of the most important driving forces for individuals to do self-regulation for adapting to the environment (Bandura, 2000). Learners

with higher levels of self-efficacy would have higher levels of self-regulation learning behaviors such as goal setting, self-monitoring, self-evaluation and strategy useing (Zimmerman, 2000, Cho et al., 2017). Online collaborative learning requires learners to have enough abilities in learning planning and strategy using, so self-efficacy is likely to affect the cognitive construction in online collaborative learning due to its influence on self-regulation behaviors.

Bandura (1997) mentioned that self-efficacy should be aimed at a certain situation. Bian (2006）summarized previous studies and her own empirical study, argued that there are two kind of self-efficacy: general self-efficacy and special self-efficacy. Both of them can predict behaviors. Special self-efficacy is more accurate in predicting, but more unstable. Therefore, in the online learning environment, self-efficacy should not only consider learning factors, but also consider online environment factors. Hsu and Chiu (2004) and Torkzadeh, Chang, and, Demirhan (2006) pointed out that in activities using computers, learners with higher computer self-efficacy felt more comfortable to the environment, and had higher levels of persistence. In online environment, learners' Internet self-efficacy affected their achievements and motivations (Papastergiou, 2010). Li, Wang Cixiao, and Wu Feng (2015) and Xie Youru, Liu Chunhua, Zhu quietly, and Yin Rui (2011) also took online environment into account when developing online learning self-efficacy scales. Online collaborative learning requires learners using computers to operate Web2.0 tools, so this study will consider the impact of learners' self-efficacy in online environment on cognitive construction.

This study takes learners’ confidence levels in learning ability, in making efforts and persistence, in self-regulation and in operating online learning environment into account as four aspects of online learning self-efficacy, and tries to explore their impacts on cognitive presence.

2.4 Research Questions

To that end, the research questions in this study are proposed as follows:

Question 1: What do learners’ perceptions of cognitive presence look like in online collaborative learning?

Question 2: Is there a correlation between online learning self-efficacy and perceived cognitive presence in online collaborative learning?

Question 3: Is there a correlation between perceived cognitive presence and objective online learning outcomes in online collaborative learning?

3. Methodology

3.1 Participant

Participants of this study are 63 eighth graders from a vocational school. On design introduction course, they took part in the online collaborative learning activity on the theme of Futurism. They didn't have any learning experience about Futurism before. The 63 students came from two different classes, of which 52 (82.5%) were females, and 11 (17.46%) were males, aged between 16-17 years old.

3.2 Course Design

The theme of the online learning activity is Futurism, aiming at three aspects. The first is to make learners understand the development and characteristics of Futurism. The second is to help them grasp the knowledge architecture of Futurism. And the third aspect is to make them develop the ability of expressing knowledge architecture by visual representation tools. The activity lasted 6 weeks and learners were divided into small groups of 3-4 people. Table 1 illustrates the process of the online collaborative learning activity.

Table 1: *The Process of Online Collaborative Learning Activity*

Before Activities（in face-to-face classroom）	**Activities（in online environment, 4 phases）**	**After Activities（in face-to-face classroom）**
Introduction of the activity	Data collection phase（DC1） Information arrangement and question answering phase (IAQA, scored by teachers） Draft conception phase (DC2) Map design phase (MD , scored by teachers）	Online learning self-efficacy measurement Cognitive presence measurement Achievement test

Contents of each phase were released by the tutor of this course through Facebook and Google drive. Groups had discussion online through Facebook group messenger and Google

Doc, and collaborated online to complete learning tasks and work out learning products through Google Doc.

3.3 Activity Design in Online Collaborative Learning

The activity is divided into four phases: Data collection phase (DC1), Information arrangement and question answering phase (IAQA, scored by teachers), Draft conception phase (DC) and Map design phase (MD, scored by teachers). Details of the four phases are in table 2.

Table 2: *Design of Online Collaborative Learning Activity*

Phases	Learning Task	Work produced
Data collection phase (DC1)	Collecting information about Futurism according to learning questions and gathering these information into a document as notes collaboratively	A "Futurism notes" document
Information arrangement and question answering phase (IAQA）	Summarizing notes to answer questions raised in phase 2 collaboratively	A "Futurism answering" document
Draft conception phase (DC2)	Making knowledge architecture of Futurism according to the knowledge learned in phase1 and phase 2 Designing the draft of Futurism map	A "Futurism draft" document
Map design phase (MD)	Expressing the knowledge architecture of Futurism by visual map design.	A Futurism map

Taking sociality of learning into consideration, each phase of learning activity required learners to lead learning by themselves, and reach group consensus by online discussion,

communication and exchange of views. For example, Teacher and tutor of this activity encouraged team members to use Google doc to edit online documents collectively, and encouraged the use of Google Doc's online chatting and comment function, and the use of Facebook's group messengers to express views and ideas.

In the aspect of knowledge construction, this study adopted some designs that can lead to critical thinking, and required learning work produced in each phase. For example, Wang et al. (2017) argued that many studies have paid attention to the value of communicating complex ideas by using visual representation tools such as concept map in group learning to subjective meaning making. This study also adopted the design of concept map in MD phase, requiring groups working out knowledge architecture collaboratively through arranging contents of dialogues, and expressing the architecture by visual map design. The map should be accurate, clear and aesthetic.

In this online collaborative learning activity, learners are the leaders, while teacher and tutor become facilitators and help providers. For example, the tutor of this activity had accompanied learners during the whole course of learning, reminding schedule information, encouraging discussion, providing feedback to guide learning and so on.

3.4 Learning Platform

In this study, Facebook and Google Doc were used as Web 2.0 tools for online collaborative learning activity.

Wang, Woo, Quek, Yang, and, Liu (2012) tried to use Facebook as a learning management system to assist teaching, and found that it can enhance learning motivation. This study uses Face Book as the main tool for information transmission. Teacher and tutor used Face Book groups and group messengers to publish information about learning activity like introduction of activities, schedules, advices and so on. Learners used them to discuss and exchange views leaded by them.

Figure 1: *Face Book Group*

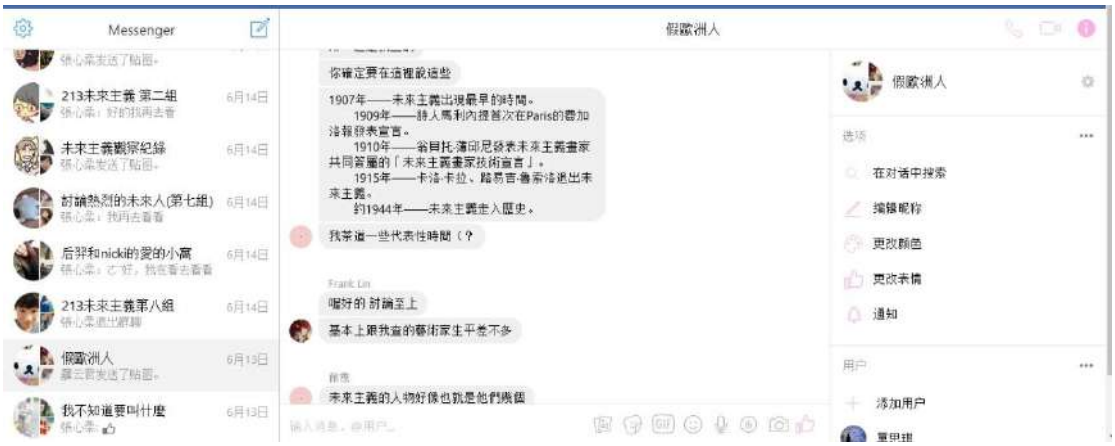

Figure 2: *Face Book Group Messengers*

Google doc can support multi-users to co-construct the same file without time and space constraints. All participants can easily collaborate with others through the same online document (Lin & Yang, 2013). It also provides online chatting and comment function for users to exchange views every time and everywhere. So it seems to be a valuable online collaboration tool in many studies, which can increase the enthusiasm for content creation and enhance students' engagement (Parra, 2013; Ravid, Kalman, & Rafaeli, 2008).

Therefore, this study adopted Google doc as the main collaboration tool. Teacher and tutor created learning documents of each phase according to the schedule, which included learning contents and task requirements. Learners created, edited, and deleted writing content under guidelines collaboratively in Google doc online documents. They could also make comments and chat with each other through Google Doc directly.

Figure 3: *Google Doc Online Document*

3.4 Measures

3.4.1 Online Learning Self-efficacy Questionnaire

Learners' online learning self-efficacy were measured with questionnaire at the end of the online collaborative learning activity. The questionnaire is a revised form of the online learning self-efficacy survey instrument (Li et al., 2015). This measure was scaled in a 5-point Likert scale, ranging from 1 "strongly disagree" and 5 "strongly agree." The questionnaire included 4 constructs: learning ability (8 items), learning volition (10 items), sense of control (9 items), and sense of environment (10 items), corresponding to learners' confidence in learning ability, efforts and persistence, self-regulation, and using online learning environment. An example item of learning ability is: "I think I can achieve good results in learning activities"; an example item of learning volition is: "Even if encountering resistance, I can still keep on studying"; An example item of sense of control is: "During the process of online learning, I can allocate learning task appropriately"; An example item of sense of environment is: "I think I can use the online platform or other communication software to discuss with others". In this study, item reliabilities were evaluated using Cronbach Alphas: $\alpha = 0.985$.

3.4.2 Cognitive Presence Questionnaire

Learners' cognitive presence were measured at the end of the online collaborative learning activity with the modified cognitive presence instrument (Swan et al., 2008, Arbaugh et al., 2008) consisted of triggering event, exploration, integration and resolution. This measure was scaled in a 5-point Likert scale, ranging from 1 "strongly disagree" and 5

"strongly agree." All constructs were measured with 4 items. An example item of triggering event is: "Problems posed by teachers and classmates increased my interest in learning activity issues"; An example item of exploration is: "Brainstorming in learning activity helped me resolve content related questions"; An example item of integration is: "I have combined new information helped me answer questions raised in learning activities."; An example item of resolution is: " I have developed solutions to course problems and tasks that can be applied in practice." In this study, item reliabilities were evaluated using Cronbach Alphas: $\alpha = 0.962$.

3.4.3 Objective Learning Outcomes Measurements

This study took cognitive presence as learners' subjective assessment of cognitive construction in online collaborative learning activities, trying to explore the relationship between it and objective learning outcomes. Choy and Quek (2016) suggested that the quality of work that learners produced in online learning process should also be included in the assessment of learning outcomes. Therefore, this study evaluated objective learning outcomes from two aspects, achievement test and learners' works produced. Works produced were divided into IAQA phase and MD phases.

Scores of IAQA phase represent learners' level of understanding about Futurism knowledge and ability of summarizing. Learners' answers of IAQA phase were measured by an experienced teacher and a tutor who had profound knowledge of Futurism based on the accuracy, completeness, and clarity of learners' works.

Scores of MP phase represent learners' level of knowledge construction about Futurism, their understanding about Futurism characteristics and designing ability. Learners' designs of visual concept map were measured by the teacher and the tutor based on their accuracy, completeness, clarity and aesthetics.

The achievement test was consisting of 12 multi-choice questions, six of them only have one correct answer and others have more than one correct answer. This written-test was designed by the teacher and the tutor, who tried to measure learners' understandings of Futurism knowledge and analytical abilities of Futurism works.

4. Results

4.1 Descriptive Statistics

Means and standard deviations for learners' online learning self-efficacy, cognitive presence, achievement test score, MP phase score and IAQA phase score are presented in Table 3.

Table 3: *Descriptive Statistics (N=63)*

	M	**SD**
Online learning self-efficacy	3.28	0.60
Cognitive presence	3.27	0.58
Achievement test score	2.68	0.82
MP phase score	3.59	1.43
IAQA phase score	4.02	0.44

Means and standard deviations for learners' self-efficacy in learning ability, learning volition, sense of control and sense of environment are presented in Table 4.

Table 4: *Descriptive Statistics of Online Collaborative Learning（N=63）*

	M	**SD**
Learning ability	3.16	0.68
Learning volition	3.24	0.72
Sense of control	3.02	0.80
Sense of environment	3.64	0.80
Total score	3.28	0.60

The result shows that learners have the highest self-efficacy in the sense of environment, followed by in learning volition and in learning ability, and have the lowest self-efficacy in the sense of control.

To answer question 1, this study measured cognitive presence from four phases--trigger event, exploration, integration and resolution. The results are shown in Table 5.

Table 5: *Descriptive Statistics of Cognitive Presence（N=63）*

	M	**SD**
Trigger event	3.02	0.70
Exploration	3.42	0.66
Integration	3.41	0.67
Resolution	3.22	0.61
Total socre	3.27	0.58

As with the results of most studies, learners have the strongest perception of the exploration phase (Morueta, López, Gómez, & Harris, 2016), followed by the integration and resolution phases, and the weakest perception of the trigger event phase.

4.2 Correlations between Online Learning Self-efficacy and Cognitive Presence

To answer question 2, this study explored the correlation between various aspects of online learning self-efficacy and various phases of cognitive presence. The results are shown in Table 6.

Table 6: *Correlations between Online Learning Self-efficacy and Cognitive Presence (N=63)*

	Trigger event	**Exploration**	**Integration**	**Resolution**	**Total score of cognitive presence**
Learning ability	.580**	.575**	.590**	.629**	.629**
Learning volition	.639**	.626**	.588**	.607**	.699**
Sense of control	.666**	.676**	.529**	.534**	.685**
Sense of environment	.511**	.699**	.730**	.445**	.680**
Total score of online learning self-efficacy	.693**	.758**	.724**	.639**	.800**

The results show that there is a significant positive correlation between various aspects of online learning self-efficacy and various phases of cognitive presence.

4.3 Correlations between Cognitive Presence and Learning Outcomes

To answer questions 3, this study explored the correlation between learners' cognitive presence and objective learning outcomes. Objective learning outcomes consisted of achievement test score, IAQA phase score and MP phase score. The results are shown in Table

7

Table 7: *Correlations between Cognitive Presence and Learning Outcomes (N=63)*

	No.	**6**	**7**	**8**
Trigger event	1	.033	.366**	.074
Exploration	2	.073	.397**	-.012
Integration	2	.114	.443**	.039
Resolution	4	.138	.435**	-.060
Total socre of cognitive presence	5	.100	.465**	.014
Score of IAQA phase	6	1	.249*	.123
Score of MP phase	7	.249*	1	.014
Score of achievement test	8	.123	.014	1

The results show that MP phase scores of learners significantly affected their cognitive presence in trigger event ($r = .366$, $p < .01$), exploration ($r = .397$, $p = .001$)，integration ($R = .443$, $p < .001$), and resolution ($r = .435$, $p < .001$). No significant correlation was found between learners' scores of achievement test and cognitive presence, either learners' scores of the IAQA phase and cognitive presence.

5. Discussion

5.1 Discussion of Descriptive Statistics

Online collaborative learning activities in this study required learners to collect a large amount of information actively from outside world and discuss with peers fully, which may be the reason why learners perceived strongest on exploration phase. Kovanović et al. (2015) also found the same result.

Learners perceived integration and resolution phase fewer than exploration phase but stronger than trigger event phase, which may be related to the fact that learners need to integrate information through reflections and dialogues, summarize the knowledge architecture and try to design the concept map in the last three phases of learning activities. The reason why learners perceive trigger event phase lowest may be because that the teachers have proposed learning questions at the beginning, and learners only need to collect

information according to the known learning questions.

Levels of learners perceived on integration and resolution phases are higher among four phases of cognitive presence, but the mean of cognitive presence is general. Researchers also find that there is a difference between learners on perceived levels of cognitive presence. This may due to the individual difference that discussed in this study, but also remind the need of paying attention to the design of online learning activities. Different types of tasks may affect the level of cognitive presence (Olesova et al., 2016). Darabi et al. (2011) argued that scaffoldings provided by tutors could motivate learners into high-level study which is worthy of reference.

In online collaborative learning activities, learners have the highest self-efficacy on sense of environment, which indicates that learners in this study are suitable for the use of web 2.0 tools and Internet involved in this study. Learners have the lowest self-efficacy on sense of control. Perhaps for high school students, it's difficult to manage learning and focus on learning without any interference in online collaborative learning activities. This reminds educators to pay more attention on guiding, such as reminding schedules, providing help for setting up learning goals.

In terms of learning outcomes, the scores of IAQA phase and MP phase reach a high level, but the score of achievement test is general. These are probably due to the fact that some multi-choice questions in this test have more than one correct answer, and students are not familiar with this design.

5.2 Discussion of the Correlation between Online Learning Self-efficacy and Cognitive Presence

In online collaborative learning, online learning self-efficacy as the intrinsic motivation will affect perceived cognitive presence due to the significant correlation between them. This result also confirms that learners' individual characteristics should be taken into account when exploring learners' cognitive presence in online learning, which is consistent with views proposed by Shea and Bidjerano (2010) and Joksimovic et al. (2014). Personal motivation factors, such as online learning self-efficacy, should be paid more attention to when the learning environment require high activity, such as online collaborative learning environment.

Self-efficacy on learning ability represents learners' confidence level of their ability to complete online learning tasks. In traditional learning, Bandura (2007) proposed that it would be helpful for learning performance if learners made higher assessment of their learning ability. This statement has also been confirmed in online collaborative learning in this study.

Self-efficacy on learning volition represents learners' confidence level of their efforts and persistence in online learning process. Garrison et al. (2001) argued that the reason why learners could not enter deep phases of cognitive presence was that those phases were more challenging, and learners may encounter difficulties and dilemmas. In online collaborative learning, learners are likely to face comments and challenges from peers, so they need to work harder and stick at it.

Self-efficacy on sense of control represents learners' confidence level of controlling online learning activities and behaviors. Online collaborative learning requires learners to be more active and take on more responsibilities (Cho, Deme, & Laffey, 2010). Learners' self-regulation behaviors represent being more active in learning, which is related to high level of criticism and creative thinking (Shea & Bidjerano, 2012). The higher self-efficacy learners have on sense of control， the higher level of perceived cognitive presence they may reach， which is in line with the result of Cho et al. (2017).

Self-efficacy on sense of environment represents learners' confidence level of mastering the learning environment online. Online collaborative learning occurs in computer-used online environment， Torkzadeh et al. (2006) and Papastergiou (2010) pointed out that Internet and computer self-efficacy would affect learners' motivation and perception of environment. The result of this study shows that the more confident learners feel about operating computers and online environments，the easier for them to reach high level of cognition.

In summary, this study suggests that online learning self-efficacy of learners can affect their cognition construction through affecting their online learning behaviors， which is reflected in their cognitive presence levels.

5.2 Discussion of the Correlation between Cognitive Presence and Objective Learning Outcomes

The correlation between achievement test scores and cognitive presence was not

significant. There are two possible reasons, firstly students were not familiar with the design of test which some multi-choice questions have more than one correct answer. Secondly, Akyol et al. (2011) found that two groups of learners with different levels of cognitive presence did not show any differences in test scores, in their opinions that result may be an artifact of the assignment and the grading rubric.

Although learners' scores of IAQA phase are high, they do not show any significant correlation with cognitive presence, which may be due to the fact that learners were still in a state of conceptual understanding of knowledge in IAQA phase. Although learners needed to induce and arrange knowledge in this phase, they didn't need to think about how to use that knowledge in solving practical problems, which made them not able to reach high level of cognitive construction. Morueta, L, PEZ, G, mez & Harris (2016) said, the more complex the task was, the more probably learners' cognition construction occurred.

In this study, there is a significant correlation between learners' scores of MP phase and learners' cognitive presence. This result verifies what Wang et al. (2017) said about using visual representation tools such as concept maps and diagrams to communicate complex ideas was valuable to subjective meaning making in online learning. Research results also show that learners' scores of MP phase are more related to the deep phases of cognitive presence like integration and resolution phases than trigger event and exploration phases, which means that this learning activity is advantageous to cognition construction.

6. Conclusion

Due to the importance of cognition construction to online collaborative learning, this study suggests that educators should consider the impact of online learning self-efficacy on cognitive presence when designing online collaborative learning activities. This study proposed two suggestions for reference.

Firstly, different teaching strategies should be used for students with different online learning self-efficacy. Online collaborative learning environment is highly autonomous. The study of Artino and Stephens (2009) mentioned that the design of teaching strategies should be based on learners' motivations and beliefs in such an environment. Learners' different online learning self-efficacy levels mean different needs, which requires the flexibility of

learning design and personalized supports, which is in line with Hoic et al. (2016). For example, according to the level of self-efficacy, learners could be assigned different roles in learning, and different learning activities should be recommended to different learners due to their self-efficacy. In online collaborative learning environment, how to design activities to enhance learners' perceived cognitive presence according to their different self-efficacy is worthy of further discussion.

Secondly, adopting designs that can improve online learning self-efficacy. Educators can inspect teaching design according to the four sources of self-efficacy proposed by Bandura and the four aspects of online learning self-efficacy in this study. Designs such as providing learners with guidance and feedback timely to support and encourage them to complete learning activities; promoting social interaction between learners to enhance the sense of participation; clarifying learning goals; providing scaffolding to help learners doing self-regulation; providing necessary technical guidance should be considered.

In addition, this study suggests that co-constructing graphical map may be an ideal online collaborative activity design. Simple discussions only lead learners to lower phases of cognition, and online collaborative learning activities should consider providing learners specific backgrounds and goals, to promote learners' critical reflections by increase the complexity of task design.

There is no control group in this study. So researchers can't infer whether there is a interaction between self-efficacy and teaching strategies, and whether it has a combined effect on cognitive presence. This study only chooses self-efficacy as one of individual differences. How other individual factors like age，identity affect CP in online collaborative learning is worth exploring.

References

Abdelmalak, M. M. M. (2015). Web 2.0 Technologies and Building Online Learning Communities: Students' Perspectives. *Online Learning*, *19*(2), n2.

Abdoli-Sejzi, A., Aris, B., Ahmad, M. H., & Rosli, M. S. (2015). The Relationship between Web 2.0 Technologies and Students Achievement in Virtual University. *International Education Studies*, *8*(13), 67.

Akyol, Z., & Garrison, D. R. (2011). Understanding cognitive presence in an online and

blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology*, *42*(2), 233-250. https://doi.org/10.1111/j.1467-8535.2009.01029.x

Alexander, B. (2006). Web 2.0: A new wave of innovation for teaching and learning?. *Educause review*, *41*(2), 32.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The internet and higher education*, *11*(3), 133-136. https://doi.org/10.1016/j.iheduc.2008.06.003

Artino, A. R., & Stephens, J. M. (2009). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *The Internet and Higher Education*, *12*(3), 146-151. https://doi.org/10.1016/j.iheduc.2009.02.001

Balakrishnan, B. (2015). Online computer supported collaborative learning (CSCL) for engineering students: a case study in Malaysia. *Computer Applications in Engineering Education*, *23*(3), 352-362. https://doi.org/10.1002/cae.21605

Bandura, A. (1988). Self-regulation of motivation and action through goal systems. *In Cognitive perspectives on emotion and motivation* (pp. 37-61). Springer Netherlands. https://doi.org/10.1007/978-94-009-2792-6_2

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Bandura, A. (2000). Cultivate self-efficacy for personal and organizational effectiveness. *Handbook of principles of organization behavior*, 2, 0011-21.

Bandura, A. (2007). Much ado over a faulty conception of perceived self-efficacy grounded in faulty experimentation. *Journal of Social and Clinical Psychology*, 26(6), 641–658. https://doi.org/10.1521/jscp.2007.26.6.641

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., & Surkes, M. A., et al. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243-1289. https://doi.org/10.3102/0034654309333844

Bernard, R., Abrami, P., Lou, Y., Borokhovski, E., et al. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, 74(3), 379–439. https://doi.org/10.3102/00346543074003379

Bian, Y.F. (2006). Perceived Academic Self-efficacy: Is It General or Domain-specific?. *Psychological Science*, 29(5), 1275-1277.

Boulos, M. N. K., Maramba, I., & Wheeler, S. (2006). Wikis, blogs and podcasts: a new generation of Web-based tools for virtual collaborative clinical practice and education. *BMC medical education, 6*(1), 41 https://doi.org/10.1186/1472-6920-6-41

Celentin, P. (2007). Online education: analysis of interaction and knowledge building patterns among foreign language teachers. *Journal of Distance Education, 21*(3), 39-58.

Cho, M.-H., Demei, S., & Laffey, J. (2010). Relationships between self-regulation and social experiences in asynchronous online learning environments. *Journal of Interactive Learning Research, 21*(3), 297–316.

Cho, M. H., Kim, Y., & Choi, D. (2017). The effect of self-regulated learning on college students' perceptions of community of inquiry and affective outcomes in online learning. *The Internet and Higher Education, 34,* 10-17. https://doi.org/10.1016/j.iheduc.2017.04.001

Choy, J. L. F., & Quek, C. L. (2016). Modelling relationships between students' academic achievement and community of inquiry in an online learning environment for a blended course. *Australasian Journal of Educational Technology, 32*(4). https://doi.org/10.14742/ajet.2500

Cormode, G., & Krishnamurthy, B. (2008). Key differences between Web 1.0 and Web 2.0. *First Monday, 13*(6). https://doi.org/10.5210/fm.v13i6.2125

Darabi, A., Arrastia, M. C., Nelson, D. W., Cornille, T., & Liang, X. (2011). Cognitive presence in asynchronous online learning: A comparison of four discussion strategies. *Journal of Computer Assisted Learning, 27*(3), 216-227. https://doi.org/10.1111/j.1365-2729.2010.00392.x

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), Collaborative-learning: Cognitive and computational approaches (pp. 1–19). Oxford: Elsevier.

Fischer, F., Bruhn, J., Gräsel, C., & Mandl, H. (2002). Fostering collaborative knowledge construction with visualization tools. *Learning and Instruction, 12*(2), 213-232. https://doi.org/10.1016/S0959-4752(01)00005-6

Garrison, D. R., & Akyol, Z. (2015). Toward the development of a metacognition construct for communities of inquiry. *Internet & Higher Education, 24*(1), 66-71. https://doi.org/10.1016/j.iheduc.2014.10.001

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of distance education, 15*(1), 7-23. https://doi.org/10.1080/08923640109527071

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157-172. https://doi.org/10.1016/j.iheduc.2007.04.001

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *The American journal of distance education*, *19*(3), 133-148. https://doi.org/10.1207/s15389286ajde1903_2

Gaytan, J., & McEwen, B. C. (2007). Effective online instructional and assessment strategies. *The American Journal of Distance Education, 21*(3), 117–132. http://dx.doi.org/10.1080/08923640701341653

Hoskins, S. L., & Van Hooff, J. C. (2005). Motivation and ability: which students use online learning and what influence does it have on their achievement?. *British journal of educational technology*, *36*(2), 177-192. https://doi.org/10.1111/j.1467-8535.2005.00451.x

Hoic-Bozic, N., Dlab, M. H., & Mornar, V. (2016). Recommender System and Web 2.0 Tools to Enhance a Blended Learning Model. IEEE Transactions on Education, 59(1), 39-44. https://doi.org/10.1109/TE.2015.2427116

Hsu, M., & Chiu, C. (2004). Internet self-efficacy and electronic service acceptance. *Decision Support Systems*, *38*(3), 369–381. https://doi.org/10.1016/j.dss.2003.08.001

Johnson, D. W. (1981). Student-student interaction: the neglected variable in education. *Educational Researcher*, *10*(1), 5-10. https://doi.org/10.3102/0013189X010001005

Joksimovic, S., Gasevic, D., Kovanovic, V., Adesope, O., & Hatala, M. (2014). Psychological characteristics in cognitive presence of communities of inquiry: A linguistic analysis of online discussions. *The internet and higher education*, *22*, 1-10. https://doi.org/10.1016/j.iheduc.2014.03.001

Joo, Y. J., Lim, K. Y., & Kim, J. (2013). Locus of control, self-efficacy, and task value as predictors of learning outcome in an online university context.*Computers & Education*, *62*, 149-158. https://doi.org/10.1016/j.compedu.2012.10.027

Kanuka, H., Rourke, L., & Laflamme, E. (2007). The influence of instructional methods on the quality of online discussion. *British Journal of Educational Technology*, *38*(2), 260–271. https://doi.org/10.1111/j.1467-8535.2006.00620.x

Koriat, A., & Bjork, R. A. (2005). Illusions of competence in monitoring one's knowledge during study. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *31*(2), 187–194. http://dx.doi.org/10.1037/0278-7393.31.2.18

Kovanović, V., Gašević, D., Joksimović, S., Hatala, M., & Adesope, O. (2015). Analytics of communities of inquiry: Effects of learning technology use on cognitive presence in asynchronous online discussions. *The Internet and Higher Education, 27*, 74–89. https://doi.org/10.1111/j.1467-8535.2006.00620.x

Kuo, F. R., Hwang, G. J., & Lee, C. C. (2012). A hybrid approach to promoting students' web-based problem-solving competence and learning attitude. *Computers & Education, 58*(1), 351-364. https://doi.org/10.1016/j.compedu.2011.09.020

Lee, Y. Y., Lin, H. P., & Lin, J. Y. (2007). The analysis and application of self-efficacy theory. *Cheng Ching Medical Journal, 3*, 46-52.

Li, J., Wang, C.X., & Wu, F.(2015). Designing the Online Learning Self-Efficacy Scale for Adult Learners and Its Measurement. *JOURNAL OF DISTANCE EDUCATION, (2015.06).47-53.*

Liu. C.J., & Yang. S.C. (2014). Collaborative Learning with a Web 2.0 Technology-Integrated University Course: Differences in the Presence of a CoI Model between Wiki-Integrated and Asynchronous Discussions. *Curriculum & Instruction Quarterly, 17*(2), 167-195.

Lin, S., Hung, T. C., & Lee, C. T. (2015). Revalidate forms of presence in training effectiveness: Mediating effect of self-efficacy. *Journal of Educational Computing Research, 53*(1), 32-54. https://doi.org/10.1177/0735633115588772

Lin, W. C., & Yang, S. C. (2013). Exploring the roles of Google. doc and peer e-tutors in English writing. *English Teaching, 12*(1), 79.

Lin, Y.-C., Liang, J.-C., Yang, C.-J., & Tsai, C.-C. (2013). Exploring middle-aged and older adults' sources of Internet selfefficacy: A case study. *Computers in Human Behavior, 29*(6), 2733-2743. https://doi.org/10.1016/j.chb.2013.07.017

Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks,7*(3), 55-65.

Morueta, R. T., López, P. M., Gómez, Á. H., & Harris, V. W. (2016). Exploring social and cognitive presences in communities of inquiry to perform higher cognitive tasks. *The Internet and Higher Education, 31*, 122-131. https://doi.org/10.1016/j.iheduc.2016.07.004

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology, 18*,30–38. https://doi.org/10.1037/0022-0167.38.1.30

Olesova, L., Slavin, M., & Lim, J. (2016). Exploring the Effect of Scripted Roles on Cognitive

Presence in Asynchronous Online Discussions. *Online Learning, 20*(4), 34-53. https://doi.org/10.24059/olj.v20i4.1058

Papastergiou, M. (2010). Enhancing physical education and sport science students' self-efficacy and attitudes regarding information and communication technologies through a computer literacy course. *Computers & Education,54*(1), 298-308. https://doi.org/10.1016/j.compedu.2009.08.015

Parra, J. L. (2013). Developing technology and collaborative group work skills: supporting student and group success in online and blended courses. In Increasing Student Engagement and Retention in e-learning Environments: Web 2.0 and Blended Learning Technologies (pp. 287-337). Emerald Group Publishing Limited. https://doi.org/10.1108/S2044-9968(2013)000006G013

Pellas, N. (2014). The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: Evidence from the virtual world of Second Life. *Computers in Human Behavior, 35*, 157-170. https://doi.org/10.1016/j.chb.2014.02.048

Ravid, G., Kalman, Y. M., & Rafaeli, S. (2008). Wikibooks in higher education: Empowerment through online distributed collaboration. *Computers in Human Behavior*, *24*(5), 1913-1928. https://doi.org/10.1016/j.chb.2008.02.010

Rhodes, M. G., & Castel, A. D. (2008). Memory predictions are influenced by perceptual information: Evidence for metacognitive illusions. Journal of Experimental Psychology: General, 137(4), 615. http://dx.doi.org/10.1037/a0013684

Robinson, K. (2013). The interrelationship of emotion and cognition when students undertake collaborative group work online: An interdisciplinary approach. *Computers & Education, 62,* 298-307. https://doi.org/10.1016/j.compedu.2012.11.003

Schellens, T., & Valcke, M. (2005). Collaborative learning in asynchronous discussion groups: What about the impact on cognitive processing?.*Computers in Human behavior, 21*(6), 957-975. https://doi.org/10.1016/j.chb.2004.02.025

Schrire, S. (2006). Knowledge building in asynchronous discussion groups: going beyond quantitative analysis. *Computers & Education,46*(1), 49-70. https://doi.org/10.1016/j.compedu.2005.04.006

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education, 55*(4), 1721-1731. https://doi.org/10.1016/j.compedu.2010.07.017

Shea, P., & Bidjerano, T. (2012). Learning presence as a moderator in the community of inquiry model. *Computers & Education, 59,* 316–326. https://doi.org/10.1016/j.compedu.2012.01.011

Shea, P., & Bidjerano, T. (2013). Understanding distinctions in learning in hybrid, and online environments: an empirical investigation of the community of inquiry framework. *Interactive Learning Environments, 21*(4), 355-370. https://doi.org/10.1080/10494820.2011.584320

Sigala, M. (2007). Integrating web 2.0 in e-learning environments: a socio-technical approach. international journal of knowledge and learning, 3(6), 628-648. *International Journal of Knowledge & Learning, 3*(6), 628-648. https://doi.org/10.1504/IJKL.2007.016837

Solimeno, A., Mebane, M. E., Tomai, M., & Francescato, D. (2008). The influence of students and teachers characteristics on the efficacy of face-to-face and computer supported collaborative learning. *Computers & Education,51*(1), 109-128. https://doi.org/10.1016/j.compedu.2007.04.003

Torkzadeh, G., Chang, J. C. J., & Demirhan, D. (2006). A contingency model of computer and Internet self-efficacy. *Information & Management, 43*(4), 541-550. https://doi.org/10.1016/j.compedu.2007.04.003

Tseng, S. C., & Tsai, C. C. (2010). Taiwan college students' self-efficacy and motivation of learning in online peer assessment environments. *The Internet and Higher Education, 13*(3), 164-169. https://doi.org/10.1016/j.iheduc.2010.01.001

Vaughan, N., & Garrison, D. R. (2005). Creating cognitive presence in a blended faculty development community. *The Internet and Higher Education, 8,* 1–12. https://doi.org/10.1016/j.iheduc.2004.11.001

Wang, L. (2016). Employing Wikibook project in a linguistics course to promote teaching and learning. *Education and Information Technologies, 21*(2), 453-470. https://doi.org/10.1007/s10639-014-9332-x

Wang, M., Cheng, B., Chen, J., Mercer, N., & Kirschner, P. A. (2017). The use of web-based collaborative concept mapping to support group learning and interaction in an online environment. T*he Internet and Higher Education, 34,* 28-40 https://doi.org/10.1016/j.iheduc.2017.04.003

Wang, Q., Woo, H.L., Quek, C.L., Yang, Y., & Liu, M. (2012). Using the facebook group as a learning management system: An exploratory study. British Journal of Educational Technology, 43(3), 428–438 https://doi.org/10.1111/j.1467-8535.2011.01195.x

Yang, C. C., Tsai, I. C., Kim, B., Cho, M. H., & Laffey, J. M. (2006). Exploring the

relationships between students' academic motivation and social ability in online learning environments. *The Internet and Higher Education*,*9*(4), 277-286. https://doi.org/10.1016/j.iheduc.2006.08.002

Yang, J. C., Quadir, B., Chen, N. S., & Miao, Q. (2016). Effects of online presence on learning performance in a blog-based online course. *The Internet and Higher Education*, *30*, 11-20. https://doi.org/10.1016/j.iheduc.2016.04.002

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary educational psychology*, *25*(1), 82-91. https://doi.org/10.1006/ceps.1999.1016