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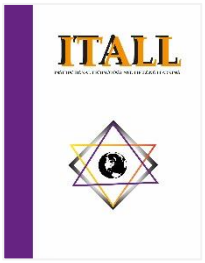

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The Community of Inquiry Framework Applied in the 3D Virtual Language Learning Environments: A Narrative Review

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ABSTRACT

The Community of Inquiry (CoI) framework, developed by Garrison, Anderson, and Archer (2000), has been used to define the core elements of a collaborative constructivist learning environment needed to build and maintain a purposeful learning community, in online and blended learning contexts. Several researchers have used, analyzed and studied the CoI framework extensively in many ways since it was developed. Virtual worlds (VWs), immersive 3D online environments, have attracted significant interest by researchers in a variety of fields. Researchers in the field of language education have also benefitted and utilized VWs due to their pedagogical opportunities, potential to foster collaborative constructivist learning, so on. This study presents the current status and trend of application of CoI framework in three-dimensional virtual language learning environments (3D VLLEs). In this study, a systematic analysis of studies related to CoI framework applied in 3D VLLEs was carried out. In this context, a search was conducted in ten electronic databases and yielded limited number of studies: three research articles and one thesis. The studies were analyzed by inductive content analysis and the findings were presented descriptively. In addition, potential research suggestions for researchers were provided based on existing studies.

3B Sanal Dil Öğrenme Ortamlarında Uygulanan Sorgulama Topluluğu Modeli: Bir Anlatı İncelemesi

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ÖZET

Garrison, Anderson ve Archer (2000) tarafından geliştirilen Sorgulama Topluluğu Modeli (STM), çevrimiçi ve harmanlanmış öğrenme ortamlarında amaçlı öğrenme topluluğu oluşturmak ve sürdürmek için gereken işbirlikçi bir yapılandırmacı öğrenme ortamının temel öğelerini tanımlamak için kullanılmıştır. STM'nin geliştirilmesinden bu yana, birçok araştırmacı tarafından yaygın olarak kullanıp birçok yönden incelenmiştir. Sürükleyici 3B çevrimiçi ortam olan sanal dünyalar, çeşitli alanlarda araştırmacılar tarafından büyük ilgi görmektedir. Dil eğitimi alanındaki araştırmacılar da pedagojik fırsatları, işbirlikçi yapılandırmacı öğrenmeyi teşvik etme potansiyeli vb. özellikleri nedeniyle sanal dünyalardan faydalanmaktadır. Bu çalışma, üç boyutlu sanal dil öğrenme ortamlarında (3B SDÖO) STM uygulamalarının mevcut durumunu ve eğilimini sunmaktadır. Bu çalışmada, 3B SDÖO'larına STM modelinin uygulandığı çalışmaların sistematik bir analizi yapılmıştır. Bu bağlamda, on elektronik veri tabanında arama yapılmış ve arama sonucunda sınırlı sayıda çalışma (3 araştırma makalesi ve 1 doktora tezi) elde edilmiştir. Çalışmalar tümevarımsal içerik analizi ile analiz edilmiş ve bulgular betimsel olarak sunulmuştur. Ayrıca, mevcut çalışmalara dayanarak araştırmacılar için potansiyel araştırma önerileri sunulmuştur.

1. Introduction (Times New Roman, Font Size 12)

The Community of Inquiry (CoI) framework, based on conceptual perspectives proposed by Dewey (1933), can be defined as a "generic and coherent structure of a transactional educational experience whose core function is to manage and monitor the dynamic for thinking and learning collaboratively" (Garrison, 2017, p. 24). The CoI framework, developed by Garrison, Anderson, and Archer (2000), has been widely used, debated, and analyzed to define the core elements of a collaborative constructivist learning environment needed to build and maintain a purposeful learning community, in online and blended learning contexts (Garrison, Cleveland-Innes, & Fung, 2010; Garrison, 2017; Stenbom, 2018).

Virtual worlds, immersive 3D online environments, have attracted significant interest by researchers in a variety of fields. Researchers in the field of language education have also benefitted and utilized VWs due to their pedagogical opportunities, potential to foster collaborative constructivist learning, so on (see also Chiu, 2013; Chun, 2012; Lin & Lan, 2015; Reisoğlu, Topu, Yilmaz, Yilmaz, & Göktaş, 2017, Sadler, 2017; Wang et al., 2019).

The aim of the study is to provide a review of the state of the art of the application of CoI framework in 3D VLLEs. A systematic analysis of studies based on CoI framework applied in 3D VLLEs was carried out and existing articles and theses based on CoI framework applied in 3D VLLEs in the selected databases were analyzed in terms of their purpose, included CoI elements, context and research design, and results related to CoI framework. Thus, this study presents the current status and trend of application of CoI framework in 3D VLLEs.

2. The Community of Inquiry Framework

The CoI Framework was built based on the assumption that, "a community of learners is an essential element of a deep and meaningful educational experience" (Garrison, 2017, p. 22). Stewart (2017) claimed that "In a successful community of inquiry, students engage in a combination of dialogue and reflection to question their existing assumptions about a subject matter and ultimately construct new knowledge" (p.68). In creating this process-oriented framework, the purpose was to "define, describe and measure the elements of a collaborative and worthwhile educational experience" (Garrison, Anderson, & Archer, 2010, p.6).

The CoI framework explains an educational experience putting the emphasis on critical thinking skills and collaborative inquiry with the intersection of three elements (presences), namely teaching presence (TP), social presence (SP), and cognitive presence (CP) that create and facilitate meaningful online learning (Garrison et al., 2000). These elements of the CoI framework are illustrated in Figure 2.1 and defined as below.

- CP was defined as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning" (Garrison et al.,2000, p.89)
- On the other hand, SP was defined as "the ability of learners to project themselves (i.e., their personal characteristics) socially and emotionally, thereby representing themselves as real people, in a community of inquiry" (Rourke, Anderson, Garrison, & Archer, 2001).
- Finally, TP was defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes" (Garrison and Anderson, 2003, p. 29).

Briefly, TP outlines "the moderation and guidance of the inquiry", SP "the human experience of learning" and CP "the process of learning" (Stenbom, 2015, pp.10-12).

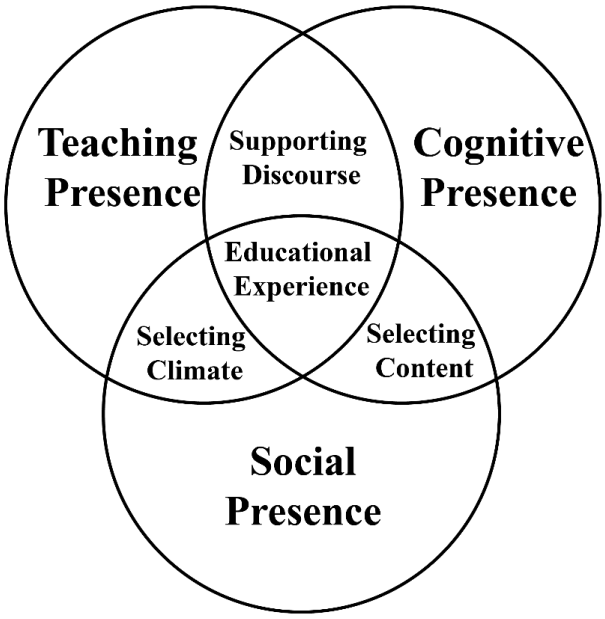

Figure 2.1. Community of inquiry (Garrison et al., 2000, p. 88)

Since its birth in 2000, CoI has been revised and refined while being used widely to develop and evaluate learning in various learning environments by researchers and educators (Akyol & Garrison 2008; Daspit & D'souza, 2012). Toyoda and Harrison (2018) summarized the purposes of the use of CoI framework in the research and stated that:

"CoI has been used to compare students' higher-order thinking skills in face-to-face discussions and online discussions (Meyer, 2003), to design an online collaborative learning environment (Redmond & Lock, 2006); to evaluate students' learning experience in online discussions in a blended course (Akyol & Garrison, 2008); to develop higher – order thinking

skills in an online and blended learning environment (Akyol & Garrison, 2011); to evaluate an online course (Lamber & Fisher, 2013)."

The two main methods used by the researchers for gathering and analysing data based on the CoI framework were "transcript coding" by a coding scheme (e.g. Shea et al., 2010) and "survey procedure method" by CoI Survey (Arbaugh et al., 2008). In addition, "Multi User Virtual Environment Education Evaluation Tool" (MUVEEET) observation checklist was developed by McKerlich and Anderson (2007) to justify an educational event in multi-user virtual environments (MUVEs) in terms of indicators of CoI framework.

Since the introduction of the CoI Survey, which was developed by Arbaugh et al. (2008) and validated by Swan et al. (2008), to assess the degree to which CoI presences occur in online courses and to quantitatively determine the state of a CoI, and found to be "a valid, reliable, and efficient measure of the dimensions" of the CoI framework (Arbaugh et al., 2008, p. 133)., it has been used in many contexts and applied for multiple purposes (Stewart, 2017).

In a recent review, Stenbom (2018) analyzed the development and implementation of the CoI survey by reviewing 103 journal papers published between 2008 and 2017 and outlined the use of the CoI instrument by researchers as: "to explore a single learning environment, to examine differences using the CoI survey, to observe relationships among the different elements of CoI and their relationships with other data, and to address the reliability and/or validity of data using the CoI survey" (p. 25). The most common area of instruction was found to be e-learning (including educational technology, blended learning, and learning, design, and technology) with 22 studies. Stenbom (2018) suggested that the instructional settings be extended to make more general claims about the nature of online and blended learning through the CoI study, which was found to provide valid and reliable results for assessing learning experiences and comparing instructional settings.

3. 3D Virtual Language Learning Environments

A virtual world has been defined as "A synchronous, persistent network of people, represented as avatars, facilitated by networked computers" (Bell, 2008, p. 2). Girvan (2018) defined it recently as "Shared, simulated spaces which are inhabited and shaped by their inhabitants who are represented as avatars. These avatars mediate our experience of this space as we move, interact with objects and interact with others, with whom we construct a shared understanding of the world at that time.". VWs provide immersive characteristics that give the sense of being there (Zulkanain,2017) and can "serve to motivate learners to engage in a series of purposeful educational inquiries without losing interest or sidestepping intended learning goals" (Cooke-Plagwitz, 2008). Some of the

popular 3-D VWs being used specifically for educational purposes include Active Worlds, Second Life, OpenSim, and Sansar.

Since the mid-1990s, three dimensional(3D) VWs' pedagogical opportunities have created considerable interest and dialog between educators and educational researchers across a variety of disciplines (Wigham et al., 2018). According to many research findings (Gamage et al. 2011; Gregory & Masters, 2012; Rayner & Fluck, 2014), 3D MUVEs are of great value for foreign language courses. The benefits of using VWs in the language education context comprise opportunities to access a target language, to illustrate linguistic concepts, to use authentic language communication, to support social collaborative learning, to implement student-centered collaborative learning, and to design identity-related tasks (Wang, 2017). In Borona, Tambouris, and Tarabanis's (2018) systematic literature review, 32 out of 128 papers were reviewed on the use of MUVEs in computer-assisted second language learning, and the study results showed progress in learning outcomes, communication skills, and motivation.

4. Method

This study followed the systematic literature review-based guidelines offered by Kitchenham and Charters (2007) and a comprehensive review protocol was developed to guide and minimize the likelihood of bias in a study the review (Kitchenham, 2004). The protocol provided a detailed plan for the systematic review by specifying the approaches to be followed and the quality measures or conditions to apply while selecting the literature (Brereton et al., 2007) and was carried out through five phases: the identification of research and research questions, search procedure, criteria for study selection, quality assessment, data extraction and data synthesis (Kitchenham & Charters, 2007).

4.1. Research Question

The following question specifically guided this study:

"What is the current status and trend of the literature in CoI framework applied in 3D VLLEs?".

The two most critical aspects of the analysis were:

1. "to provide a review of available studies on the application of CoI framework into 3D VLLEs"; and
2. "to draw on the findings and make recommendations on future directions for research and practice in this field".

4.2. Search Strategy

To determine whether the studies applied the CoI framework in the 3D Virtual Language Learning Environments, a literature search was conducted in ten databases: ACM Digital Library, Ebscohost, IEEE Digital Library, Council of Higher Education National Thesis Center, Proquest Dissertations and Theses, ScienceDirect, Scopus, Springer, ULAKBİM TR Index and Web of Science.

The following keywords were used alone or in combination for the research (by using "AND" and "OR" Boolean combinations): "Community of Inquiry", "CoI", "Virtual world", "Second Life", "OpenSim", "OpenSimulator", "Active Worlds", "Sansar", "3DLE", "3D VLE", "3D VLLE", "3DVE", "3D VE", "MUVE", "immersive", "language education", "language learning", "language teaching", "language acquisition", "foreign language", "second language" and "language learners". In the pilot search test, it was found that search engines of selected databases use different search strings. Therefore, the search terms were modified according to the search engines.

4.3. Study Selection

There were two stages in the selection process of the studies: Stage 1 was a preliminary screening, focusing on following exclusion criteria: Studies outside the domain of CoI framework applied in 3D VLLE, no full-length peer reviewed studies, restricted theses, and duplicated studies found by search in different databases and studies not published in the English and Turkish language were excluded. In Stage 2, each study was evaluated to be included if it is related to the domain of CoI framework applied in 3D VLLE (using CoI Framework, contextually in language education field, applied in a 3D virtual world).

Table 1 represents the detailed inclusion/exclusion criteria which were applied to ensure relevant studies within the boundaries of the research objective (Kitchenham & Charters, 2007).

Table 1. Study inclusion/exclusion criteria

Inclusion Criteria	**Exclusion Criteria**
Studies with the domain of CoI framework applied in 3D VLLE.	Studies outside this domain.
Full-length peer reviewed studies	No full-length peer reviewed studies
Full-length theses	Restricted theses
Available in selected databases	Duplicated
Published in the English or Turkish language	Not published in the English or Turkish language

As a result of the broad primary screening of the selected databases by using the determined keywords, 151 Articles and 30 Theses (total 181 studies) were found in the selected databases. 104 studies remained after removing duplicates. Each study for inclusion in the set of candidate papers based on title and abstract were

evaluated. The primary focus was on including studies if they were obviously irrelevant (Kitchenham & Brereton, 2013). After applying exclusion criteria, of the studies remaining were downloaded for further selection. As a result of application of inclusion and exclusion criteria, it was found that only four studies; three articles and one graduate thesis had applied the CoI framework into 3D VLLEs.

4.4. Data analysis and extraction

An inductive content analysis proposed by Elo and Kyngäs (2008) was adopted in the eligible studies to extract data from them. Results of the database searches were imported into Rayyan QCRI (rayyan.qcri.org) software to facilitate title/abstract review. Data extraction form (coding schema) recording information from identified studies was created (Kitchenham, 2004). The data extraction form included following elements: study reference, type of publication, topic, purpose of the study, purposes of using of CoI Framework, included CoI elements, target audience, research method, research design, data collection tools, course delivery method, 3D platform, and results. To help data extraction, a Microsoft Excel form was designed based on the mentioned elements.

4.5. Validity of the research

The researcher consulted to a colleague (expert) in the field of Instructional Technology during the review process. All eligible studies coded independently, and the researcher and the expert as coders collaborated closely and came together to compare resultant codes to ensure high inter-rater reliability. Any disagreement on coding was resolved and the final rate of agreement reached 100% by ensuring consensus. The data extraction form was reviewed and piloted.

4.6. Limitation and delimitation of the research

The main focus of the study was on CoI framework application in 3D VLLE. The number of eligible studies was below the expectation of such a systematic literature review. To delimitate this situation, studies related to CoI framework applied in language education were also identified in the search of the selected databases and the results were enriched by discussion of the CoI research in language education. The systematic review conducted searches in ten databases; it might not have reviewed all studies in the literature and only studies in English and Turkish were eligible.

5. Result

The search of the databases by predetermined selection criteria identified 4 studies applied the CoI in the 3D Virtual Language Learning Environments. Table 2 shows the list of studies that met the inclusion criteria and brief summaries of the studies in terms of type of the publication, topic, and purpose. Studies were categorized as; research article (n = 3) and Ph.D. Dissertation (n = 1).

Table 2. Studies applied the CoI framework in the 3D Virtual Language Learning Environment

Reference	Type of the Publication	Topic / Theme / Context	Purpose
Pellas and Boumpa (2016)	Research Article	Continuing Professional Development (CPD) of Pre-service Foreign Language Teachers	"To investigate possible differences of pre-service foreign language teachers' learning gain (if any) through the three activities (Using Moodle, Using OpenSim and Evaluation of the CoI model) that were implemented in SLOODLE that was combined with OpenSim."
Pellas and Boumpa (2017)	Research Article	CPD of Pre-service Foreign Language Teachers	"To investigate the effect of pre-service foreign language teachers' interactions on their CPD, using a CoI model and the Jigsaw teaching technique for the development of virtual learning environments that can be held in OpenSim and SLOODLE."
Ozbek, Comoglu, and Baran (2017)	Research Article	Enhancement of English language learners' speaking skills	"To explore the design of the two activities "presentation" (topic was "introducing an innovation") and "role playing" in Second Life" "To evaluate qualitatively Turkish foreign language learner's roles and outputs before, while, and after the implementation of the activities."
King (2018)	Ph.D. Dissertation	Spanish heritage language learning	"To describe and explain how Spanish heritage language learners (SHLLs) engage in pedagogically structured and tailored learning of their heritage language within a virtual world, Second Life"

Table 3 shows the purposes of using CoI Framework and/or CoI Survey and included CoI elements in the reviewed studies.

Table 3. Purposes of using CoI Framework and/or CoI Survey and included CoI elements in the reviewed studies

Reference	Purposes of using CoI Framework and/or CoI Survey	Included CoI elements		
		Teaching Presence	Social Presence	Cognitive Presence
Pellas and Boumpa (2016)	- CoI Framework as an instructional design mean "For the development of an instructional design framework focusing on users' interactions"	√	√	√
Pellas and Boumpa (2017)	- CoI Framework as an instructional design mean - CoI Survey as a rubric for formative evaluation of the learning process "Measurement of the learning process of preservice teachers in synchronous communication modes"	√	√	√
Ozbek et al. (2017)	- CoI Framework as an instructional design mean "To discuss the Turkish Foreign Language Learners' roles and outputs (perceived benefits of the participants from the 3DLE)"	-	√	√
King (2018)	- CoI Framework as an instructional design mean "To frame each stage conceptually in the development of tasks for SHLLs to be performed in Second Life (Task Design – pedagogical design)"	√	√	√

Pellas and Boumpa (2016) examined the comparative perspectives on the efficacy of SLOODLE and Open Sim as a 3D web-based platform for CPD of preservice foreign language teachers to learn basic terms related to IT literacy, using the CoI model as a theoretical framework focusing on user experiences with the development of 3D VLE activities. The components of the CoI have been used to foster interaction and encourage participation in blended synchronous mode (Pellas & Boumpa, 2016).

In another study of Pellas and Boumpa (2017) on CPD, the impact of the experiences of pre-service foreign language teachers on their CPD in Opensim using SLOODLE was investigated using a theoretical framework of instructional design including the CoI model and the Jigsaw teaching technique. The CoI model was used in the study to identify the experiences and relationships of pre-service foreign language teachers in a learning community and as an instructional design tool to test the efficacy of preservice teachers' CPD in synchronous communication modes (Pellas & Boumpa, 2017).

In the research of Ozbek et al. (2017), two activities "introducing an innovation" and "role playing" in Second Life are planned to improve the speaking skills of English-language learners and qualitatively assess the roles and outputs of Turkish language learners before, during and after the implementation of the two activities through the CoI model, consisting of CP and SP. The CoI model was used as a theoretical framework to analyze the roles and outcomes (perceived benefits of the participants from the 3DLE).

A thesis study conducted by King (2018) investigated how college students in the Second Life environment college students learn Spanish as a foreign language in the Second Life environment and designed a tool for SHLLs studying their Heritage Language. The CoI framework was used to frame each stage conceptually in the development of tasks for SHLLs to be performed in Second Life; specifically, determining how to balance the online class (SL Language Lab) between structuring and directing the learning experiences of SHLLs (TP), socially engaging them with peers and other Spanish speakers (SP), and also promoting higher-order thinking while reflecting on these experiences (CP) (King, 2018).

5.1. Purposes of using CoI Framework and CoI Survey

The aims of using the CoI Framework and CoI Survey were explored in aims/purposes, and discussions of qualifying studies by the inductive method. They were categorized into two groups as follows:

- CoI Framework as an instructional design mean (or, in other words, as a theoretical model)
    - For the development of an instructional design framework focusing on users' interactions (Pellas & Boumpa, 2016).
    - For pedagogical design of Second Life -Task Design
      To frame each stage conceptually in the development of tasks for SHLLs to be performed in Second Life (King, 2018)
    - To discuss the Turkish Foreign Language Learners' roles and outputs
      (Ozbek et al., 2017)
- CoI Survey as a rubric for formative evaluation of the learning process
    - Measurement of the learning process of preservice teachers in synchronous communication modes (Pellas & Boumpa, 2017)[1].

5.2. Included CoI elements

The structure for the CoI framework consists of three interdependent components: teaching, social and cognitive presence. Out of the 4 reviewed studies, 3 included the entire framework elements; a study (Ozbek et al., 2017)

[1] Pellas and Boumpa (2017) employed both CoI model as an instructional design mean and CoI Survey to measure of the learning process.

with two elements of the framework; SP and CP. In addition, King (2018) was added motivation as a new element to the original elements.

5.3. The topic/theme/context

The topic in the reviewed studies was instruction was introducing technology for CPD of pre-service foreign language teachers (Pellas & Boumpa, 2016; 2017), enhancement of English language learners' speaking skills (Ozbek et al., 2017) and Spanish heritage language learning (King, 2018).

5.4. Participants, research methodology and design and data collection tools in reviewed studies

Participants and their level of education

Table 4 presents the brief information about the participants in the reviewed studies.

Table 4. Participants in the reviewed studies

Reference	Participants	Level of Education
Pellas and Boumpa (2016)	135 Pre-service Foreign Language Teachers (English – German – French – Italian)	Undergraduate Level
Pellas and Boumpa (2017)	35 Pre-service Foreign Language Teachers (English – German – French – Italian)	Undergraduate Level
Ozbek et al. (2017)	12 High School Students 2 English High School Teachers	High School
King (2018)	47 Spanish Heritage Language Learners	Undergraduate Level

As seen in Table 4, while there are 135 participants in the largest study, there are 14 participants in the smallest study. Qualifying studies of this review are performed almost entirely at the undergraduate level of students. Of the 4 studies, 3 studies were conducted in higher education at undergraduate level. The study of Ozbek et al. (2017) differs from other 3 studies that it was carried out by high school students and high school English language teachers. Most studies included participants studying at English language and the followed by Spanish, French, German, Italian language.

5.4.1. Research Methodology & Design

The research methods and designs used in the reviewed studies are presented in Table 5, which shows qualitative research employed by Ozbek et al. (2017) and King (2018). A one-group pretest–posttest design was employed by Pellas and Boumpa (2016) in quantitative research. Exploratory design was used in the study by Pellas and Boumpa (2017) employing mixed method. Case study was preferred in qualitative research. No other qualitative design was used in the studies examined.

Table 5. Research methods and designs used in the reviewed studies

Reference	Research Method	Research Design
Pellas and Boumpa (2016)	Quantitative	Quasi-experimental design (A one-group pretest–posttest design)
Pellas and Boumpa (2017)	Mixed Method	Quantitative + Qualitative
Ozbek et al. (2017)	Qualitative	Case Study
King (2018)	Qualitative	Case Study (Exploratory)

5.4.2. Data collection tools

Table 6 presents the data collection tools used in the reviewed studies and indicates that the tools preferred were: CoI instrument (sometimes called as CoI questionnaire, mostly preferred as CoI Survey in literature) by Swan et al. (2008) and by Arbaugh et al. (2008), interview, questionnaire, observation, reflective journals, reflective journals and chatlogs.

Table 6. Data collection tools used in the reviewed studies

Reference	Data Collection Tools
Pellas and Boumpa (2016)	CoI instrument by Swan et al. (2008) Questionnaire
Pellas and Boumpa (2017)	CoI instrument by Arbaugh et al. (2008) Online surveys Interview
Ozbek et al. (2017)	Observation Researchers' dairies Semi structured interviews
King (2018)	Surveys/asynchronous interviews Chat-logs Reflective journals with extension activities

5.5. Course Delivery Method and Platform

Table 7 presents the course delivery method and platforms used in the reviewed studies. It showed that the course delivers methods most preferred were: Blended (face-to-face and online). King (2018) applied CoI in an online course. Opensim combined with SLOODLE and Second Life platform were used.

Table 7.Course Delivery Method and platform

Reference	Course Delivery Method	Platform
Pellas and Boumpa (2016)	Blended (face-to-face and online)	Open Simulator (Opensim) + SLOODLE
Pellas and Boumpa (2017)	Blended (face-to-face and online)	Open Simulator (Opensim) + SLOODLE
Ozbek et al. (2017)	Blended	Second Life
King (2018)	Online	Second Life

5.6. Research results in the reviewed studies related to CoI

The results of the first study by Pellas and Boumpa (2016) strongly indicated that pre-service foreign language teachers had high learning gain and learned meaningfully with 3D virtual world-mediated learning activities guided by the indicators of the three presences in CoI, in OpenSim and SLOODLE regardless of the activity's class or knowledge subject/learning goals. In this article, significant educational implications for pre-service teachers' CPD and benefits of the using the CoI model as a theoretical framework to organize a virtual class using SLOODLE and Open Sim were also presented.

Pellas and Boumpa (2017) combined CoI framework with Jigsaw teaching technique and used as an instructional design framework to reduce the organizational-pedagogical complexity and opportunity of the appropriate management responsibility for each of pre-service teachers. The results of the second study by Pellas and Boumpa (2017) indicated that "collaborative practice-based tasks in synchronous communication modes, such as group work, team effort, instructor's or peer feedback and consolidated learning material in a 3D multiuser virtual environment have enhanced the learning experience for more meaningful outcomes" (p. 939). In this study, the CoI Survey as a rubric for formative evaluation of the learning process. Consistent with the earlier studies of Akyol and Garrison (2008) and Shea and Bidjerano (2010), TP effect was substantial and correlated with the SP and CP.

Ozbek et al. (2017) used CP and SP of the CoI framework as a theoretical frame to discuss the roles and outputs and showed that SP in both activities of "role-playing" and the "presentation of innovation strategies" in SL influenced the quality and variability of the outcomes. They claimed that, the interaction between the teacher-students and the social environment is higher in the "role-playing activity" by considering the learning contexts created for SL in terms of CP (Ozbek et al., 2017).

King (2018) used the CoI framework to frame each stage conceptually in the development of tasks to be performed in SL for SHLLs and focussed on motivational factors which are not considered by CoI framework but which play a major role in the language learning process and claimed that the CoI framework was not enough to provide a well-planned instructional design and suggested to integrate motivation component to ensure a better supported learning experience.

6. Discussion and Conclusion

On the contrary of earlier research regarding the implementation of CoI framework to the online and blended environments, the application of CoI framework into 3D VLLEs have remained limited in number, only four studies by searching ten databases. The limited number of studies made it difficult to draw conclusions on the results for exploring the implication of CoI framework on 3D VLLE. However, it can be concluded that Implementation of CoI framework as an instructional design mean in 3D VLLEs revealed positive results for effective teaching and learning: high learning gain and learned meaningfully (Pellas & Boumpa, 2016), more meaningful outcomes (Pellas & Boumpa, 2017).

Ozbek et al. (2017) claimed that avatars helped to strengthen "the relationship between student-student and student-teacher by enabling communication and stated "It is possible to state that social presence is also high in a real-life context where students choose their favourite avatar and work on speaking". Moreover, roleplay activities in which the students worked actively and performed the different scenarios through their avatars in small groups increased SP. Considering CP, Ozbek et al. (2017) claimed that "the interaction between the teacher-students and the social environment is higher in the role-playing activity" (p.296). The study was performed in synchronous format, but written preparation in all the teaching strategies influenced the success of students positively. Students' spontaneous response to the questions without following the scenario and finding the correct answer through discussion affected CP positively.

Pellas and Boumpa (2017) used the CoI Survey as a rubric for formative evaluation of the learning process. CP mean score was relatively higher than TP and SP. CP had the highest mean score (4.59) whilst the social presence was the lowest (3.54). Considering the context, and/or design of previous studies, comparing the mean scores of TP, CP and SP might not be so feasible. In order to have a more feasible comparison, detailed qualitative findings could be better (Kilis, 2016). Moreover, Pellas and Boumpa (2017) claimed that TP effect was substantial and correlated with the SP and CP and the result was consistent with the earlier studies of Akyol and Garrison (2008) and Shea and Bidjerano (2010). TP refers to "the design, facilitation and direction of cognitive and social presence with the aim of producing valuable educational outcomes" and in this context, to ensure effective and successful learning experiences for students, the planning and design of online learning are extremely important (Zhang & Zou, 2020). These causal relationship and correlations among the presences and with other variables, such as self-efficacy have been confirmed in several other studies (Stenbom, 2018).

King (2018) criticized CoI framework due to the lack of motivation factor which was crucial in language education and stressed on the need of additional motivation component to the CoI framework to ensure a better supported learning experience. Adding additional component to the CoI framework to be more meaningful as a framework is one of the critiques in the CoI literature (Castellanos-Reyes, 2020). Researchers suggested adding learner presence (Shea et al.,2012), emotional presence (Cleveland-Innes & Campbell, 2012), autonomy presence (Lam, 2015), regulatory presence (Kilis & Yıldırım, 2018) to the CoI framework (see also Armellini & De Stefani, 2016; Dunlap, Verma, & Johnson, 2016).

After the review on implementation of CoI into Teaching English as Foreign language by González Miy, and Herrera Díaz (2015), there is an increasing number of studies of CoI applied in the language education field in online and blended environments including different types of technologies (see Schumann, 2019; Solimani, Ameri-Golestan & Lotfi, 2019; Xu, 2019; Wu, Hsieh & Yang, 2017; Zhang & Zou, 2020).

Considering the findings of the reviewed studies, CoI framework could be helpful in designing and evaluating educational experiences for 3D VLLEs and it may create a deep and meaningful learning by collaborative and constructivist experience through the development of its TP, SP and CP. The affordances of 3D VLLEs provide an opportunity to the development of learning community in which learners engaging authentic or complex experiential learning tasks, collaboratively. It may lead to increase their intrinsic motivation and engagement (Dalgarno & Lee, 2009).

Although some steps have been taken to consider the benefits of application of the CoI framework in 3D VLLEs, there is still more to be done. The need to measure learning in design and development of effective and engaging 3D VLLEs by using CoI framework will continue to increase as they become more widely used in language education to deliver instruction (Burgess et al., 2010). The following recommendations based on the findings discussed in this paper are given:

- Traphagan et al. (2010) stated that "… we lack empirically based information as to how, or what aspects of virtual worlds, facilitate learning. Such knowledge would be critical to optimally take advantage of affordances of virtual worlds for learning" (p.923-924). In addition, McClannon (2013) claimed that further research is required to understand the unique impact of 3D immersive learning environments on the sense of community and presence of students in these unique environments. In this context, the factors affecting each element of CoI framework in 3D VLLEs can be examined in detail.

- The effects of learner characteristics; age, gender, level of education (K-12 context or higher education), the level of language proficiency (CEFR level) can be examined in 3D VLLE combined with CoI framework.
- A course on various language skills (receptive/productive skills) to be taught in 3D VLLEs can be designed by using CoI framework as an instructional design framework and learning experience can be evaluated by the CoI Survey, CoI coding schemes and/or MUVEEET observation checklist. In addition, the effect of various methods and approaches (e.g. Communicative Language Teaching, Content Based Instruction, Task Based Language Teaching, etc.) of English Language Teaching can be also evaluated. Moreover, different pedagogical models (e.g. flipped classroom) can be applied to the course.
- Various communicative activities/tasks can be applied in a 3D VLLE synchronously and/or asynchronously and the result can be evaluated.
- The course materials can be designed and developed by applying different language teaching techniques and then examined differences by using the CoI survey, CoI coding schemes or both.
- Relationship between each element of CoI and various variables, such as anxiety, willingness to communicate, online EFL achievement, etc. and can be examined.

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