

Why Teachers should consider *User Experience* within Learning Management Systems: A Community of Inquiry approach during COVID-19 containment measures

Perché i docenti dovrebbero considerare *l'Esperienza Utente* all'interno dei Sistemi di Gestione dell'Apprendimento: Un approccio basato sulla *Community of Inquiry* durante le restrizioni per il contenimento del COVID-19

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DOUBLE BLIND PEER REVIEW

ABSTRACT

Community of Inquiry (CoI) has been used noticeably to research and practice online and blended education, and in such contexts the Learning Management System (LMS) can profoundly affect learners' performances. Nevertheless, the choice of the most appropriate digital environment often leaves aside the user experience. A review of the available literature shows that usability has not been frequently investigated within the CoI, hence a bibliometric network analysis has been conducted to detect this feature in the research niche. By introducing the concept of affordance, it is possible to recognize the pre-existing status to Social and Cognitive Presence as qualities nested in the digital environment but capable to manifest only when learners act. Following an academic survey carried out during the COVID-19 lockdown in Italy, Teaching Presence was examined within a Moodle-based university environment. Findings suggest that instructors should acknowledge educational and social affordances to incorporate them into instructional design.

La Community of Inquiry è stata frequentemente adottata nella ricerca e nella didattica in contesti educativi online e ibridi, laddove il Sistema di Gestione dell'Apprendimento può condizionare le prestazioni dei discenti. Tuttavia, la scelta dell'ambiente digitale più adeguato spesso prescinde dall'esperienza utente. Una revisione della letteratura evidenzia che l'usabilità è stata considerata solo occasionalmente in questo contesto, pertanto, è stata condotta un'analisi bibliometrica per esaminare la mappatura delle parole chiave e i caratteri salienti dell'affordance circoscritti a quest'ambito di ricerca. L'adozione del concetto di affordance riconosce lo status preesistente alla Social Presence e alla Cognitive Presence come qualità nidificate nell'ambiente digitale, ma in grado di manifestarsi solo quando i discenti agiscono. Un'indagine condotta durante l'adozione delle restrizioni COVID-19 in Italia, consente di osservare la Teaching Presence in una piattaforma Moodle universitaria. I risultati suggeriscono che i docenti dovrebbero riconoscere le affordance educative e sociali per incorporarle nella progettazione didattica.

KEYWORDS

Affordance in Education; Instructional Design; User Experience in Education; Learning Management Systems; Bibliographic Network Analysis
Affordance nell'istruzione; Progettazione didattica; Esperienza utente nell'istruzione; Sistemi di gestione dell'apprendimento; Analisi degli accoppiamenti bibliografici

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1. Introduction

Concepts such as *usability* and *user experience* are gaining relevance in education to examine human-computer interaction and to explain the features that establish a bond between the digital space and the skills learned in online education environments. Substantial contributions came from studies around virtual learning experiences (Alalwan et al., 2020; Lacka & Wong, 2019; Pellas et al., 2017; Raes et al., 2020); mobile learning (Hao et al., 2019; Jahnke & Liebscher, 2020; Qian & Tang, 2018; Rummler et al., 2020); learning apps and learning management systems (LMS) (Althobaiti & Mayhew, 2016; Brown & Hocutt, 2015; Kazanidis et al., 2018). The concept of “situated learning”, applied to a digital context suggests that the agent-environment interactions based on functionalities and aimed to project the learners’ performances into the e-learning community, should be considered of paramount importance by the course designer (Oliver & Herrington, 2011). In e-learning spaces we still recognize the conventional roles of instructor and learner: the first as “evaluation actor”; the second as “evaluated subject” who develops and externalizes skills.

Proposals for evaluation still reveal old clues of a cognitive dichotomy internal/external, since they still conceive the learner as an entity who first internalizes and then acts (see Lave e Wenger 1991). Conversely, we note that environmental dynamics are not yet properly considered in the design of a remote experience. As Young et al. point out (2002), observations on learners within the learning context should begin to consider the influence of educational design, and how it affects personal attributes conveying limitations and motivations. Indeed, being the online learning-setting a multidimensional experience, we deal also with *user interfaces*, *functionalities*, *interaction design*, *usability*, *personal perception*, *responsiveness*, *affordance* and many more elements which converge to form a significant part of the online teaching/learning experience.

The term *affordance*, in particular, defines action possibilities in the physical environment that are objectively measurable but only become manifest in relation to an agent (Gibson, 1977). This concept has been extensively researched and widened to define relations between human behavior and ICT under different subjects and from different angles. Concerning the present work, we will explore the field encompassed by the theories around *affordance* and their implications within the Community of Inquiry framework (CoI). The CoI conceptual model is rooted in John Dewey’s education philosophy and Social Constructivism, and it was officially introduced to the international research community in 1999 by Randy Garrison, Terry Anderson and Walter Archer to support high-order teaching/learning experiences (Garrison et al., 1999). CoI promotes the creation of a community of learners committed in exploring, sharing and creating meaning. Such experience requires a high level of commitment to support high order thinking and collaboration (Garrison & Arbaugh, 2007; Garrison & Cleveland-Innes, 2004; 2005; Garrison et al.; 2001; 2002; Kanuka & Garrison, 2004). Frequently, scholars interested in CoI highlight its flexibility, and focus on the possibility of shifting e-learning experiences

into collaborative environments where both instructors and students can collaborate in creating knowledge (Redmond & Lock, 2006). The active process of constructing is a counterpoint to the acquisition of knowledge, as education is referred to a content-based experience and teachers focus too much on transferring knowledge instead of fostering co-creation activities (Maddrell et al., 2011).

The CoI framework is based on three overlapping dimensions named ‘presences’ which are essential to an educational transaction based on knowledge co-creation (Garrison et al., 1999).

- Cognitive Presence (CP) is a vital element in critical thinking, a process and outcome that is frequently presented as the ostensible goal of all higher education (Garrison et al., 2002).
- Social Presence (SP) is the ability of participants to project their personal characteristics into the community (Garrison et al., 2002).
- Teaching Presence (TP) can be summarized as the responsibility to design, facilitate, and direct learning online (Anderson et al., 2001).

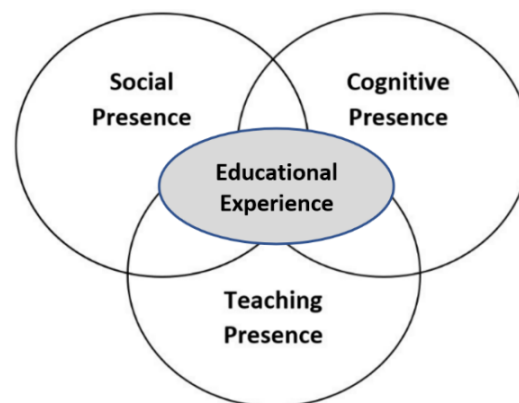


Figure 1. CoI Framework adapted from Garrison et al. (1999)

The continuous interaction among the three presences creates the educational experience within a remote teaching/learning environment. The social-constructivist triadic pattern fosters an active process of building knowledge rather than focusing on the instruction/task context.

The CoI was originally forged for asynchronous computer mediated communication (ACMC), namely, exclusively for text-based learning spaces. Consequently, the LMS chosen by the instructor may mold learners’ behaviors, and may generate constraints, obligations, or reductions in degrees of freedom at various stages. This common sense has been triggering a new perspective in the recent years, as we will highlight in the next sections, and giving an impulse to go deeper into students’ perception of the learning technologies proposed. Indeed, being *affordance* a wholeness of interrelations between context and agent, the concept is plural, and it always involves two realities, but it only manifests when the agent acts intentionally. Hence, *affordances* are defined by learners’ attributes interacting with tools, and as such they are better determined as a dual concept (Young et al., 2002). It follows that when the distinct *affordances* of a LMS are not properly identified and predicted, lear-

ners may not be fully engaged, and the implementation of an inquiry-based learning community may not achieve its full potential. As our survey shows in the next sections, students tend to remain attached to their informal *social affordances* (outside lesson timetable) if they do not find an appealing alternative in the formal education space. In consequence, when designing a CoI-based course environment, giving clear instructions, goals, due dates (Stenbom, 2018) and choosing intuitive e-tools may not be enough to facilitate SP and CP. A learning space implies a changing process where instructor and learners go through a practice of mutual attunement, this correlates the education experience with expectations and anticipations conveyed through digital cockpits.

2. Topics co-occurrences in the Literature Review

2.1 Relevant papers

The cross-disciplinary topic of *affordance* has become increasingly popular in the last two decades, as shown by searches for documents featuring the word “affordance” in title, abstract, or keyword between 2000 and 2022. Results show near-null publications circa 2001 and a steep increase up to almost 2,500 publications featuring the term “affordance” in 2022 alone. Even so, after a bibliographic scrutiny, it is possible to affirm that only a handful of scholars have investigated the significance of *affordance* withing the CoI. It is possible to recognize previous attempts to identify the degree and frequency of students’ interaction with certain ICT features as predictors of learning success (Arbaugh & Benbunan-Fich, 2007; Kupczynski et al., 2011); but an *affordance*-based approach involving the CoI has not been object of wide investigation yet.

Our first step was that of choosing the criteria to build a bibliographic database by retrieving data from SCOPUS. The compound terms “Community of Inquiry” AND “affordance” were cross-searched together in title-abstract-keywords, limited to journal and book chapters in English within the timeline 2000-2022. The semantic constructs were inserted in the search box using the double quotations in order to

detect them as whole phrases. SCOPUS is notoriously based on SJR indexes and due to its advanced features to refine and categorize targeted results, provides a range of options to download search items in different formats for bibliographic inspections. Only 22 results were returned and subsequent limited to journal articles, for a total of 13 relevant papers. They were all included in our list regardless of the number of citations, being the most recent ones, published in 2022, not cited yet.

The most cited work is a research by Rubin et al. (2013), which recognizes the need to handle LMSs in terms of their *affordances*, so, to distinguish between the physical properties of a ICT object and the learner’s perception of those properties. A model based on student’s satisfaction is proposed, to measure the level of perceived *affordances* in a learning context where the platforms Blackboard and D2L are adopted. The authors’ pilot study includes all the relevant parties concurring to monitor the teaching/learning experience within the CoI, and it is the most complete and rigorous approach available so far among the selected studies. Authors support their hypothesis with extensive pragmatism and root their observations in routine-based examples. This approach makes their study particularly useful to equip instructors with practical guidelines. The major outcomes of this research lays in the conclusion that there is a positive association between the LMS *affordances* and the CoI presences perceived by students. In other terms, a good level of LMS *usability* favors learners’ perception of TP, CP and SP due to the ease of use of ICTs to leverage motivation. Another valuable scope of this study is related to the research sample itself, which includes both university instructors and students. So, the research perspective offers a view on the efficiency of teaching within the LMS adopted and the level of students’ satisfaction according to certain modifications introduced through the LMS. Accordingly, the study offers a valid kick off to start deepening our theme, as it assigns to Course Design (CD) a pivotal role between TP and the adoption of a certain LMS, as well as the implementation of CoI tightly linked to the learners’ satisfaction with the LMS.

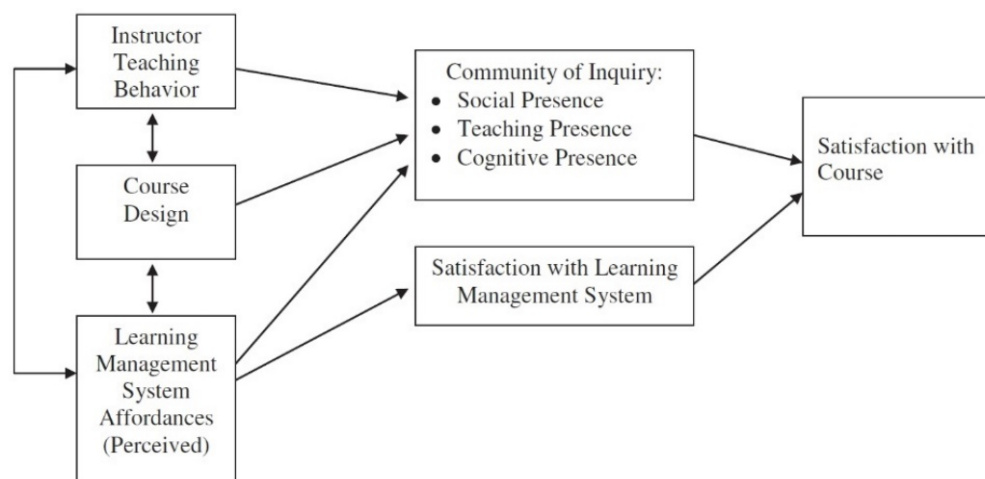


Figure 2. Factors influencing CoI satisfaction (Rubin et al., 2013, p. 51)

Rubin et al. (2013) concluded that the *affordances* of the learning platform directly affect the CoI implementation. Another relevant aspect of this study is that of acknowledging the premise that TP, which includes the design of online instructions, precedes and causes SP and CP. So, the perspective of TP is of paramount importance in the stage of Instructional Design and determine the future success of the CoI. In addition, the fact that TP responded most to these perceptions about technology may be explained by students' tendency to hold educators responsible for organizing resources, including technological features, as part of CD.

The second paper in order of citations, by Blayone et al. (2017), focuses on the democratization of learning through accessible and usable learning environments. The underlying arguments count synchronous and asynchronous *digital affordances* in order to foster self-regulating and transformative learning communities that can be built and sustained in fully online environments. Such communities produce a variety of positive learning outcomes and deepen the democratic functioning of learners and their social contexts. The paper proposes a research agenda stemming from two Canadian Universities actively involved in the implementation of the CoI. Formal and informal *affordances* are considered a matter of negotiation, similarly, the roles of instructor and learner are not fixed but subject to a continuous attunement.

The third paper, by Wang et al. (2016), explores the *affordances* of WeChat for the development of CoI in a learning community of English as a Foreign Language (EFL). First, their work broadened the scope of research from the study of asynchronous text-based interaction to that of semi-synchronous text-and-audio-based interaction. This investigation has strengthened the research on language learning associated with CoI, which has been dominated by studies in other disciplinary areas. Indeed, the particular influence between the subject taught and the implementation of CoI, is a topic often overlooked. The article opens up some new perspectives and issues not yet addressed. For example, if a learning environment where students develops a high self-regulation (so, a higher level of CP), requires a lower level of TP. And if a high degree of CP improves SP or not.

Both the fourth and fifth papers, in order of citations (Rambe, 2012) and (Lin et al., 2016) examines the adoption of Facebook to pursue the CoI-related statement of "meaningful learning". These studies stand in contrast to the traditional view that sees social networks as frivolous and useful means for activities unrelated to effective learning. This works exhibit the controversy of certain frames of mind claiming innovation but avoiding disruptive novelties, such as the adoption of informal technologies. While Facebook represents a flexible tool that can be adapted and even reconstructed as a student-managed space, students should be able to self-manage their own reflective capacity, to reflect on their own achievements and learning, in order to connect learning and personal context. Such a networking-based tool requires teachers to provide only informational cues that encourage students to seek new information about particular concepts and build knowledge through mutual exchange. This practice is in line with the

"deep and meaningful learning" professed by the CoI principles. The research experience by Lin et al. (2016), as the previously cited paper by Wang (Wang et al., 2016) took place in an EFL context. In addition, another recent paper in our list of results focuses on the same topic and the same learning context: Facebook as medium to facilitate EFL (Ud Duha et al., 2022). These studies improve our understanding of the application of the CoI framework in a social media platform in general. More specifically, they also provide insights into the effectiveness of the CoI framework in facilitating language learning through the features of the most popular Social Network Sites (SNSs). They also provide cues and ideas for teachers on how to structure discussion-based activities on SNSs and adopting the CoI to teach language skills. It is worth noticing the aspect of observing CoI through the lens of the specific subject taught, since it is a matter frequently overlooked in the investigations around the framework (Nizzolino, 2020).

Most of the research on CoI has been accomplished within asynchronous contexts, being the model originally conceived for text-based ACMC. Conversely, other papers in our list investigated the framework within synchronous learning experiences, claiming that the arrival of popular synchronous communication tools implies that CoI needs verification under these new modes. More specifically, Giesbers et al., (2014) found controversial results which conflicts to the CoI assumption that students may reach a higher and meaningful learning degree by projecting their identities in the community. The results of this study are based on a seven-year teaching experience related to an online summer course in economics. Among the factors that may negatively influence synchronous exchanges, and that the original CoI did not embrace, there is the complex construct of individual emotional dispositions. In fact, the perceived *affordances* are influenced by conventions and/or cultural expectations (Rubin et al., 2013) and these dimensions may vary a lot according to the individual background. For instance, when streaming one's own image in videoconferencing, some individuals may find it a challenging duty. Also, the perceived ease of using audiovisual technology and the perceived usefulness of meeting other participants in streaming videoconferences may discourage some participants who are less confident in using ICT and have difficulty engaging in synchronous cognitive discourse. Those findings are similar to certain results of our e-survey (explained in the next section) indicating that social interactions may be hindered by certain synchronous activities. The paper by Giesbers et al., (2014) and all the ones previously mentioned, provides practical details on instructional scaffolding strategies. More in general, this set of studies is characterized by an on-the-job orientation and a more pragmatic cut in comparison to the dominant body of literature theorizing the CoI.

2.2 Co-occurrences Networks

After a one-by-one analysis of the relevant small group of publications, a set of similarity metrics based on the concepts of co-occurrences and bibliographic coupling have been carried out to visualize the net-

work maps based on bibliographic data. Our intent is that of detecting the keywords associated to both *affordance* and *CoI*, in order to understand the intellectual map of this research-niche. Keywords association to scientific papers, either author's or indexed keywords, are a common method to filter publications under the umbrella of a certain theme or field. Among the various bibliometric techniques, such as the co-citation analysis or co-author analysis, keyword co-occurrences are content-based, and is among the most suitable to detect the semantic structure underlying a body of publications (Zhao et al., 2018). Identifying topics and themes based on their frequency, usually by examining a selection of articles one by one, disregards the iterative linking of specific keywords and ignores how semantic similarities contribute to linking articles within a comprehensive domain. Sharing of keywords within a community of authors may reveal a recurring conceptual structure that is sometimes more regular than what emerges from mere observation of topic trends. In a network-based approach to bibliographic analysis the nodes are keywords, so all the metrics applied to rank nodes and edges became keyword-ranking measures. In the next analysis, the metrics adopted to rank the degree of relatedness are *Degree Centrality* and *Ego-Centric Network* (also known also *Ego-network*). A combination of more metrics is always advisable, since only one is not sufficient to define all attributes of network components (Yan & Ding, 2009). Co-occurrence networks may include also some dis-connected items, that in our case represents keywords used only once and never re-used in further couplings. These isolated components have been excluded by our maps, since they were not functional to our analysis. The procedure is the following:

1. The data sample was refined and extracted from Scopus in text format (*.csv).
2. The text format was submitted to the VOSViewer

mapping algorithm (van Eck & Waltman, 2010) and processed to generate a co-citation analysis based on a minimum citation threshold 1.

3. A final co-citation network was generated in VOSViewer and a Pajek (*.net) file was then extracted and imported into the network analysis tool NetDraw.
4. In NetDraw, a selection of node centrality measures, including Degree Centrality and *Ego-Network* were calculated to identify the keyword relatedness in the co-citation network.

Measure	General definition	How it applies to bibliometrics
Degree Centrality	Degree centrality defines the node ranking by the number of links connecting a node to the rest of the network. If the network is directed (meaning that ties have arrow heads showing direction), then the degree centrality can be determined as spreading towards the node (In-Degree) and from the node (OutDegree).	The more a keyword is tied to others (co-occurrences) the bigger the node size. The highest ranked keywords are those with more couplings (links) with all the other keywords. The highest ranked keywords usually correspond to the major topics characterizing the research field.
Ego-Centric Network	It is a particular type of sub-network which maps the direct connections of and from the perspective of a single node (an "ego").	From the perspective of a single keyword, it is possible to isolate the sub-group of direct co-occurrences. This allows to encompass the specific set of themes bonding with that given keyword across the entire network.

Table 1. Definitions of the applied metrics and how they suit bibliographic analysis

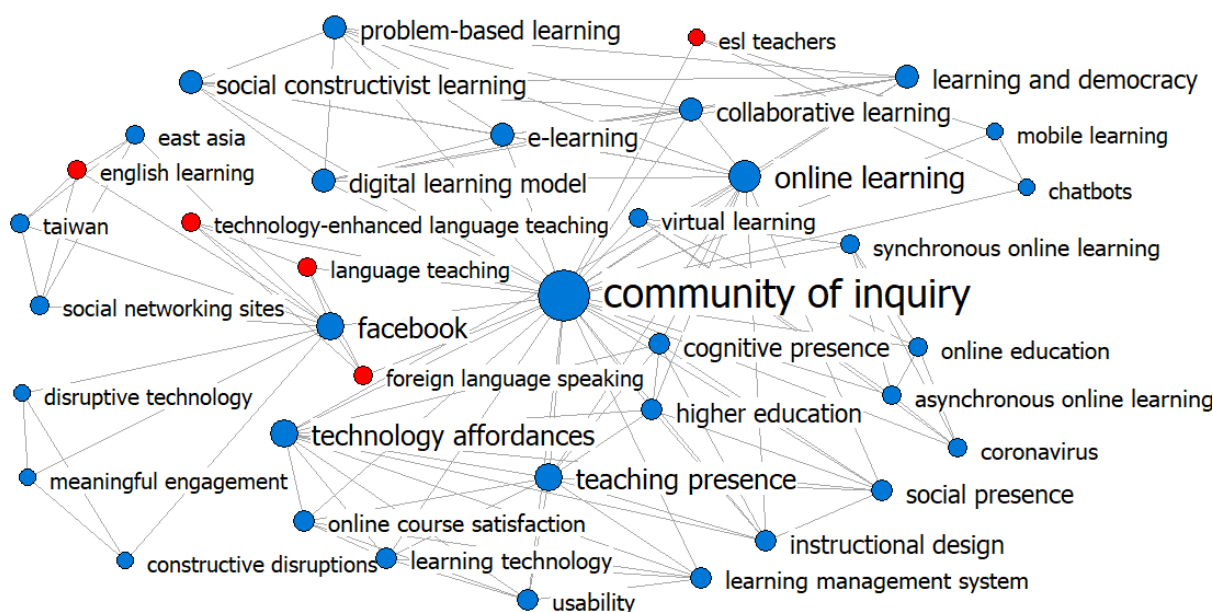


Figure 3. Co-occurrence network of the most frequently used authors' keywords from the 13 selected papers. The red nodes highlight the terms related to the subject of English as a Foreign Language which emerges as particularly representative in the selected body of literature

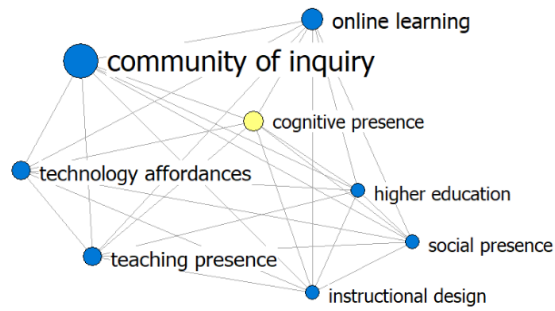


Figure 4. Ego-network of the Keyword *Cognitive Presence*

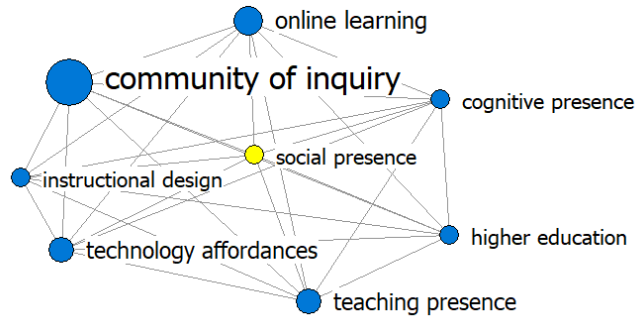


Figure 5. Ego-network of the Keyword *Social Presence*

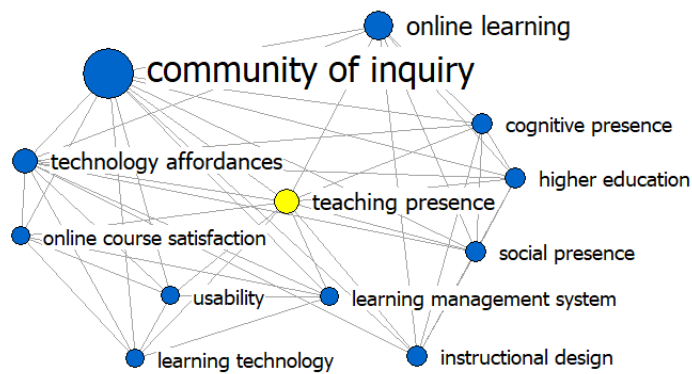


Figure 6. Ego-network of the Keyword *Teaching Presence*. Node-size attribute based on Degree Centrality

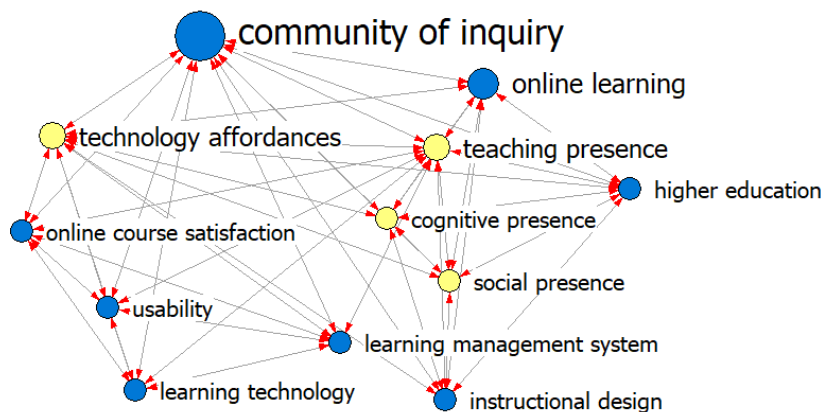


Figure 7. Ego-network of *Technology Affordances* highlighting the number of links (red arrowheads) from and to the three presences of CoI

According to the three *Ego-networks* based on the three Col presences, CP directly links to 7 keywords, similarly SP links to 7, whilst TP establishes the highest number of direct links with a total of 11 nodes. In addition, the *Ego-Network of Technology Affordances* presents the highest number of links to TP, confirming that TP has been predominantly used as the main standpoint in the 13 papers to examine the concept of *affordance*. So, this set of 11 node-topics (including the three Col presences) gains relevance in the present work and in future research projects, within a context including both *affordance* and Col: *learning technology; instructional design; higher education; learning management systems; usability; online course satisfaction; online learning; higher education*. It is worth mentioning the fact that in this handful of publications, the context of foreign language learning, specifically English as a Foreign or Second Language, relates to 5 on 13 papers (Chuah & Kabilan, 2021; Nizzolino & Canals, 2021; Lin et al., 2016; Pellas & Boumpa, 2017; Ud Duha et al., 2022). In fact, there are five keywords associated to this paradigm (red nodes in Figure 4): *English Learning, ESL teachers, Foreign Language Speaking, Language Teaching, Technology-Enhanced Language Teaching*. These 5 studies focused on foreign language teaching may represent the tendency of language instructors and researchers to look for community-based learning environments, due to the social nature of language learning itself. This particular disposition in the language learning field may leverage favourable collaborations to investigate LMS *affordances* and Col elements.

3. Rationale and Research Questions

The bond between emotions and the Col environment has been increasingly investigated (Cleveland-Innes & Campbell, 2012; Stenbom et al., 2016; Majeski et al., 2018), but more in general, emotions and skill-learning have been massively researched during the past three years, due to the impact caused by the pandemic. During the 2020, from March 8 Italy was sealed off, starting from the northern regions (*Lombardia, Emilia-Romagna, Liguria, Piemonte, Veneto and Friuli-Venezia Giulia*). From March 10 the measure was extended to the rest of the country's 14 regions. Students and their families lived in total isolation for almost 2 months. Schools and universities remained closed until September 2020, working only remotely. Taking into account holidays and other planned school interruptions, Italian students lost 65 days of regular schooling to combat covid-19 and also the 8th and 13th grade final exams were mostly performed online. The impact of Emergency Remote Education (ERE) offered the possibility to observe a massive adoption of ICT solutions in mandatory and academic education, and the impact is still generating an increasing number of works and studies (Manca & Delfino, 2021). The opportunity to implement the basic principle of the Col framework conveyed into the present work.

Accordingly, this study aims at exploring the matter of *affordance* in LMSs through the lens of the Col, by the following research questions:

- 1 Which elements may concur to define the *affordance* within the Col framework?
And consequently,
2. Which factors should be considered when selecting a LMS to facilitate *affordance* and foster the three Col presences?

Concerning the first RQ, we took the intellectual features emerging from the niche-academia around the concept of *affordance* within the Col framework, and used them as macro-concepts to encompass our theoretical assumptions and targets. This perspective, jointly with the scrutiny of the small set of papers available, returns a scenario which still offers promising opportunities for further research. The second RQ exploits a survey conducted at *Sapienza University of Rome*, during the 2020 lockdown in Italy, and oriented to measure the level of *social affordances* perceived by students within the Moodle-based LMS adopted.

4. Results and Discussion

In this section our observations arise from a past e-survey¹ taken in 2020 in two university courses of EFL, in *Sapienza University of Rome* (Italy) which used a hybrid delivery format, face-to-face and ACMC space, due to Covid-19 containment measures in force. During the first academic semester, the national lockdown was over but university students were allowed to attend face-to-face and access university facilities only by showing the vaccine-certificate.

The 102 respondents were freshmen from two EFL courses, where one of the authors served as an English Professor and Tutor². During the first semester of 2020, all academic courses were delivered online through the *Sapienza University Zoom* application, other G-Suite tools and the Moodle based eLearning *Sapienza* platform. Students were asked to access the survey using their official *Sapienza* email domain and complete a set of questions regarding their online experience.

The e-survey was framed on open-ended, multiple choice and *likert-scale* questions; 40 in total. It was conducted through a Google Form during the time-frame September/October 2020, corresponding to the first academic semester. Leaving aside some marginal demographic responses, 35 questions are relevant to the present analysis. Only those including key-data are extracted and grouped according to the concepts discussed step by step.

- *Number of respondents*: 102.
- *Age range*: 18 – 22 (82.4%); 23 – 27 (16.7%); 28 – 32 (0.9%).
- *Stage in academic pathway (by %)*: Freshmen, recently enrolled at the Bachelor's 75.5; Freshmen, recently enrolled at the Master's Degree 21.6; Bachelor's Degree 3d year 1; Still deciding between BD and MD 1; Not yet formally enrolled 1.

- 1 The results are available as supplementary materials in this article's page, accessible through the article's DOI URL. An interactive on-line version is available at <https://tinyurl.com/2p8cdcbf>.
- 2 The Author designed and carried out two EFL courses in the Faculty of Engineering and the Faculty of Economics.

The item that closed the survey, a six multiple-choice with an open-ended option, is probably the most relevant to start our process of reflection.

- Item 40: *Define the primary element for an effective Remote Learning.* Responses were: (1) *Teacher* 41.4%; (2) *Interaction between teacher and e-tools* 21.2%; (3) *My study method* 21.2%; (4) *Interaction between e-tools and my study method* 7.1%; (5) *E-tools (softwares, apps, devices)* 6.1%; (6) *Interaction between e-tools and students' group* 5.1%. The first and second replies focusing on teachers' role collect together 62.6% of total responses. In addition, being the last option an open response, it received 7 replies, which is worth reporting since 6 of them mentioned "the teacher": *A combination of all the items above; Interaction between teacher and students using e-tools effectively; I think both the teacher and my study method are fundamental; The teacher and my method of study; Interaction and dialogue between teacher and students; The teacher and an appropriate study method; The teacher is the core element, but students are also motivated by.*

Despite 97.1% of all students were university freshmen and had experienced almost three months of forced remote learning just a few months earlier (in their high school final year), that experience had not changed their perception of the centrality of the teachers' role. In fact, a specific question (No. 4) addressed the matter of ERE already experienced.

- Item 4: *Did you experience online-learning before the first academic semester of 2020?* Responses were: *Yes, for 3 months* 34.4%; *Yes for 4 months* 23.5%; *No* 17.6%; *Yes, for more than 4 months* 12.7%; *Yes, for 2 months* 6.9%; *Yes, for 1 month* 3.9%; *Only for an exam* 1. This item makes explicit reference to the 2020 Italian lockdown, when the whole education sector was obliged to move online. The different responses are due to the fact that Italian Regions were entitled to partially modify the lockdown restrictions according to local needs and situations, so the consistency of the remote learning was not always uniform.

The following two items explicitly made reference to *usability* and *affordance*.

- Item 24: *The eLearning Sapienza platform is easy to use.* Responses: *Strongly agree* 24.5%; *Agree* 42.2%; *NAND* 21.6%; *Disagree* 9.8%; *Totally Disagree* 2.0%.
- Item 28: *Did you use a Forum to practice English prior to attending this course?* 78.4% replied *Never*; 14.7% *Once*; 7.8% *More than once*.

According to item 28 most of respondents had never used a forum for e-learning purposes, nevertheless they declare to be at ease with the functionalities selected by the instructor and including a regular use of a forum. Despite the fact that the forum was an unknown learning tool for most of the students, this scenario should not represent a drawback, since skills and confidence in using an e-learning tool are not the consequential results of the total hours of previous practice (Sun et al., 2018).

While students declared that the forced remote learning were not dramatically changing their learning habits, the vast majority complained about the interruption of face-to-face interactions with their peers (60.8%) and with the teacher (54.9%). Socialization was perceived as a motivating factor and was informally carried out in student's groups on Instant Messaging services (IM); mainly WhatsApp, Instagram and occasionally by Facebook. At a first glance, this shows that the formal e-learning space designed by the instructor was not matching students' demand for social interactions and was not empowering their informal community. As is known, when implementing the CoI framework we have to set the proper conditions to allow SP to flourish, namely a "degree to which learners feel socially and emotionally connected with others in an online environment" (Cleveland-Innes & Campbell, 2012, p. 272). Consequently, the structural relationships of the SP elements, *Affective Expression*, *Open Communication* and *Group Cohesion* (Stenbom, 2018) were not properly activated yet.

A specific set of items were framed to detect social elements, mostly the need to project learners' personality in the community, according to the construct of SP.

- Item 15: *How many course mates were my previous personal acquaintances?* Resulting ratios were: *Nobody* 17.6%; *One* 18.6%; *Two* 20.6%; *More than one* 43.1%.
- Item 16: *I miss the opportunity to socialize with other students face-to-face.* Resulting ratios were: *Strongly agree* 31.4%; *Agree* 29.4%; *NAND* 25.5%; *Disagree* 8.8%; *Totally Disagree* 4.9%.
- Item 17: *I miss the opportunity to share my learning experiences with other students face-to-face.* Resulting ratios were: *Strongly agree* 32.4%; *Agree* 26.5%; *NAND* 23.5%; *Disagree* 11.8%; *Totally Disagree* 5.9%.
- Item 19: *I miss the interaction with the teacher face-to-face.* Responses ratio were: *Strongly agree* 23.5%; *Agree* 31.4%; *NAND* 25.5%; *Disagree* 17.6%; *Totally Disagree* 2.0%.

As responses show, a LMS framed by basic tools such as an asynchronous Moodle Forum and synchronous regular Zoom sessions does not offer sufficient *social affordances* to replace a satisfactory social interaction. The next multiple-choice question asked the respondents to provide suggestions to improve the course design (this task engages the CP), but surprisingly preferences did not favor synchronous solutions.

- Item 36: *Besides the Forum, what tool do you think may enhance this online course? (multiple choices are possible).* Responses' ratios were: *Pdf resumming lesson contents* 65.7%; *Recorded video lessons* 60.8%; *Chat active during lessons* 40.2%; *Distance work-groups (out of lesson timetable)* 24.5%; *Recorded podcast lessons* 17.6%; *Recorded podcast lessons* 12.7%.

Most students selected proposals for asynchronous study and self-paced learning, such as lessons recorded in video formats and pdf summarizing lesson contents. So, on one hand students claim that the lack

of social interactions affects their learning experience, but on the other hand, they are in favor of asynchronous learning solutions. In this context, this incongruence may suggest that social needs might correspond to a more common feeling of being part of a community. This result is totally in line with those scholars who affirm that SP in the CoI model has been overestimated (Annand, 2011) and is not including individual emotional attributes (Majeski et al., 2018). In fact, another multiple-choice question asked if students had created a specific IM group for the English course they were attending, but 27.5% answered “no”; 28.4% answered that it was not necessary since they kept on using the IM groups already in place; eventually a 43.1% replied they did not know anything about a new group. The avoidance of setting up a new IM subgroup may reveal the students’ strategy to keep ties and continuity within the existing online community previously built up with their peers through familiar IM and SNSs. This aspect suggests that the formal environment designed by the instructor should be merged with IM solutions aimed to allow informal interactions only, leaving aside formal tasks and evaluations. For instance, the use of WhatsApp for educational purposes in a variety of contexts has been widely researched, but a more extensive adoption of this IM within formal education spaces is being affected by common *biases* among educators (Coleman & O’Connor, 2019). On the other hand, without a direct instructor’s incentive, the standardized informal interactions may neither change nor generate new social spaces spontaneously. In fact, as the following multiple-choice question reveals, students’ IM groups seldom are built up by structured interactions.

- Item 33: *If you are a member of a social media group of students, how did you get to know it? (multiple choices possible)*. Responses’ ratio: Informally, I’ve heard of it from friends or other students 84.3%; Chatting out of the classrooms & university’s premises 14.7%; I received an invitation from the students’ representative 10.8%; A notice on the University bulletin boards 2.9%; A teacher’s mediation 2.0%.

As a matter of fact, it is evident that teachers did not act as informal agents to build up the students’ community and this result conflicts with the CoI fundamentals. SP is indicated by three subcategories: *affective expression, open communication, group cohesion*. TP is defined by three subcategories: *design and organization, facilitation of discourse, direct instruction*. CP is framed by four subcategories: *triggering events, exploration, integration, resolution* (Garrison et al., 1999; Anderson et al., 2001; Garrison et al., 2010; Garrison, 2009; Garrison et al., 2010). Needless to say, if TP does not favor group cohesion within the formal timetable by harmonizing the principles of SP and CP, it will not be capable to incubate a good exchange among the three dimensions.

5. Bridging the Formal-Informal gap

Not enough exploration has been carried out of the connection between formal, non-formal and informal learning (Greenhow & Lewin, 2016). A stronger focus

on these dynamics is needed since the progressive adoption of MOOCs, SNSs, learning apps and other e-learning methodologies is blurring the border between institutional education and learners’ personal sphere, making the traditional dichotomy between formal and informal learning increasingly fuzzy (Dabagh & Kitsantas, 2012; Greenhow & Lewin, 2016; Madge et al., 2009). Therefore, users’ perspective of the e-learning context is already expanding outside the formal environment (school and university) and starts including communication as part of the learning experience (Al-Aufi & Fulton, 2015). This communication implies the exchange of contents framed by different coordinates.

Synchronous and Asynchronous paradigms linked to formal, non-formal and informal moments in the Blended Learning course under analysis are the following:

1. Synchronous Formal “face-to-face” – Within lesson timetable
2. Synchronous Formal “online” – Within lesson timetable
3. Synchronous Non-Formal – Within lesson timetable
4. Asynchronous Formal – Within lesson timetable
5. Synchronous Non-Formal – Outside lesson timetable
6. Asynchronous Formal – Outside lesson timetable
7. Synchronous Informal – Outside lesson timetable
8. Asynchronous Informal – Outside lesson timetable

The Synchronous Formal moments *par excellence* are the face-to-face lessons or the synchronous remote sessions by Zoom, which are not investigated in this chapter.

Pace, emotions and expectations in the eight above cases imply the adoption of different e-tools, which are defined by the instructor who maintains complete or indirect control (1 to 6), whilst in the last two cases (7, 8) they may be proposed by the instructor but stay beyond his/her direct control. Indeed, in the last two cases, instructors do not monitor the process, thus, there is no possibility to observe communications and interactions. While the scenarios from 1 to 6 depict the average situation of a teacher assigning tasks to be performed by a due date, the 7th and 8th are related to spontaneous learners’ interactions by IM and SNSs. Needless to say, that informal communication leads to other social affinities, ties and interconnections whose cognitive effects may be discovered only by the “interview tool-box”. In a broad Constructivist perspective, a part of the learners’ free time may be interpreted as an extension of the formal learning moment; with all the implications that such a concept may bring into a possible research perspective. Other aspects lay in the restrictions imposed to the use of social media in the formal context, while students are used to unrestricted access during the informal interactions in their free time (Mpungose, 2020). Other informal implications are related to the process of acquiring new knowledge which is connected to the learners’ possibility to interact with one another and to the sense of increased possibility to express themselves through digital interactions (Moghavvemi et al., 2017).

CoI Presences	MoodleMain Board	Moodle Forum	Moodle Col-laborative Glossary	Multimedia Repository	ChatApp	MobileApp #1	MobileApp #2
CP	M	H	H	M	M	H	H
SP	L	H	L	L	H	L	L
TP	H	M	M	L	U	U	U
	2-3-4-6	2-3-4-6	2-3-4-6	2-3-4-6	7-8	7-8	7-8

Table 2. Levels of potential involvement associated to the CoI presences: *High, Medium, Low, U (Undetected)*. The last three tools on the right are out of teacher's direct control, being totally labelled as *Informal*, thus, they can be monitored only through an individual qualitative interview. The last line is a cross-reference matrix between the digital tools adopted and Synchronous and Asynchronous paradigms linked to formal, non-formal and informal moments in the Blended Learning course under analysis. The three tools on the right are not monitored by the instructor as they are totally informal and external to the lesson timetable

In the Moodle-based LMS adopted, the major drawback lays on the sharp separation between formal and informal *affordances*. It is not difficult to imagine the massive use of *emoticons* and/or *emojis* in students IM groups (informal) while they are totally absent in the Moodle forum (formal).

Having clear learning objectives not detached by social needs may assist the instructor in the basic CD. It helps with the creation of effective teaching/learning interactions by adopting specific e-tools and IM features. By using action verbs taken from Bloom's Taxonomy, instructors may predict the relation between the capabilities of the learner (agent), the properties of the e-tool (object) and the possibilities perceived by learners (*affordance*) in order to select those e-tools which are appropriate to foster the three CoI presences. Regardless of the configuration of an *Action > Activity > eTool*, all instructors should follow the golden rule that "*in terms of practical implications, assessment and feedback are high on the priority list for students and educators, as these link directly to student success and to the success of a course, programme, faculty and university*" (Nguyen et al., 2017, p. 714)

By adopting a configuration of two or more e-tools, the context forces instructors and learners to use predetermined interaction models and course formats. The *affordances* established in such a way may negatively impact flexibility and usability for all agents: administrators, instructors, and students. Therefore, a tool should be selected in relation to a variety of courses and combinations of tasks. For instance, a web-based learning platform should provide features for supporting inquiry learning, so it requires different sections for news and announcements, to store course notes; synchronous and asynchronous tools such as forum, email, bulletin board, and chat; features to create and manage online quizzes and online submissions. Needless to say, in a CoI-based context all these *affordances* must contribute to boost SP and to follow up social dynamics.

6. Conclusions

As our survey reveals, the *social affordances* stemming from our Moodle-based LMS were affected by the students' perception of the teaching/learning context as formal and not suitable to fuel their informal social needs. It is no coincidence that the most relevant contexts associated to *social affordances*, in the Literature Review, involved SNSs like Facebook, WeChat and streaming platforms like Twitch. Several researchers have been coupling the *social affordances* provided by popular community-building-tools with the adoption of the CoI principles. It means that a successful LMS, introducing also the CoI model, needs to distinguish between *educational* and *social affordances* and should introduce features and tools capable to encourage both types of interactions. Being the two classes of *affordances* not always equally available in a LMS, instructors may choose to merge different tools and create a learning ecosystem, similar to the one suggested in Table 2.

The CoI framework may be examined when a specific software or application is implemented in a course, from and within the functionalities of that specific medium. *Usability* and *user experience* may be adopted as "research categories" in a new cross-border approach to examine the three elements of the CoI framework in a set of coexisting and coextensive features, thus, in a viable way to deploy simultaneous eye views: on the three CoI dimensions, on the LMS, on students' interaction; so, reproducing and/or expanding the pilot experience by Rubin et al. (2013). It would be advisable to explore more "affordance models" to study the CoI implementation from and within every single feature or function of a certain LMS, before selecting the most suitable one for designing a course.

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