

# Community Model of Online Pedagogical Inquiry and Mediation: necessary perceptions

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**Abstract**—This study analyzes the process of online pedagogical mediation in a Distance Education undergraduate Pedagogy course based on the students' perception of the learning experience in a virtual learning environment (VLE). Online pedagogical mediation is understood in this study as an educational and communicational process that aims at collective and collaborative construction of knowledge involving multiple mediators (human and non-human). To analyze this process, the community of inquiry (CoI) theoretical model played a central role in our study, especially in the interaction between online pedagogical mediation and the elements that constitute this model, considered interdependent and crucial for a successful higher educational experience: teaching presence, social presence, and cognitive presence. Data was collected with a questionnaire survey, which allowed us to identify the student's conception of online pedagogical mediation and to assess the perception on the development of the presences of the CoI model in the pedagogical mediation used in the course VLE. The results suggest that most students share the perception that online pedagogical mediation is related to the role played by teachers and tutors. Regarding student's perception of the learning experience, the results show that they positively perceive the development of the presences of the model, while also suggesting aspects of the online pedagogical mediation process that can be improved, aiming at the constitution of a community of inquiry more focused and effective in the development of learning.

**Keywords**—pedagogical mediation, distance education, community of inquiry (CoI)

## I. INTRODUCTION

The field of Distance Education (DE)—in Brazil and in other contexts worldwide—has changed drastically in the last two decades due to the possibilities brought on by digital technologies. Specifically in Higher Education, the offer of distance courses and disciplines has become an increasingly frequent reality, meeting the formative demands of society, of the technological advances itself and, more recently, of the COVID-19 pandemic. These aspects brought new challenges to the courses offered in both DE and in-person modalities, while also drawing attention to the need to explore and develop structures and theoretical models seeking to understand the complex nature of the teaching and learning process of the completely online or hybrid models. Regarding the changes arising from technological development and the consequent challenges DE faces, [1] (p. 01) argue that it is necessary to “explore experiences, test models and theories, so that one can define the path of distance education.” (free translation)

In this sense, a variety of theories and theoretical models have emerged in recent decades aiming to clarify the activities

and processes that encompass the context of courses and programs offered in the DE modality, with emphasis on online learning [1]. In one of these theoretical advances, Garrison, Anderson, and Archer [2] proceeded with a research project titled “A Study of the Characteristics and Qualities of Text-Based Computer Conferencing for Educational Purposes.” Seeking to understand the concepts and instruments involved in computer-mediated communication (CMC) and how the constructed discourses could support the educational experience, [2] proposed the community of inquiry theoretical model, to which, in this study, we will refer to by the acronym CoI. This model has been developing ever since, being adopted and adapted by many researchers worldwide [3], [4], [5], [6], [7], and is now recognized internationally as an important and appropriate theoretical model that allows researchers to understand the complex and multifaceted nature of the process of teaching and learning in online context.

A community of inquiry comprises three interdependent elements that are decisive for the success of the online educational experience: cognitive presence, social presence, and teaching presence [8]. Since this theoretical model considers that meaningful and profound learning in an online learning community happens in the interaction between these three dimensions—which incorporate, among other aspects, the mediating role of humans and non-humans (technologies, contents)—the CoI model presents theoretical and methodological elements needed to converse with the online pedagogical mediation process.

Among the approaches around the concept of online pedagogical mediation, we considered those that extrapolate their association beyond the teacher-student interaction in the teaching-learning process; we understand that learning can also happen in interactions with peers (other students), with didactic material, and with the structuring/organization of the Virtual Learning Environment (VLE). This does not mean that we value less, or even disregard, the teaching activity in the teaching-learning process in DE. We consider that the role of the teacher, regardless of the denomination they receive in this modality, is a key factor for the development of meaningful learning. Thus, we rely on the concept of pedagogical mediation of learning, having as reference Vygotsky's perspective of social interaction [9], in which he considers that human development and access to objects of knowledge (learning) occur within mediated activity.

Considering that online learning results from pedagogical mediation processes involving human and non-human or technological mediating agents and that the CoI theoretical model assists in the organization, understanding, and evaluation of an educational experience, this study aims to analyze the process of online pedagogical mediation in an

online undergraduate program in Pedagogy, from the students' perception of their learning experience in the VLE.

## II. THE COMMUNITY OF INQUIRY THEORETICAL MODEL

Researchers [3], [4] maintain that the CoI model is becoming increasingly influential in explaining and sorting the effective conduct of learning in online environments. They also argue that this theoretical model is generally considered one of the most complete and integrated proposals regarding the understanding of the teacher's role in online teaching and learning since it composes a balanced approach in the confluence among a constructivist perspective of learning and knowledge, based on interaction and collaborative work.

According to [10], the dynamics conducted in a learning community, within an online educational context, enable thoughts and learning to be constructed and shaped. Notably, teachers and students share the responsibility for collaboratively building and validating meanings in this process. This is the "transactional" view of education, a term that the author uses to describe the event that, in the same open communication space of learning and construction of knowledge, there may be an alternation of roles, in which teachers are students and students are teachers. This aspect reinforces the character that online pedagogical mediation can be constituted from a distributive, collaborative, and collective process.

As aforementioned, a community of inquiry consists of three interdependent and interrelated elements or dimensions, which are essential for an online learning experience to be effectively conducted: social presence, teaching presence, and cognitive presence.

Social presence, the most studied component among the three, is defined as "the ability of learners to project themselves socially and affectively into a community of inquiry" [11] (p. 52). The social presence reflects the ability of participants to identify with the community, communicating purposefully in an environment of trust, and developing interpersonal relationships, projecting their individual personalities. In this sense, the categories that define this presence are affective expression, open communication, and group cohesion [12].

The role of the social presence in the CoI model is strongly related to learning outcomes (cognitive presence) and with increased student satisfaction in relation to the Internet as an educational medium. Additionally, collaborative activities provide students with better conditions to expand their social presence and a greater sense of online community, which also tends to improve the socio-emotional mood in courses with online components. Thus, the appropriate choice of technologies (as an educational and communicational medium) in a CoI contributes to consolidate the social presence, favoring collaborative work and the development of cognitive presence [8]. This helps strengthen our position that digital technologies (such as VLE) are the mediation agents of online learning.

The teaching presence is based on two general functions, which can be performed by any participant of a CoI (another student, for example); in an educational environment, however, these functions are usually centered on the teacher/tutor/instructor. The first of these functions is the design of the educational experience, which is related to the selection, organization, and primary presentation of the course

content, as well as to the design and development of learning and evaluation activities. The second function concerns facilitation, which is a responsibility that can be shared between the teacher and some or all other participants (students). In both cases, the element of the teaching presence is a means that aims to support and improve the social and cognitive presence, with the purpose of achieving efficient educational results. This sharing of the facilitation function in an inquiry community is appropriate for Higher Education and common in courses, completely or partially, online. We understand that this sharing aspect of the facilitating function of the teaching presence, highlighted by [2], is in line with the concept of online pedagogical mediation that we defend, which considers teacher mediation a crucial factor in the process of knowledge construction within DE, in addition to considering that students and technologies also act as mediating elements in the teaching-learning process.

Of the three elements of the CoI model, cognitive presence is probably the most challenging to study and develop in online courses since it is related to the willingness by which students construct and validate meanings by critical reflection and sustained discourse [2], [8]. This presence is related to the progressive development of inquiry in an online learning environment and is operationalized by the following categories: triggering event (initiation phase of critical investigation that occurs from the identification of a triggering event), exploration (exploration phase of the triggering event by students, both individually and collectively, by critical reflection and discourse), integration (phase characterized by the construction of meanings, by the students, from the ideas raised during the exploratory phase), and resolution (phase in which students apply, in a practical way, the acquired knowledge to educational contexts or scenarios of professional performance). These categories represent means to evaluate the nature and quality of critical discourse (deep and meaningful understanding) that occurs in a text-based (not in-person) educational environment. This means that this model serves to describe and to understand the development of cognitive presence in an online education.

The CoI theoretical model seeks to delineate not only the central elements of the structure of a community of inquiry but also to highlight the dynamics of an online educational experience, which can be measured by the perception of the three dimensions combined that occurs by the intersection between social and cognitive presence (resulting in speech support), by the intersection between social presence and teaching presence (which results in the negotiation of the social mood) and by the intersection of cognitive presence and teaching presence (which results in the regulation of learning) [5].

Regarding the development of instruments to validate the structure of the CoI model, [5] argue that the model and its associated methodology were designed for exploratory purposes and descriptive studies due to the lack of comprehensive theoretical models on online learning at the time they began their research. Thus, the initial work included the laborious transcription and analysis of online forum discussions. Subsequently, [8] signal the need for quantitative approaches to study the dynamic relationships between the three presences, as well as the need to perform interdisciplinary procedures and institutional studies. Based on this finding, a collaborative team of researchers [3], [13], [14] developed and improved the quantitative instrument to

measure the effectiveness of learning in a CoI, capable of encompassing the three main components: social presence, cognitive presence, and teaching presence. Each dimension is evaluated via a questionnaire composed of 34 questions, in which: nine measure social presence; 12 measure cognitive presence; and 13, teaching presence. Answers to these questions are provided on a 5-point Likert scale, ranging from “1 – I totally disagree” to “5 – I totally agree.” Furthermore, previous studies [13], [14], [15] proved—using factor analysis of the scale—that this instrument actually measures the three theoretical constructs (the presences). This instrument was translated from English, after obtaining the necessary authorizations, and incorporated into this study, by a questionnaire survey.

Although there are still isolated studies on the presences, the most recent investigations on CoI have focused on investigating the causal relationships between the three presences [16], [17], [18] and the way these presences evolve or develop dynamically [19], [20]. Additionally, [21] conducted a study on the different data collection tools developed by different researchers with the objective of determining the perception of the CoI via a scale. The results revealed that the research instrument—CoI questionnaire—developed by [3] has been widely accepted in the literature and that the instrument has been adapted to several languages (such as Turkish, Korean, and Arabic) and employed in several disciplines, such as education, business, and health.

### III. METHODOLOGY

This study presents partial data from a case study [22]. The research context is part of the conjuncture of the online undergraduate program in Pedagogy, offered by the College of Distance Learning (CEAD) of the State University of Santa Catarina (UDESC). Considering the objective of this study, the research was based on a paradigm of interpretative research, using qualitative and quantitative data from two sections of an online questionnaire: I – Online pedagogical mediation; II – Online pedagogical mediation in pedagogy course: teaching presence, social presence, and cognitive presence. Section I is composed of two open-ended questions and section II consists of 34 close-ended questions that were adapted from the CoI questionnaire, proposed by [2] and validated in the studies of [3], [14], [13]. The CoI questionnaire is structured according to the categories that characterize each of the three presences, in which the interviewees can express their degree of agreement or disagreement with each of the questions formulated. Thus, a 5-point Linkert scale was used for the answer options. The questionnaire was adapted by translating the questions from English into Portuguese and adapting some terms to the context of the course and the participants.

The questionnaire survey was conducted during April, May, and June 2018. For analysis of the CoI data, Excel software was used, in which a statistical analysis was performed based on the index of agreement and disagreement of the answers attributed by the subjects. For this, the Percentage Agreement Index (PAI) was employed, which allowed for the estimation and analysis of the degree of agreement (or disagreement) to the answers given to the questions that compose each dimension of the CoI (and their respective categories) [23]. Regarding the PAI, [23] argues that the higher the PAI, the higher or closer to the agreement; and the lower the PAI, the closer to disagreement.

For the data obtained from the open questions, thematic content analysis was performed. According to [24], performing a thematic analysis consists in discovering the “cores of meanings” that make up communication and of which the presence, or frequency of emergence, can mean something to the chosen analytical objective. This is a rule for the framing of a meaning.

### IV. RESULTS

In total, 50 sixth-semester students and 55 eighth-semester students from the online undergraduate course in Pedagogy participated in the questionnaire survey. Considering both groups, a total of 105 students participated in the questionnaire, totaling 23.3% of the total number of students enrolled in both classes during the first semester of 2018. The presentation and discussion of the results will be carried out in two moments, according to the sections of the questionnaire applied. In the first, we present the conception of online pedagogical mediation of students and, in the second, the result of the application of the CoI questionnaire.

#### A. The concept of online pedagogical mediation of students

The questions that are part of the first stage of the questionnaire are: 1. Write a brief description of what you understand by online pedagogical mediation; 2. If you had to define the online pedagogical mediation process in three words, what would they be?

The analysis of the answers of the 105 students to Question 1 showed that most students (76.2%) understand the process of online pedagogical mediation as the intervention/interaction of teachers and tutors within the VLE. Only 12 students (11.4%) associated this process with technological mediation (non-human), such as that performed by teaching materials and VLE interface. The responses associated with the human and non-human mediators category were recorded by five students (4.8%). Eight responses (7.6%) were not associated with predefined categories since they were incomplete or out of context. Notably, only one student considered that online educational practice also happens via student-student interaction.

In view of these results, we reinforce our understanding that non-human pedagogical mediators, especially digital technologies, cause cognitive and behavioral changes, contributing to the acquisition of knowledge. However, it is important to consider, as [25] observed, that both the human and technological dimensions are intertwined in each other and that, together, they enable pedagogical mediation in this context.

Regarding Question 2, we present a word cloud (Figure 1), elaborated on the Wordclouds website, with the terms mentioned by the students to define the process of online pedagogical mediation.

Figure 1. Word cloud from the answers given by the students to question 2



The word cloud highlights (in larger sizes) the terms that were repeated the most in students' responses, these include: "interaction" (18 times), "knowledge"/"knowledge production" (16 times), and "learning" (16 times).

Generally, the terms used by students to define online pedagogical mediation were diversified and most of them suggest an understanding of this process associated with human mediators. The terms "interaction," "dialogue," "organization," "participation," "empathy," "teacher," "student," "responsibility," "respect," among others, appeared with a certain frequency and reinforce this perception, corroborating the result obtained in the analysis of Question 1.

We conclude that the prevailing conception of online pedagogical mediation, according to students from the online undergraduate program in Pedagogy, privileges the mediating character of human agents, especially related to the role performed remotely by teachers and tutors in this process.

*B. CoI questionnaire result from the students' perspective*

Table 1 shows the general result of students' perception of the development of teaching, social, and cognitive presences in the online undergraduate program in Pedagogy of UDESC.

TABLE 1 MEAN PERCENTAGE OF AGREEMENT INDEX OF THE CATEGORIES AND TOTAL PERCENTAGE OF AGREEMENT INDEX OF THE PRESENCES

Teaching Presence	
Categories	MPAI (%)
Design and organization	82.02
Facilitation of discussion	78.25
Direct education	77.46
<b>TPAI</b>	<b>79.23</b>
Social Presence	
Affectionate expression	75.08
Open communication	78.73
Group cohesion	76.43
<b>TPAI</b>	<b>76.75</b>
Cognitive Presence	
Triggering event	82.38
Exploration	83.65
Integration	83.49
Resolution	80.79
<b>TPAI</b>	<b>82.58</b>

Regarding teaching presence, the design and organization category presented the highest mean percentage of agreement index (MPAI) in the assessment of students (82.02%), followed by the categories of facilitation of the discussion (78.25%) and direct instruction (77.46%). The total percentage of agreement index (TPAI) of the teaching presence was 79.23% of agreement. Thus, the results for teaching presence suggest that students are satisfied with the role of teachers and tutors within the process of online pedagogical mediation carried out by the online undergraduate program in Pedagogy. According to [2], one of the functions of the teaching presence relates to the design of the educational experience, such as the selection, organization, and primary presentation of the course content and conception, development, and evaluation of learning activities.

The results of the students' perception of the development of social presence showed that the open communication category presented the highest MPAI (78.73%) in relation to the categories of affectionate expression (75.08%), and group cohesion (76.43%). In general, the MPAI of the categories of social presence presented relatively close indexes. The TPAI of social presence, however, was evaluated by students with a degree of agreement of 76.75%. The lowest PAI of social presence questions in the students' view, with an index of less than 70%, was related to forming distinct impressions of some course colleagues in the online environment, with 69.52% of agreement. This result suggests that due to the students' in-person meetings in the support center almost every week, it is possible that they do not associate the impressions they build on their colleagues with the VLE, but to this in-person contact.

However, the general result of social presence, since it is above average, suggests a positive evaluation of the development of this social presence in the pedagogy course, while also indicating aspects to be improved in all categories. Since social presence is related to the ability of participants to identify with the online community, how to deliberately communicate in an environment of trust and develop interpersonal relationships, we understand that this result also suggests satisfaction with the online pedagogical mediation carried out in the Pedagogy course, while also suggesting that this dimension needs to be improved.

Finally, regarding students' perception of the development of cognitive presence, the categories exploration and integration presented the highest MPAI: 83.65% and 83.49%, respectively. The category of resolution obtained the lowest MPAI (80.79%), and the triggering event category obtained an MPAI of 82.38%. In general, the MPAI of the categories of cognitive presence presented rates that were relatively close and higher than 80%.

Since the cognitive presence is related to the capacity by which students construct and validate meanings with critical reflection and sustained discourse, it is the most challenging aspect to study and develop in distance or online courses [2], [8]. We can affirm, based on the results obtained, that even though the pedagogical project of the Pedagogy course was not structured and planned according to the CoI theoretical model, the evaluation of this dimension by the subjects directly involved in the online pedagogical mediation in this course was important for the analysis of the process of pedagogical mediation.

Considering the general evaluation of the students, Chart 2 shows that cognitive presence presented the highest TPAI (82.58%), followed by teaching presence (79.23%), and social presence (76.75%). These results show that the degree of agreement of these subjects with the development of the learning experience in the Pedagogy program is 79.75%. Since we believe that the CoI model offers theoretical and practical elements for understanding different aspects related to learning in online contexts, we understand that the results mentioned may suggest satisfaction with the online pedagogical mediation process carried out in the online undergraduate program in Pedagogy of the UDESC, as well as signaling for aspects—from the three analyzed dimensions (presences)—that can be improved.

## V. FINAL CONSIDERATIONS

Pedagogical mediation is the mobilizing theme of this study, due to its relevance in the teaching-learning process and to the need to better understand how it has been developing with in DE with online components.

The CoI theoretical model presupposes that learning in a virtual community, in which communication is mediated, occurs in the interdependent relationship between the three dimensions—or presences—that structure it: teaching presence, social presence, and cognitive presence [2]. According to this model, the development of these dimensions in distance education, conducted fully or partially online, are crucial for the construction of deep and meaningful learning.

This investigation process, in which the CoI theoretical model was essential to analyze the process of online pedagogical mediation conducted in the VLE of the online undergraduate program in Pedagogy, allowed us some important considerations and recommendations to be appreciated both by the context of distance higher education and by other similar contexts [10], [12].

a) Designing and planning pedagogical models in DE based on theoretical and methodological principles of the CoI model enables students to learn from the practice of critical and reflective investigation within online learning communities.

b) Proposing distance higher education courses, based on the CoI theoretical model, contributes to the definition of consistent pedagogical models that consider that online pedagogical mediation is a process that presupposes the action of human and non-human mediators, contributing to a clearer and more coherent definition of the roles of subjects and technologies in DE.

c) The CoI theoretical model offers theoretical and methodological elements to evaluate online learning experiences that signal student satisfaction regarding the development of teaching, social, and cognitive presences in online learning communities.

d) The CoI's idea of the teaching presence can help courses with online components to more clearly delimit the role of human actors in pedagogical mediation and, consequently, reflect on the pedagogical potential of non-human mediators in this process.

e) The CoI theoretical model can contribute by generating communication processes that drive the social presence, keeping students engaged throughout their educational journey by balancing the three dimensions (presences).

f) Basing pedagogical practice on the CoI theoretical model can contribute to breaking away from the instrumental view of the role of technologies, especially digital technologies, in online processes of pedagogical mediation.

Finally, despite the CoI theoretical model not being a part of the principles that underlie the online undergraduate program in Pedagogy, the analysis of the CoI questionnaire suggests evidence of a community of inquiry, with positive (to high) levels of the three presences (teaching, social, and cognitive). However, with the objective that the course be structured on the CoI theoretical model, it is essential to expand research, especially on the operationalization of a community of inquiry.

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