HOW RELIABLE AND CONSISTENT IS OUR LEARNING COMMUNITY OF INQUIRY? PSYCHOMETRIC QUALITIES OF THE COMMUNITY OF INQUIRY SURVEY INSTRUMENT APPLIED TO A SAMPLE OF HIGHER EDUCATION PORTUGUESE STUDENTS

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Abstract

The purpose of this study was to report on the adaptation and empirical evidence to support the validation of the Community of Inquiry Survey Instrument based on the Community of Inquiry (CoI) framework (Garrison, Anderson & Archer, 2000). The participants for this study were undergraduate students (n = 280) enrolled in blended online courses offered through Moodle platform during one semester at different Portuguese high schools and university, involving students of diverse courses (specially in Health and Education). Factor analysis of student responses identified a three factor model which was tested through confirmatory factor analysis and found to be an acceptable fit to the predicted population model. Results from this study suggest that the instrument is a valid, reliable, and efficient measure of its dimensions; thereby the CoI survey holds promise as a useful evaluation tool for providing formative and summative feedback about the effectiveness of online courses and programs considering Garrison and collaborator's model for constructing effective learning environments. The study also discuses potential implications of the CoI measures for innovations in the field of New Technologies in Education peculiarly in the nearest context of teaching and learning of emergent communities of practice, of learning and of inquiry web mediated.

Keywords: Higher Education, Community of Inquiry; online learning.

1 THE NEED OF A COMMUNITY OF INQUIRY FOR HIGHER ORDER SKILLS

The large groups of students in the class and the requirement of skill training in higher education shows that traditional methods of teaching and role of both teaches and students must be reframed. Looking for convenient solving the problems of growth of knowledge inherent to specific learning and, at the same time, of gaining practice and develop competence, no more is possible to ignore technological support [1]. So, recursive need of maintaining the teaching presence as well as cognitive and social and dialogical presence of students into the overall process of learning imposes that new ways of guiding the instructional dynamics and cope with the pedagogical relationship, without losing the epistemological bases of education, must emerge into the educational system. Web based support and blended learning are plausible answers to such a problem. However, we must be confident that the alternate changing paradigm above and beyond the guarantee of transmission of information that is intended to be selective and crucial content of learning, offers the sufficient relational context in a setting climate prompt to effective educational experience. Since the constitution of massive classes that the proximity between teacher-student and student-student has been drastically biased. We ought to approach people participating in the learning processes. So, the need of a community is imperious and the requisite that such a community must be of inquiry, allowing the promotion of skills and acquisition of knowledge in constructivist and collaborative ambience, advocated as convenient in preparation of professionals that are expected to be autonomous, active and effective in performing their functions [2], feeling closeness or belonging that improves both affect and cognitive learning [1].

2 THE MODEL OF A COMMUNITY OF INQUIRY

The Community Inquiry framework [3, 4, 5] is considered one of the most promising schemes of modelling online teaching. It is an overall and integrated model that explains successful teaching, allowing the research and monitoring of learning processes in a collaboratively, interacting and constructivist approach. To its authors, an educational *Community of Inquiry* is a group of individuals

who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding [3]. In this way, the assumptions for a successful learning were conceptual structured concerning three critical elements which interacted with each other and are mutually influenced: the cognitive presence, the social presence and the presence of teaching. With a vast literature that define this elements [e.g., 5] and represent them in a model as the one reproduced in the fig.1, we are interested in the test of our own educational experience, that is, to verify if the teaching process we design has such an structure and organization that encourages a diversity of perspectives that promote research, criticism and creativity in collaborative environment of learning.

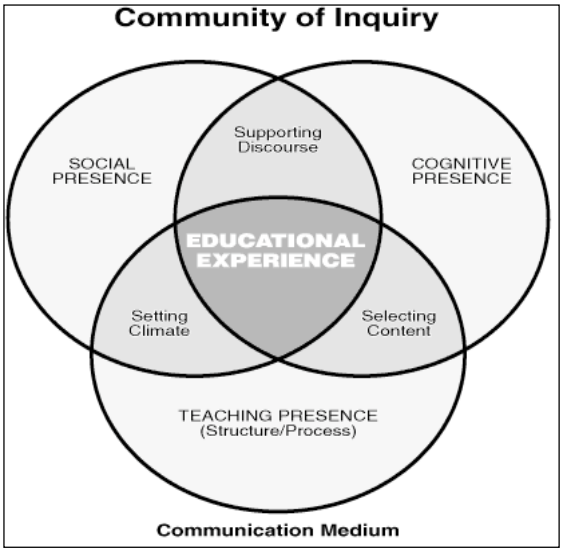

Figure 1- The Model of Community of Inquiry [4]

At the end, we wish to foster a learning community of inquiry, preparing our students to be responsible, looking for the meaning of his/her educational experience, by self-regulation and conscientious control through negotiation of meanings with the community. Cognitive presence is seen by the authors (Garrison et al.) as a process of critical thinking; Social presence is based on creating emotional relationships between the participants, while facilitating the cognitive presence; Teaching presence is a basic element, inasmuch as the teacher has the task to implement and develop the community and influence the learning of its members, generating a social environment likely to critical thinking, on the other hand, guiding the acquisition of information and knowledge building.

3 METHODOLOGY

Once the Community of Inquiry framework have been presented as a valid and trustworthy instrument to measure the quality of online teaching, focusing on the three important components [6, 7], we wanted to study its contribution to test how good is the setting we've defined to promote meaningful collaborative learning, in spite of our large classes. However we tried to use available resources. So we envisaged the use of CoI as a valid model to design and evaluate effective learning course and CoI measures to portray the three presences as our students feel them.

3.1 Participants

The participants for this study were undergraduate students (n = 280) enrolled in blended online courses offered through Moodle platform during one semester at different Portuguese high schools and university, involving students of diverse courses (especially in Health and Education). Aged between 17 and 54 years old, there were 133 female and 95 male students (cf. table 1).

Table 1 – Sample characterization by cross tabulation between age and sex

			Age				Total
			[17 – 24]	[25 - 34]	[35 - 44]	[45 - 54]	
Sex	Female	Count	83	26	16	8	133
		% within Sex	62,4%	19,5%	12,0%	6,0%	100,0%
		% within Age	56,8%	55,3%	64,0%	80,0%	58,3%
		% of Total	36,4%	11,4%	7,0%	3,5%	58,3%
	Male	Count	63	21	9	2	95
		% within Sex	66,3%	22,1%	9,5%	2,1%	100,0%
		% within Age	43,2%	44,7%	36,0%	20,0%	41,7%
		% of Total	27,6%	9,2%	3,9%	,9%	41,7%
Total		Count	146	47	25	10	228
		% within Sex	64,0%	20,6%	11,0%	4,4%	100,0%
		% within Age	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	64,0%	20,6%	11,0%	4,4%	100,0%

3.2 Instrument

The instrument used to study the learning community in our teaching environment was the Community of Inquiry Survey of Garrison et al., translated, adapted and retroverted. The survey instrument contains 34 items presented in a random sequence of the ten categories of factors compounding the three elements of presence in any desirable learning context, as they are distributed in the coding template (table 2). The fulfilment is done by pointing the degree of agreement (from Strongly Disagree to Strongly Agree) situated in a Likert scale of five points.

Table 2 – Community of Inquiry Coding Template [3]

Elements	Categories	Indicators (examples)
Cognitive Presence	Triggering Event	Sense of puzzlement
	Exploration	Information Exchange
	Integration	Connecting ideas
	Resolution	Apply new ideas
Social Presence	Affective Expression	Emotions
	Open Communication	Risk-free expression
	Group Cohesion	Encouraging collaboration
Teaching Presence	Design & Organization	Defining/initiating discussion topics
	Facilitation	Sharing personal meaning
	Direct Instruction	Focusing discussion

3.3 Procedures

In different courses (in Health and Education) of undergraduate degrees the students were enrolled in blended online courses offered through Moodle platform, during one semester at different Portuguese high schools and university. At the end of the courses, respective students answered to the CoI survey, which has been translated and adapted to Portuguese language (of Portugal). The survey was presented in paper support and data base was construct in SPSS (Statistical Package for the Social Sciences, version 17.0) The aim of the study is to observe the psychometric qualities of the instrument and also to appreciate the consistency of the learning community of inquiry. Ordinal responses were

scored using the scale in 5 points (graduated from 1=Strongly Disagree to 5=Strongly Agree). There were no inverted items.

4 RESULTS

The study of reliability revealed that the instrument used in this study is valid (Table 3).

Table 3 - Reliability Statistics found for CoI and each factor

Variables	Cronbach's Alpha	N of Items
Community of Inquiry	,966	34
Cognitive Presence	,920	12
Social Presence	,894	9
Teaching Presence	,936	13

In spite of all items were scored along all points of the range (from 1 = Strongly Disagree or 2 = Disagree to 5 = Strongly Agree), mean responses for the 34 items extended from 3.77 to 4.28, with a standard deviation range of 0.60 to 0.89. That means that students recognize each presence of the model relevant during learning in an online web-base.

With the Kaiser-Meyer-Olkin Measure we looked for the sampling adequacy. KMO is a statistic that indicates the proportion of variance in variables that might be caused by underlying factors. With the high value of .958 and the Bartlett's test of sphericity with the value of the significance level equal to 0.00, a factor analysis is suggested being useful with the data collected.

From correlation analyses, the extraction communalities (estimates of the variance in each variable accounted for by the factors in the factor solution) for the solution of three factors are all acceptable, fitting as well. The variance explained by the initial solution indicates that the factors explain 56.2 % of variance in the original variables. This suggests that the three presences are latent influences associated with leaning community. Yet, there remains room for a lot of unexplained variation.
As such, we've tried principal component analysis with the fixed number of three factors and obliminal rotation with Kaiser normalization. The pattern matrix obtained relates the cognitive and social presences differentiated from the teaching presence.

So, on the assumptions of the theoretical model and on previous exploratory work, the three presences were considered to be distinct but overlapping. By factor analysis to reduce scale dimension we attempted to identify underlying factors that explain the pattern of correlations within the set of observed variables and the variance that is observed in the larger number of 34 manifest variables. As Factor analysis can also be used to generate hypotheses regarding causal mechanisms (tutorial SPSS 17) we've choose to extract three factors, retaining the specific number of factors considered by the underlying model. The three factor model found to be an acceptable fit to the theoretical model. As the model predicts, the three presences – cognitive, social and teaching - overlap and are related to each other.

Collectively, Teaching *Presence* items yielded a mean score of 4.14 (s.d. = 0.53); *Cognitive Presence* items yielded a mean score of 3.97 (s.d. = 0.50) and *Social Presence* items collectively yielded a mean score of 3.89 (s.d. = 0.56). The teaching presence is the most recognized by students, differently from other studies [9] that concluded that an increased emphasis should be placed on teaching presence within a blended learning environment to ensure that participants achieve resolution in the inquiry cycle.

Table 4 presents de descriptive statistics (mean, mode and standard deviation) for each sub-grouped variables in the respective categories of each one of the three presences.

Table 4–Statistics observed in each category of the three presence elements of CoI survey

Elements	Categories	Mean N=280	Mode	Std Deviation
Cognitive Presence	Triggering Event	3,97	4	,61
	Exploration	3,98	4	,56
	Integration	3,99	4	,54
	Resolution	3,94	4	,54
Social Presence	Affective Expression	3,88	4	,63
	Open Communication	3,90	4	,64
	Group Cohesion	3,89	4	,58
Teaching Presence	Design & Organization	4,21	4	,60
	Facilitation	4,11	4	,54
	Direct Instruction	4,13	4	,60

Learning is not a separate and independent activity, but an integral aspect of participation in any "community of practice" [10]. Learning doesn't dependent on teaching, if teaching is construed as deliberate instruction according to a set of preformulated objectives. In joint activity, participants contribute to the solution of emergent problems and difficulties according to their current ability to do so; at the same time, they provide support and assistance for each other in the interests of achieving the goals of the activity, as these emerge in the situation.

Cognitive presence, defined as the exploration, construction, resolution and confirmation of understanding through collaboration and reflection in a community of inquiry is consubstantiated with social presence, really a necessary precursor of cognitive presence. As most researchers in this area agree, the caveat that social presence must be directed toward learning outcomes [11] defined by the teacher, so related to teaching presence proposes.

5 CONCLUSIONS

Higher education has consistently viewed community as essential to support collaborative learning and discourse associated with higher levels of learning. In fact, a blended learning approach can support the inquiry process (cognitive presence) in a faculty development context. The enhancing of higher order skills of thinking, like problem-solving, becomes increasingly important. So, linking education to research suggests experiencing new projects and innovating academic context. Technology is an concrete and useful tool, and in matter of community building, even in such courses where face-to-face encounters are still the usual modality of educational functioning, tutorial and dialogue is moving more and more to an asynchronous status, inviting to create alternative forms of communicate and accessing learning outcomes online (or add an online component to a traditional classroom in a blended environment). In accordance with Klenner-Moore [8] a blended learning environment provide opportunity for implementing activity objects and creating an environment that is conducive to dialogic enquiry, knowledge structure, and enhancing problem-solving skills.

We infer from the results from this study that the CoI model in its three presences contribute towards the formation of a learning community, holding promise of evaluation for providing formative and summative feedback about the effectiveness of courses or programs with an online component.

Indeed, the Community of Inquiry theoretical framework represents a process of creating a deep and meaningful learning by collaborative and constructivist experience through the development of the three interdependent elements considered social, cognitive and teaching presence, although the collaborative engagement in sustained reflection to construct and confirm meaningful learning reveals overlapping of the cognitive and social presence, as the cognitive growth depends heavily of social interaction and discourse in sharing views and exchange information, or, being intelligence socially situated. Later work could explore more deeply the role of metacognition within the framework, by operationalizing the construct in its metacomponents in learning processes management, including self-regulation and the monitor and evaluation of processing modeled my affective experience and dialogical support [12].

As Wells states to sustain the conceptual spiral of knowing: «dialogue involves both the internalization of the meanings created in the inter-mental forum of discussion and the externalization of those intramental meanings that are constructed in response» [2]. That also constitutes a particularly clear instance of Vygotsky's insight of mediated learning [13].

This study hypothesized complex relationships between the variables considered in the theoretic model of presence factors that have implications for the development of higher order thinking and meaningful learning in online environments. Although reliable and consistent, our learning community of inquiry highlights that additional studies are necessary to consistently analyze the conceptual differences between cognitive and social presence in online learning contexts, as well as the dynamics of cognitive presence. The identification of the processing elements that facilitate and of those that hinder significant and higher learning and ability to solve complex learning problems has implications for teaching practice. Ongoing research is needed, with CoI framework and other methodological and instrumental resources, both under a qualitative as a quantitative approaching as other studies have done [e.g., 14].

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