KNOWLEDGE CONSTRUCTION IN SOCIAL NETWORKS: DOES IT REALLY MATTER?

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Abstract

Knowledge construction in social networks is a critical issue for educators who research the opportunities and challenges those new environments offer for online education. In order to contribute to the debate we present in this article an empirical study whose objective was to analyze online interactions in a discussion forum of a social network that gathers a community of Portuguese speaking teachers who discuss online topics related to professional development in ICT. The theoretical framework is the Online Collaborative Learning Theory – OCL developed by [1] as well as the concept of cognitive presence as presented by [2] who developed a grid to detect and evaluate the process of knowledge construction in online asynchronous interactions. As advocated by OCL although modest, results show that in the analyzed social network forum of discussion it is possible to attain higher levels thinking and collaboration. The study also shows that Garrison´s grid to detect cognitive presence is useful to pursue and anatomize the process of knowledge construction in a social network. However results also show that there is a long path to go in order to enhance the processes of collaboration and the development of the so desired autonomy of social network member to manage their own processes of knowledge construction becoming more and more independent of the e-moderator of the environment.

Keywords: Education, Online Collaborative Learning, Professional Development of Teachers.

1 INTRODUCTION

Social networks have been gaining ground as informal environments where you learn collaboratively. However, assess how learning and online collaboration are difficult goal to achieve and measure, given the nature of the organization and functioning of these environments, where each one is responsible for his own learning. For all these reasons, the study of asynchronous communication is a recurring theme in current research [3]; [4]. The main objective of this study is to analyze if it is possible to achieve high levels of cognitive thought in virtual environments, more precisely on social networks. We will consider as theoretical framework the Theory of Online Collaborative Learning (OCL), developed recently by Harasim (2012), as it values the role of the instructor in the process of knowledge construction inside a virtual community.

Several authors have developed model for the analysis of virtual interactions that allowed the study of knowledge construction [1], [5], [6], [7]. In this article we study the construct conceptualized as "cognitive presence" by [2], and verify its development in a discussion forum of a social network designed to enhance the PDT (Professional Development of Teachers). The article is organized in four parts: in the first we present the OCL theory; in the second we present the concept of cognitive presence and the instrument developed to evaluate it; in the third part we present the empirical study, and in the last, we discuss the results and present conclusions.

2 ONLINE COLLABORATIVE LEARNING THEORY (OCL)

The Theory of Online Collaborative Learning (Online Collaborative Learning Theory-OCL), by [1], has a basic assumption that the asynchronous student speech in virtual environment is the basis for creating knowledge and generating new learning.

Through 3 stages or processes, are the paths that allows the achievement of knowledge and that supposedly changing from divergent to convergent thinking as a result of negotiation and discussion among peers, supported by online e-moderator/instructor [8] [9], as outlined in Figure 1.
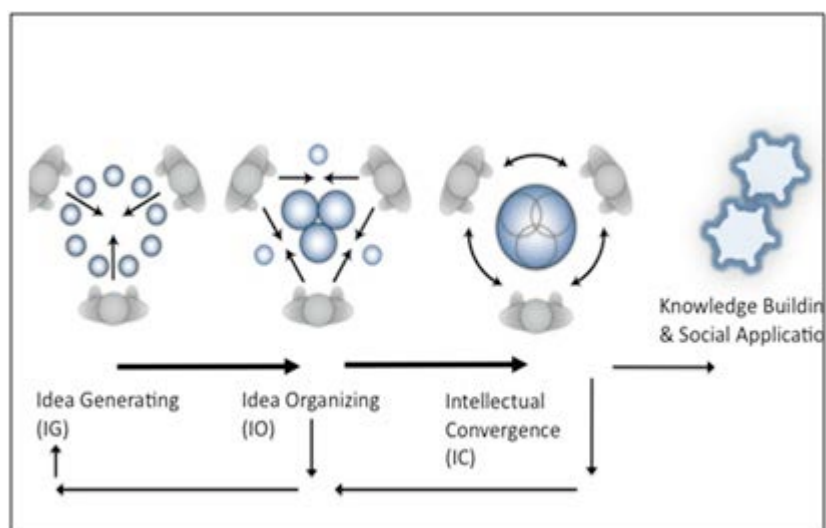
Figure 1. Three Stages of Online Collaborative Learning Theory [1]

The first phase is called "Idea Generating", where participants in a forum send reviews, and report their experiences. At this stage it is very common to have a brainstorming, where often appear ideas without any sense. As you can see in the figure, there is no interaction, there is no interaction within this group, the individual positions prevail. However, there is already a certain commitment to contribute to the construction of a diverse set of ideas and perspectives. At this stage the e-moderator creates the topic of discussion and defines how the discussion process will be, if with temporal parameters or not: "This phase is a highly democratic and engaging process: everyone presents one or several ideas"[1].

The second stage is called "Idea Organizing" and here we can already notice some conceptual changes, since the members begin to interact, questioning, agreeing or disagreeing with opinions of colleagues and also reading the suggestions of the teacher or moderator. From there they begin to organize their ideas, filtering the information relevant and rejecting those that may not have relevance to the theme, and then give rise to new ideas or placements. Contributions grow and serve to enrich the group that little by little will understand the importance of taking efforts to solve the challenge. At this stage the moderator is very important, whether in the elucidation of students in possible misconceptions or offering new sources of information to help students in the process of construction of knowledge [1]. According to the author, it is at this stage that can be noted the intellectual progress of community members who apply analytical concepts, organize and refine their reflections, even if there is still no consensus in the group.

And finally, we have the last phase, "Intellectual Convergence", where it becomes clear that the Group built knowledge collaboratively. We also realized that the ideas are structured through the previous process which enabled a convergence of ideas in the group, which, with the help of e-moderator, reached more advanced intellectual levels, analyzing and reflecting on everything that has been discussed to a conclusion. [1] emphasizes that this phase can have as final product an artifact that can be expressed as a solution to a problem, a theory, an article, among others, that can be applied in other contexts.

It should be noted that the process is not circular, but is in continuous growth, and the feedback provided by the e-moderator or instructor is a crucial factor for the growth and development of the group. As we can see in the figure, in the second phase, the group can go directly to the third stage or can generate new ideas and come back to the first stage starting the whole process.

3   COGNITIVE PRESENCE

According to [2], the cognitive presence is an essential component in an online community because in addition to providing evidence of the quality of the discussions it also allows a procedural assessment and continuous organization of critical thinking and thoughts of the members over time. For these authors, this type of assessment is crucial in environments where communication is asynchronous and text-based because it follows the rules of written transcripts and so can provide a precise record of individual contributions and group interactions. In addition, these transcriptions are reflected in the full

recognition of prior knowledge that members have added to their shared repertoire. According to the authors, cognitive presence can be "defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in the critical community of inquiry" [2].

However, we agree with the authors when they state that the evaluation of cognitive presence is not an easy task and pose true challenges to researchers in terms of controlling evaluator's subjective interference. Trying to minimize this dilemma, [2] developed an analysis model of this component supported in the pragmatism of [10] which stands that any knowledge includes reflection and practical application in solving problems (see Figure 2).
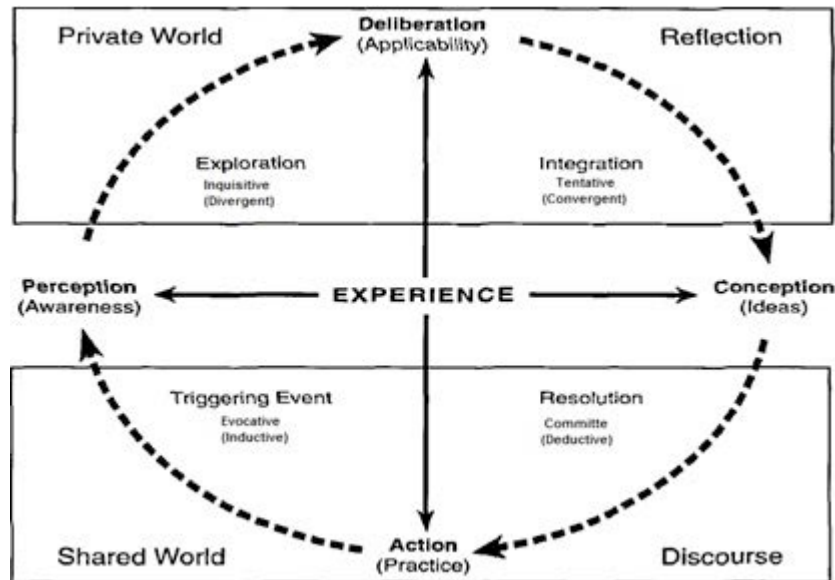

Figure 2. Categories and descriptors of cognitive presence (adapted from [2]).

As on can see in Figure 2, the first dimension of the model consists of two uninterrupted processes which are 'action' and 'deliberation', i.e., the practical application of acquired knowledge. The second dimension can be defined as the moment of transition between the awareness of the problem (perception) and the conception of ideas, generating a final product that is the collective knowledge. In addition, this model is still composed of four phases that here we'll call categories, which are:

a) First phase (Triggering Event) - configures itself as the beginning of the process or discussion. In this case, not only the e-moderator but also the members throw challenges and pose questions to be discussed: "(…) the first category (triggering event) is a problem-posing event and, therefore, is considered evocative and inductive by nature in terms of conceptualizing a problem or issue" [2];

b) Second phase (Exploration) - in this phase the members begin to explore the relevant information. The authors claim that in this phase there is a process of getting rid of the private world, since they socialize their ideas within the group. In other words "is the search for relevant information and, therefore, reflects an inquisitive and divergent process in the search for ideas to help make sense of the problem or issue" (idem, p. 14).

c) Third phase (Integration) – this phase can be characterized as the one where meanings are generated as a result of the ideas generated in the exploratory phase because it "represents the construction of a possible solution and, therefore, is a tentative conversion or connecting of relevant ideas capable of providing insight into the dilemma" (ibidem, p.9). In this phase, we observe that members begin to reflect on the subject, diagnose errors, questioning, and send comments, among others.

d) Fourth stage (Resolution) – it is the phase construction of knowledge is evidenced in the practical solutions to problem solving. The authors are also emphatic in stating that, at this stage, members could trigger new discussions because they acquired useful knowledge. According to [2] "the fourth category (resolution) is the process of critically assessing the concepts and, therefore, represents a commitment to a solution and deductively testing its validity".

Considering the four stages of development of cognitive presence in an online learning environment, [2] developed a grid to evaluate this complex dimension; based on the original instrument, the authors

of this article adapted and validated it to the Portuguese context. The process of content analysis of the Forum presented in this paper was also a process to validate the new instrument that conduced to small adjustments in the writing of the indicators in order to make them operational for a more accurate categorization of the speech of the Forum participants. Figure 3 presents the final instrument used in the process of content analysis of the cognitive presence in the forum transcripts.

Categories	Indicators	Definition
1. Factor generator (Evocative)	1.1. Recognize the problem	Submit information about the subject, culminating with questioning.
	1.2. Sense of confusion or amazement	Ask questions; send comments that lead to discussion on new directions.
2. Exploration (Inquiry)	2.1. Divergence within the online community	Disagreement of ideas, but without theoretical support.
	2.2. Divergence in a simple message	Too many different ideas or themes presented in the same message
	2.3. Exchange of information	Personal narratives/description/facts (not used as argument to sustain a position or conclusion)
	2.4. Suggestions to take into consideration	Comments that denote some restriction or disagreement of ideas. Ex: this does not seem correct; I disagree; Am I exceeding myself?
	2.5. Brainstorming	Adds new ideas, but does not defend them theoretically, and neither develop them systematically.
	2.6. Conclusions	Points suggestions and opinions, but not justifies.
3. Integration (Attempt)	3.1. Convergence among members of a group	References to the contribution of colleagues, agreeing with their ideas, but also adds new ideas and new meanings.
	3.2. Convergence in the same message	Try to justify, develop and defend hypotheses.
	3.3. Connect ideas, synthesize	Integrate information from various sources: books, articles, personal experiences
	3.4. Create solutions	Explicit characterization of a message as a solution by the participant
4. Resolution (Compromised)	4.1 Apply to the real world	Practical application of the knowledge acquired
	4.2. Test and defend solutions	Establish relationships with other existing knowledge; acquire competence in analysis and critical reflection and have the power of argument to support the ideas advocated regarding the challenge.

Figure 3. Grid to evaluate the cognitive presence
([11] - adapted from [2])

4   METHOD

The study focused on the social network Proedi Forum (www.proedi.ning.com) entitled "Technology vs. Methodology", which was applied to a group of future teachers that are part of a master's degree in Teaching at the University of Minho (Philosophy and Geography/History). Participation in the Forum was one of the teaching strategies used by the teacher in the field of Educational Technology that was lectured in the second half of 2012. In this forum we had the participation of 26 students and a total of 91 posts. The empirical study is analytical or documental analysis [12] by the fact that the research is based on a documentary analysis process in which the data sources have the written text format (contributions from members in a social network Forum PROEDI). Analytical research is a form of non-experimental or descriptive studies [13] in which the researcher, based on a grid, shall examine the content of documents in different formats, such as books, newspapers, radio programs or websites. The technique used was content analysis and, according to [12] it is a quantitative technique for the objective, systematic, quantitative description of the manifest content of communication.

According to [14], the first step in the process of content analysis of asynchronous communication is to define which is the unit of analysis to adopt whereas in literature there is no consensus on what would be the most appropriate: the so called formal units (whole message, the paragraph, or the phrase) or the semantic units (thematic unit, context unit). According to [15], this option has to be in accordance with the purpose and specificity of the study. In our study, whose objective is to analyze the construction of knowledge through the development of critical thinking of the members who participated in the discussions of a social networking we choose a combined process, using the 'message' as the unit of analysis to ensure the reliability of coding process, as suggested by [15] [16] and [2], that consider it the more appropriate for several reasons: i) it's objectively identifiable, ii) it meets the principles of exhaustiveness and exclusivity as needed to ensure the reliability of the investigated object and iii) it allows the researcher to calculate the degree of agreement between encoders ensuring the objectivity of the coding process ([16], [17]). In spite of considering the

message as a whole to calculate the reliability of the coding process, the thematic unit was also used to codify fragments of the transcripts inside the message, considering the different phases of knowledge construction identified by [2] in their grid of analysis. In order to attribute the whole message a final coding to calculate the interrater fiability, we used the code up heuristics as suggested by [2] and also by [14] assigning to the whole message the highest level of knowledge construction detected inside the message as a unit.

4.1 Participants

In this discussion forum participated 26 members of the community. 7 are male and 19 are female. In regard to the age, 10 belong to the group between 26-30 years; 5 (20-25 years); 3 (31-35 years); 2 (36-40 years); 2 (41-50 years); 1 (56-60 years) and did not report 03. With respect to the country, most of them (24) are from Portugal and the remaining 2 are from Brazil. As for the marital status, 20 are single, 3 are married, 1 marked the option "other" and 2 did not respond. In relation to the ICT training, 9 reported that have basic training, 9 have average training and 3 have advanced training, while 1 has no training and 4 did not respond.

## 4.2 Reliability of the Coding Process

In order to ensure reliability and the principles of objectivity, reliability and systematic consistency described by [15] we have chosen to use the message as the unit of analysis, and for the calculation of the degree of agreement of judges we used the statistical indicator Cohen's Kappa (K), which is a measure in percentage of agreement between independent evaluators for categorical data analysis [18] aiming to minimize subjectivity, very common in research of interpretative nature, which is based on speech analysis techniques [14].

In the specific case of our study, the analysis process of asynchronous communication content recorded in the Forum of PROEDI social network was carried out by a team of two experts, the researcher, cognizant of the conceptual model, and an expert in the field of educational technology, that did not know the model yet but that was accustomed to do content analysis of written discourse. In order to achieve the greatest possible objectivity throughout the process, they had a meeting beforehand and worked on examples of the various phases and situations for assessment of cognitive presence in posts left by the participants in the discussion forum. So, they decided not to encode messages of greeting or others with little relevance to the discussion. Clarified the concept underlying the process of content analysis, it was randomly selected a sample of the forum transcripts corresponding to about 25% of all posted messages that were encoded independently by the researcher or by the expert. Finally, it was calculated the level of reliability that has a percentage of agreement of 86.7% that according to several authors [18] it corresponds to a strong level of agreement.

5 RESULTS

A total of 91 messages constituted the corpus of analysis. The length of the transcripts was very irregular, varying from a minimum of 25 to 717 words.

After codifying the corpus according to the grid of analysis the stage that featured a higher percentage was Integration, with 35.4% (51 evidence), followed by the Resolution phase, with 32.6% (47), Exploration, with 17.4% (25 evidence) and Factor generator, with 14.6% (21 evidence), as can be seen in graph 1 below:
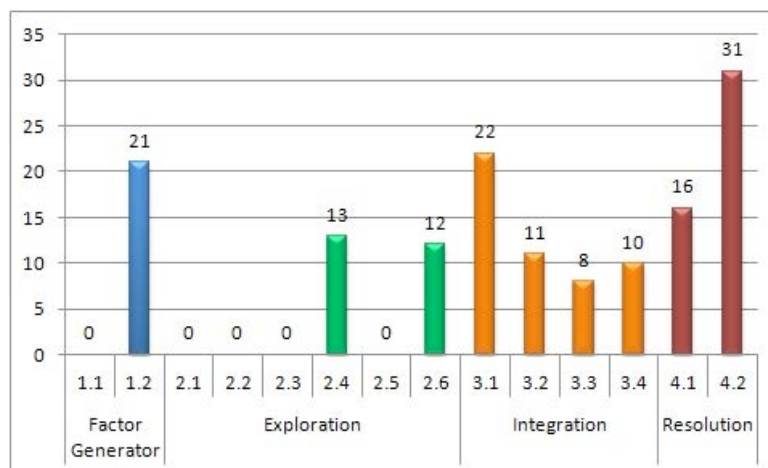
Graph 1: Categories and indicators of cognitive presence analysis
of the forum Technology vs. Methodology (absolute values)

As you can see in the figure presented, among the stages of construction of knowledge the most representative in this forum were Integration and Resolution. This can be explained taking into account that, in formal context, students, in theory, have a more uniform understanding level, allowing that, in an asynchronous discussion, to jump more quickly from the most basic levels to the most complex. This finding is confirmed on Integration and Resolution phases that have a greater percentage of evidence especially with regard to resolution.

The biggest difference was in the absence of four of the six category indicators. One possible explanation is the fact that this forum has been used in formal context, where the students already knew each other and had the teacher as an element closer to consult, search information, narrating personal facts and express disagreement of ideas, and did not felt the need to post contributions, since they could exchange these impressions in the classroom with the teacher or even with some colleagues. Interestingly in this category the only present indicators were "suggestion to take into consideration-2.4" and "conclusions-2.6" which are indicators that assume that the group was already immersed in the process of discussion and begins to interact with colleagues. These indicators are important because allow members to prepare to the next phase, Integration, where they can reflect and connect relevant ideas in order to develop critical thinking and generate meaning.

In fact, the cognitive presence is the component that enables participants of a particular community to create opportunities for individuals to build meaning, to interact with other existing knowledge and to acquire competence in analysis and critical reflection. This is because the interaction and knowledge sharing between the members of a discussion forum allows them to focus more attention on more complex thought processes than on the processes and results of individual learning [2]. Furthermore, it also allows us to a procedural review of some indicators such as, for example, creativity, problem-solving, intuition and insight, which according to [2], are strong indicators of intellectual maturation on a network or virtual community. In our study it was evident especially in the phases of Exploration and Resolution. In the Exploration stage it was possible to verify that, in addition to the existence of component evaluated (cognitive presence), there was also the presence of Teaching. We say this based on some posts where it was possible to conclude that not only the e-moderator but also some members were decisive elements to diagnose possible misunderstandings and send comments to assist the community in the development of critical thinking and, consequently, in the appropriation of knowledge:

The forums are not the only tool that teachers can use in the social network; there are other tools such as: News, video conferencing, digital courses. The social network breaks down physical barriers, leading to the motivation of teachers, due to the rapid sharing of information – 2.4 (AAM)

The Digital technologies in the teaching-learning process are importante. But it is essential to take into account the preparation of the teacher, as well as the conditions of the schools. Teacher have be up-to-date, in order to adapt teaching methods and attitudes. So, it is not enough to acquire a technical training, it is also necessary to apply new technologies to the pedagogical practices and integrate them in the disciplines, so as to stimulate interdisciplinarity-2.4 (ASG)

In the Resolution stage, it was possible to realize that the knowledge acquired there was significant as it provided their participants with solid arguments to support and defend an idea and, more importantly, if it was a useful knowledge, applicable in other contexts of their professional and personal trajectories, as can be seen in the following statements:

Digital technologies are the future. They are the tools we use to solve, the best way we can, issues that would take, under other circumstances, a long time to solve, making the discussion process more practical and comfortable -4.1 (SF)

This implies that teachers constantly question their knowledge and are themselves agents of their training and their pedagogical supervision. They should feel compelled to learn throughout their lives, looking for continuous training which promotes the rethink on how to teach and engage processes of reflection on the methodologies adopted-4.2 (E.F.L. M)

In my opinion the most important thing would be to study in depth what is in fact the pedagogical potential of technologies for teacher-student relationships, if this exists. Above all, we tend to often fall into more traditional education, even if we tend to be more criticized, although it is not always bad; sometimes traditional education is even quite effective. 4.2 (S.D.P. R)

6 DISCUSSION AND CONCLUSIONS

In a way, the analysis undertaken in this discussion forum confirmed that in this new social paradigm, technologies can give great contributions to the promotion of collaborative construction of knowledge, which is the principle advocated by authors of reference as [19], [20], [21], [22], among many others.

On the other hand, the results obtained in the study reinforces that collaborative learning theory proposed by [1], which stated that through the online discourse in virtual communities, participants can build knowledge, thus achieving higher levels of critical thinking, synthesis and a greater understanding of the topics discussed there. According to the author, when members begin discussions have divergent thoughts and, gradually, through interaction and collaboration among peers, they go through paths that lead to convergent thinking, i.e. the construction of knowledge collaboratively. In our study knowledge construction was evidenced in the last three stages of [2] model, as the group after an initial discussion where different points of view were presented evolved to resolution where a final consensus that in the case of our study where "outputs co-authored by the group" [1] that showed a collective appropriation of knowledge. The study of social networks as informal learning spaces for the collaborative construction of knowledge is still in a very early stage of development. That is why the answer to the question that is launched in the title of this article in undoubtedly "yes": the future of education will depend more and more on online scenarios for learning and so we need to know if and how knowledge construction occurs. There is still a long way to go to conclude that in virtual and informal environments the members of a community can really have an autonomous active participation without establishing a bond of dependency with the instructor or moderator for the management of their knowledge. Although in our study we evidenced the participation of some members who, along with the e-moderator, contributed to the growth of the group and the collaborative construction of knowledge, we consider that the level achieved was still very shy, not revealing the growth in the group in search of the desired autonomy so essential to a citizen of the Knowledge Era, in which learning is a continuous process that occurs throughout life. When in the title we questioned: does it really matter to study the process of knowledge construction in social networks? We believe that the answer is YES. Considering that our students spend most of their time is social networks it is our duty as educators to take advantage of these informal environment on the sake of the development of the main competencies of a wise 21st century citizen: creativity, innovation and a logic that views knowledge as a process of sharing information in social networks [23]. Knowledge construction is an issue of aggregation much more than memorization.

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