The influence of the e-tutor on the development of collaborative critical thinking in a students' e-forum: association levels with Cramer's V

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Abstract

Most courses via Internet use the electronic forum, which allows for cognitive dialogue, namely through critical thinking. The tutor's support to collaboration, reflection and learning can explore the characteristics of e-forums and contribute to a more positive academic experience. This study aims to identify which of the tutor's tasks are more influential on higher levels of collaborative critical thinking, with a content analysis of 5200 messages in several on-line Master's and Post-graduation courses forum. 11 indicators of the tutor's intervention and four indicators of collaborative critical thing were adopted. Then, a Cramer's V post-test was used to assess the effect of the tutor's posts on the highest levels of collaborative critical thinking. The tutor's tasks which relate more to the students' highest levels of critical thing were: 1) asking open questions to the students, 2) establishing associations among the students' messages and 3) modelling the debate. The study provided useful information on the ways of triggering the dialogue and taking it to higher cognitive levels.

Keywords: critical thinking, dialogue, e-forum, e-tutoring

Introduction

With the development of communication technologies, of learning management systems and of interaction tools, distance learning courses have been able to create dialogue opportunities, in order to develop several types of interaction between the e-teacher and students and among students.

A former research on the students' perceptions about the tutor's tasks, such as providing technological support the students, organizing and leading the debate, moderating the discussion, encouraging participation, solving communication problems, helping structure the debate and leading the process of building knowledge or solving problems, answering questions, correcting trajectories, constitute some of the essential tutors' tasks. (Jorge, in press).

Although, in theory, much emphasis is put on students' interaction, namely through debates in the forum, in practice, it appears that the discussions in the forum are of little importance for the students final evaluation and the tutors seldom have a clear strategy for developing the reflective skills of their students. Simultaneously, more academically competent and focused students usually show little enthusiasm for the forum: they only participate in compulsory forums, since they don't believe forums add a significant value to their learning. They argue that most tutors don't show up at the forum, to motivate, stimulate and correct trajectories and set the debate back on track, whenever necessary.

Arising from the belief that the tutor can and should promote genuine dialogue and collaboration among students, to build on each student's knowledge and experiences, some tutor's tasks and strategies typified in the literature were suggested, in order to develop the students' collaborative critical thinking.

Literature review

1. Dialogue and distance learning

Dialogue is a discursive process essential to a learning community model, a fundamental element of education since Socrates, and is embedded in the learning community model. In a learning community, students and teachers reflect on interpretations, knowledge and experiences, construct meanings and interpretations, in a setting where social interaction provides multiple perspectives of an issue / problem, where each member of a community has to understand, interpret and communicate his/her knowledge and experience with peers, through collaboration and participation. Dialogic activities such as negotiation, inquiry and reflection are considered more relevant than mere knowledge acquisition.
As for the case of distance learning, social mediated reflection has proven to have positive effects on learning, socialization, motivation, connectedness and students' satisfaction with their course (Rovai & Barnum, 2003). Through dialogue, the students establish collaborative relationships, which are crucial for a community-based model of on-line learning.
Through asynchronous online conferences, students have time to reflect on their and other students' thoughts, wind back the conversation, review information to support their arguments, search for new discussion paths.

2. Critical thinking and collaborative critical thinking

On the other hand, critical thinking is a key educational goal in today's society. The concept was described by Scriven & Paul (1992), who defined it in these terms:

> the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.

To have our students thinking critically, we must help them develop the skills, competencies and attitudes of an inquisitive, rational, persistent and fair mind, such as seeking and retrieving relevant information, and building on it, in order to clarify and persist on the seeking of relevant results.

Still, not all cognitive processes can be considered critical, since this is a superior form of problem-solving skills, decision making and creative thinking that incorporate both cognitive and affective dimensions.

There's some scarcity of rubrics to assess online collaborative critical thinking. Differences in the processing levels must be tackled, since categories such as relevance, clarity, use of personal knowledge and experiences, connections and interpretations, justifications, usefulness, depth of understanding and critical judgment represent the deepest levels of critical thinking.

Teachers should teach their students to explore multiple perspectives and try to establish connections in order to be able to learn and think in different contexts. Research has shown that students should be helped and taught to represent their experiences in levels of abstraction that transcend the context specificity and actively learn to establish paradigmatic relations, ask questions and tolerate the ambiguity and the uncertainty of problems without a

"right" answer, such as reflect on their ideas and examine them, look for similarities, assumptions, inconsistencies, alternatives and decisions. In a sound Socratic fashion, the teachers must question their students, stimulate the interpretation of information and data and the development of hypotheses, in order to understand and assess the range of hypotheses or explanations for data or assumptions, and alternative situations.

Yet, the development of critical thinking skills of on-line students depends much on the skills and ethos of their tutors, who must seek to develop those skills and attitudes themselves.

3. The tutor's tasks in the forum

Due to the features of on-line communication, which can hinder authentic dialogue and prevent it to take off, the tutor must have an active intervention as a host, a content specialist and a moderator. Quoting from Hiltz & Turoff (1978, pp. 23-24):

> In order for a computerized conference to be successful, the moderator has to work very hard at both the 'social host' and the 'meeting chairperson' roles. As social host she/he has to issue warm invitations to people; send encouraging private messages to people complimenting them or at least commenting on their entries, or suggesting what they may be uniquely qualified to contribute. As meeting chairperson, she/he must prepare an enticing-sounding initial agenda; frequently summarize or clarify what has been going on; try to express the emerging consensus or call for a formal vote; sense and announce when it is time to move on to a new topic. Without this kind of active moderator role, a conference is not apt to get off the ground.

In this definition, the authors emphasize the social role of the tutor, as suggested by the words "host" and "calls"; nevertheless, design, organization and instructional functions are also implied in ideas such as "synthesize decisions and decide when to mark a new meeting" and specific instructional tasks such as "summarize and clarify" the debate's key aspects.
The tutor's beliefs and values regarding education issues in general, and adult education in particular, have a great influence on his/her teaching style. The tutor's teaching style, how he/she designs and develops the learning environment, the methods and strategies he/she uses to display content, leads the interactions, encourages and nurtures students' curiosity, makes a difference in the quality of the interactions of the forum.

A tutor who believes in the advantages of autonomy and interaction, is ready to accept new ideas, values, different opinions, encourages different points of view, seeks new ways of teaching and learning and identifies what triggers reflection, inspires and motivates the students (Barrows, 1992); a tutor who encourages his/her students to become independent and seek for themselves the information to ground their opinions and hypotheses, a tutor who answers questions, suggests pathways, diagnoses misconceptions, provides alternative explanations is someone who has a theoretical framework based on autonomy, interdependence, communication and interaction (Keegan, 1998; Paulsen, 1995).

Also Hamza & Nash (1996) found relationships between the tutor's personality and his/her effectiveness and found that the tutor's style has an influence on the students' learning and performance and on the learning environment itself. Chan (2002), as well as Deci & Ryan (1985) concluded that certain personality traits are associated with the teaching style. Research also suggests that student motivation is influenced by the teacher's style, either more or less directive. Barrows (1992) considers that in distance education, students' passivity, where the tutor is the one who decides how much, when and what is learned, hinders the acquisition of higher level thinking skills, such as problem solving and learning critically and

independently. Thus, strategies that promote interdependence among students, critical thinking and independent learning and benefit from diversity of the students' skills and experiences are more appropriate.

Students who feel academically more competent and better motivated (Deci et al., 1991), more creative (Hamza & Nash, 1996), reveal a deeper understanding of the content (Boggiano, Flint, Shields, Seelbach , & Barett, 1993), have lower dropout rates (Tait, 2004), better learning and higher levels of satisfaction (Swan et al, 2000).

The teacher's personality and her/his teaching style are strongly associated, and there is also a significant relationship between the tutor's personality and the degree of cohesion among students (Yang & Liu, 2008). As for the tasks of the e-tutor in the e-forum, literature uses several taxonomies, which reflect differences in theoretical, conceptual and philosophical orientation about learning and, in particular, about learning in adulthood.

However, it is clear that only with an active involvement of the e-tutor, who designs, organizes, leads and clarifies the debate can take off and fly. During the forum, tasks such as identifying converging or diverging views, seeking consensus and understanding, so that students feel supported in their learning, encouraging, expressing appreciation and reinforcing students' contributions, creating a climate of trust and mutual interests conducive to learning, encouraging students to explore content, deconstructing, reconstructing and developing new ideas and reasoning, stimulating participation and discussion, keeping students involved and the debate on track, evaluate the process, keeping the course of debate, contribute to a climate-appropriate social and cognitive presence.

At the forum, the tutor has to ensure equal opportunities, call everybody to the debate, instigate participation and promote interaction, manage conflicts, turning them into opportunities to deepen relationships and develop skills in conflict resolution, decrease the negative impact of asynchrony and a possible excess of information, referring to several posts in the same post and establishing connections between them.

Methodology

1. The research goals

The study examined the association levels between the various tutor's tasks and the highest levels of collaborative reflection.

2. The context and the research material

Five thousand and two hundred messages were selected from several forums held in several Masters and Postgraduate courses at distance in Portuguese Universities. The longest and most participated threads were selected, because in longer threads, students tend to reduce social utterances, and to be less formal, when they get more confident, both with the environment and with their peers and tutors and more focused in the discussion issues; as far as cognitive presence is concerned, longer threads also tend to have more messages in the integration and decision/resolution phases.

3. The variables and their operationalization

The intervention of the e-tutor was operationalized in accordance to the results of previous research (Jorge, 2006). In this previous research, 25 tutor's tasks were identified and a survey has been developed to understand which tutor's tasks were more valued by their students.

The tutor's messages were coded according to this framework and 11 categories were found in the transcripts, as shown in table 1.

Table 1. *The tutor's messages codes*
1. Establish the goals/terms and conditions of the debate.
2. Create a positive and friendly climate (welcoming messages, greetings, encouragement and reinforcement).
3. Redirect the debate when it goes beyond the subject.
4. Model the debate.
5. Present/recognize opposing or conflicting perspectives.
6. Provide guidance and suggestions to the debate's improvement/ progress / development.
7. Comment on a student's participation.
8. Ask open questions, for clarification, justification or developments.
9. Respond to the students questions and give advice.
10. Weave several messages, establish connections among them.
11. Mediate conflicts, whenever they emerge.

For the operationalization of the variable collaborative critical thinking, Garrison, Anderson and Archer's model (2000), presented in table 2, was tried on and proved to fit into the selected forums' conferences; thus, four phases of collaborative critical thinking were considered, as proposed by the model.

Table 2. *Collaborative critical thinking*	
Phase 1 Trigger	The triggering message corresponds to the tutor's initial challenge.
Phase 2 Exploration	This is the phase where the students start responding to the tutor's initial challenge. Students begin tackling and scrutinizing the problem, identifying and clarifying main ideas and concepts, identical or conflicting formulations, assessing the information and arguments' credibility, exploring new ways to assess the problem/issue, making and evaluating inferences, looking for new ways to address them. This phase is based on each individual's point of view.
Phase 3 Integration	This is the phase when students start recognizing their views are either complementary or alternative, incorporating others' views in their arguments, seek new information the support their arguments, assess new definitions and perspectives, merge individual and social universes.
Phase 4 Decision /resolution	In this phase, the students seek new solutions and views to the problem and tend to elaborate on a common and share vision/ decision, a synthesis or reformulate of the initial problem, incorporating the group's contributions.

4. The units of analysis

The unit of analysis adopted for the tutor's variable was the sentence. In a message, there can be multiple tutor's roles and activities. To measure collaborative critical thinking the message was used as the unit of analysis.

The messages of the several threads were kept in chronological order, imported into a qualitative analysis software, where they were coded. The categories were progressively refined until they became mutually exclusive. When a stable protocol was established, the messages were coded by two sets of coders, who started to assess the protocol, suggested some refinements and then coded the selected material.

Subsequently, data were recorded in statistical software (SPSS); levels 3 and 4 of collaborative critical thinking were recoded into level 3, due to the small percentage of resolution messages. In six months' time there was a second coding procedure.

To measure the intercoding agreement and temporal coding stability, the coefficient of Holsti (1969) and Cohen's kappa are the most used. The Cohen's kappa measures the proportion of agreement between different groups of coders and codings. Cohen's kappa is used when an *a priori* decision regarding the number of coding occurrences is decided upon.

To measure the association levels between each of the variables' codes, a Cramer's V posttest was used, to determine association strengths between variables, following a chi-square test; chi-square tests measure the relationships between variables, but they don´t establish the level of association, which has to be looked for with post-tests such as Cramer's V or Phi.

Cramer´s V is a chi-square-based measure of nominal association based on adjusting chi-square significance to factor out sample size, and designed for nominal data; the association strength can diverge between 0 and 1. With the SPSS software, it is also possible to compute the standard error and significance.

Cramer's V can be interpreted as an association between two variables as a percentage of the maximum possible variation; being a symmetrical measure, Cramer's V is independent of the variables status and can be used with nominal data. A perfect relationship is the one which is predictive and a null relationship defines a statistical independence.

Results and Conclusions

1. Data analysis and triangulation

The data were analyzed through the use of coding, in a first moment, by two sets of coders, secondly by one of the sets, six months after the first coding procedure. The reliability levels ranged between 87 and 95%.

2. The tutor's participation

The five thousand and two hundred messages had an average of 93 words and 5.8 sentences per message; 622 of them (12% of the total) were posted by the tutors. A message from the tutor may contain several categories of indicators, since all the messages contain elements of a social nature, such as greetings and farewells, stimuli, reinforcements. The distribution of the tutor's message is described in table 3.

Table 3. *The tutor's messages by category*	No.
1. Establish the goals/terms and conditions of the debate.	40
2. Create a positive and friendly climate (welcoming messages, greetings, encouragement and reinforcement).	598

3.	Redirect the debate when it goes beyond the subject.	48
4.	Model the debate.	76
5.	Present/recognize opposing or conflicting perspectives.	56
6.	Provide guidance and suggestions to the debate's improvement/progress/development.	57
7.	Comment on a student's participation.	49
8.	Ask open questions, for clarification, justification or developments.	78
9.	Respond to the students questions and give advice.	59
10.	Weave several messages, establish connections among them.	101
11.	Mediate conflicts, whenever they emerge.	2

3. The students' collaborative critical thinking

Each subject first messages prevail in the triggering messages; they correspond to 4,6% of the total. The students take more time to explore the subjects with 81,3% of the posts; the integration level is less frequent: only 13,3% of the posts fit in this category. The resolution phase takes no more than 0,9% of the total, because some tutors had some students to provide a synthesis of the debate.

Table 4.

Collaborative critical thinking	*%*
Triggering messages	4,6
Exploration	81,3
Integration	13,3
Resolution/synthesis	,9

A Chi-square test (χ^2 = 371,870, sig. = 0,000) revealed that each of the variables categories has a character of its own and an explanatory power of the model

4. Association strengths

Association levels were measured by Cramer's V; three levels were considered, according to the literature: association between pairs >0.400 were considered strong, moderate association between pairs ranged between 0.250 and 0.399. Below this level, the levels of association were considered weak.

The strongest associations between the tutoring tasks and the highest levels of collaborative critical thinking were: 1) modelling the discussion, 2) weaving students messages in one single post 3) asking open questions to students for clarifications, perspectives, assumptions, reason

and proof, implications and consequences, explanations or developments, questions about the question itself.

Study limitations and future developments

The difficulties and limitations of this study relate to issues of, both theoretical and methodological nature. As far as methodology is concerned, issues such as achieving acceptable levels of agreement and stability of the encodings have to be addressed, since most of the variables studied in forum's message are usually operationalized in a high number of categories within each variable, which complicates the process of the models' stabilization and replication.

The difficulty in achieving acceptable levels of agreement suggests that systems being developed for discussion in which participants are asked to encode their messages in a limited number of categories, from a framework provided by their tutors also work as a strategy of self -regulation.

Differences between the various lines of discussion related to the topics being discussed, the team composition suggest the need to understand their meaning, why, in some situations, some students assume the tutor's role, when the tutor is absent, what personality traits they have, how technological or language variables interfere. All these issues lead to the need of understanding the forum in its multidimensional aspects, interpreting the emerging patterns through integrative evaluation.

A feature of computer-mediated communication, which can hinder the students' collaborative critical thinking, is the students' concern with issues of politeness associated with disagreement. This is more evident at the earlier stages of the discussion and tends to fade out in the process, but only if the students have gained a certain confidence in their peers and developed a sense of connectedness.

The results provide some clues about how the tutors should structure the triggering messages and pay careful attention, not only to the discussion progression, but also to the flow of ideas from one post to another, the core messages, some of which should also be considered triggering messages, since new developments tend to arise around them. Hence, a taxonomy of open questions which lead the dialogue to its highest cognitive levels and shed some light on the tutor's *modus operandi* is being built.

The results also suggest that more interactive technology solutions, which facilitate the handling of information in the forum and that students need time for reading, reflecting, and displaying their views, and an intentional guidance from their e-tutors. The minimum amount of messages categorized in level 4 can be associated to 1) the task being not intuitive and natural in such a context, 2) lack of time, 3) problem complexity, 4) lack of information, or 5) the task difficulty itself 6) work overload. Another problem, which can hinder the students' collaborative critical thinking, is the students' concern with issues of politeness associated with disagreement. This is more evident at the earlier stages of the discussion and tends to fade down in the process, but only if the students have gained a certain confidence in their peers and developed a sense of connectedness.

Unless there is a clear indication from the tutor that the students should provide their own synthesis of the conference, only some partial conclusions appear, scattered in the students' messages, but they cannot be considered for phase 4, since there is no evidence, neither of monitoring of thought processes, nor of conclusions being critically evaluated.

In this case, the tutor can excuse two students from participating in the forum and have them write and publish a synthesis of the debate at the end.

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