

Collaboration, Knowledge Sharing and Digital Environments: What about Argumentation and Questioning Skills?

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Abstract. This work aims at explaining one online platform (ArguQuest) whose main objective is to stimulate learning through argumentation and questioning in a collaborative virtual environment. It is expected that students clarify their knowledge by explaining what they know to their peers. They have to make themselves precise and clear so that their peers can understand them and the ideas they want to express.

In this online environment students are invited to discuss topics in dyads, in a certain number of modules where the level of discussion centered on arguments and questions become deeper. In some points they are invited to discuss the contents with other dyads and, to conclude, an argumentative map is presented by the system and changed or not by the participants.

Conclusions of studies developed in Brazil and Portugal reveal that the platform stimulates peer discussion develops questioning and arguing skills.

Keywords: collaboration skills, Argumentation, Questioning, eLearning platform.

1 Introduction

The context of online learning promotes innovative educational environments where collaboration plays an important role due to the characteristics of online communication. Furthermore, these educational contexts encourage discovery, motivation and the diversification of strategies. Assuming that questioning and argumentation skills promote active and reflective learning as well as critical thinking, two very important competences in the promotion of students' awareness about their metacognition. This work aims at explaining the challenges of an online platform (ArguQuest) whose main objective is to offer strategies that stimulate learning through argumentation and questioning in a collaborative virtual environment. Collaboration leads students to clarify their knowledge since they have to explain what they know to

their peers and therefore must be extremely clear so that the others can understand them and the ideas they want to convey. Thus, they structure and consolidate their knowledge. These beliefs have long been discussed and acknowledged by different authors and more recent studies, like the ones developed between 2008 and 2010 in the Netherlands at Utrecht University, in Singapore at Nanyang Technological University, and in England at the school of Education of Kings College, are a few good examples.

As previously mentioned, this paper presents an on-line platform (ArguQuest) where students are invited to discuss topics suggested by the class, by the teacher or by themselves in peers and in successive modules where the level of discussion based on the meaning of arguments or questions gets deeper and deeper. In some points of the discussion they are also invited to debate the contents with the other groups and, to finalize, the system puts forward an argumentative map about the discussion and explanations presented, that students can construct themselves or change according to their discerning. Despite having been detected some technical limitations, as well as a few difficulties due to some students' lack of experience working in on-line environments, the studies reveal that the platform stimulates motivation and peer discussion and at the same time develops questioning and arguing skills.

In addition, taking into account that two studies were made in Higher Education, one in Pernambuco, Brazil and another one in Aveiro, Portugal, in order i) to test the stability and functionality of the platform and ii) to assess the pedagogical issues related to its use, this paper also intends to address their main conclusions.

2 Theoretical Framework

In learning digital environments, different methodologies are used emphasising collaborative work, in both e-learning or b-learning approaches and giving particular importance to knowledge co-construction and sharing. It is a belief that in the interaction and negotiation processes, trying to overcome conflict and reaching consensus with their peers, students build, reflect and strengthen their knowledge, as they have to justify their opinions, counter argument and become more enlightened decision makers about their own learning and the paths they choose in order to learn. Thus, "they develop their ability to coherently express their points of view, enrich their persuasive intelligence and refine their knowledge" [1, 251].

In fact, these work methodologies favor learnings based on socio-constructivism and pro-active learning, allowing students to recreate themselves during the learning processes as they are confronted with new perspectives, with new ways of acquiring concepts, procedures, knowledge and skills, in line with Vygotsky's thinking [2].

Dealing with new perspectives and learning processes is something that comes about as students, in these learning digital environments, tend to establish new relationships with peers. These are learning relationships in the sense that students learn with others, for the others reinforcing their own learning in richer interactions since they are constantly confronted with others and constantly reconstructing their learning strategies, their own thinking and knowledge. At the same time all of these learning paradigms promote autonomy and critical thinking, as they have to make

choices and take decisions [3, 4, 5, 6, 7]. It involves high level rational and reflective thinking [8], being focused on decision making processes. As [9] states, it demands detailed analysis and evaluation by exploring ideas and concepts, going through questions and arguments, in construction and deconstruction processes of their content.

Consequently critical thinking requests high skills as interpretation, analysis, deduction and the explanation of all considerations brought to the dialogue as well as the discussion about the evidences or contexts levels in which thoughts and judgments are based.

Another statement and suggestion of literature is that it is not possible to conceive the development of critical thinking without the challenges of questioning and arguments' formulation, which leads to deeper questioning and arguing skills. This is therefore one of the most stimulating strategies in the learning and teaching processes as the voice is given to students so that they actively participate in their knowledge construction.

As a matter of fact, argumentative skills are essential to the appropriation of information and knowledge concepts: when the student selects his reasons, considers and discusses or refutes his or other's topics, he structures and organizes his own thinking in a more adequate way, which means that he learns, by the meaning of the argumentative exercise. Student intensifies and expands the knowledge about the topic.

Student's curiosity is what stimulates best their knowledge acquisition because they learn based on their interest or need and so the contents that promoted his learning need and awareness are better learnt. Obviously the student needs to identify what he knows and doesn't know and it often happens that he has to design critical non structured incidents in a very confident environment so he can express his "non knowledge areas" through questioning [10].

In what the situation of online learning is concerned, students recognize the importance of the social role that it promotes and the importance of the interaction in learning stimulation. Some students in certain online learning situations may eventually consider their posts or contributions as not adequate [3]. But even in those circumstances, in which they dislike their performance or don't see it in as a successful accomplishment, and see themselves or fell like less productive and /or displaced, they identify advantages in online collaborative learning.

In students' statements, it is not only the relation between learners that is mentioned. As a result of interviews and questionnaires performed with undergraduates, [11] and [12] refer that in online situations, the learners, the teacher and the tutor become more present, more visible and more available. In a face-to-face class the teacher has no time to pay attention and to help all the students in their doubts and concerns as it is impossible to attend to all solicitations. On the contrary, online teachers answer to every questions, they are there to help learners solve their problems, they take the time to be with each student and each group in a more rentable and proficuous way.

[11] also concluded that in a normal classroom situation, teachers' questions are poor, of a low cognitive level and without a pedagogical intention. Usually they are

out of context confirmation questions and with only an academic intention. Consequently, students are not stimulated to ask questions but only to give answers, so when they do ask their questions; they belong to a very low reasoning level and are contextless.

Once there are no constrains about the physical presence and others' evaluation, students can establish a more private relationship with their teacher or tutor and with their colleagues within the group or dyad where they feel comfortable to expose their doubts, fears and/or uncertainties, having more time and attention in this process of accompanied and supported learning.

When ArguQuest platform began to be planed, designed and structured there were no online platforms with the purposes this one was aimed at. There were other platforms for argumentation development but no online tools for the improvement of questioning and argumentation in an intended, deliberated, articulated and intersected way [13], [12].

The present study aims to explain the functioning and potentialities of the online interface as well as the steps the students have to perform on this online platform that brings together questioning and argumentation skills so that they both promote and support each other. It also intends to report the conclusions of two case studies developed in 2013.

According to [14] there is a strong connection between these two skills. Through the questioning process, students confront each other about opposing views, generating an episode of questions and answers, in order to refute, concede or justify their ideas and therefore achieving new arguments. Thus, a new and deeper level of reasoning and questioning will be achieved in these continuing and iterative argumentation episodes, which promote reasoning and critical thinking.

An explanation of the platform's organization will now be presented so that the movements and iterative episodes can be better understood.

ArguQuest is organized in four dimensions that correspond to four levels of interactions proposed by [11]: i) brainstorming; ii) collaborative training; iii) collaborative discussion and finally iv) the final product of the reflexive debate and process.

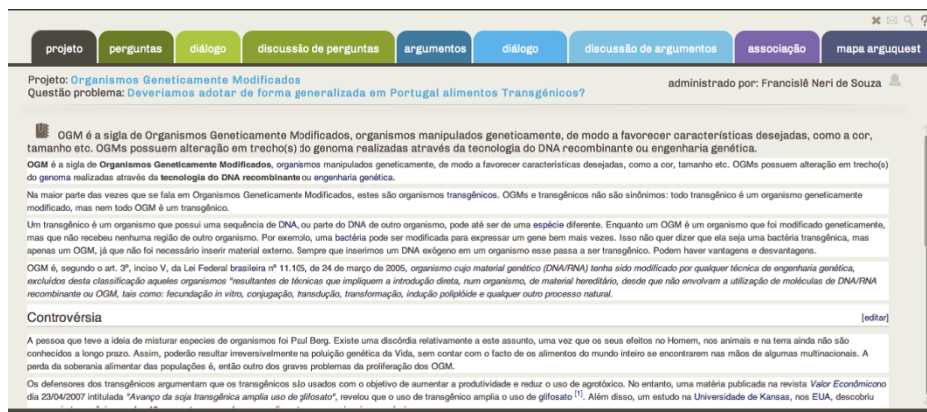


Fig. 1. Phases of the ArguQuest Platform

The four dimensions of the platform interface are organized in nine steps that the students have to follow so that all the dimensions are considered. Once they move from one step to another, they can always comeback to verify and even correct, or modify some of their contributions to the discussion, in order to make them more profound and critical.

In the platform the steps they have to follow are represented in figure 1: i) project – where they define one topic for discussion or enroll themselves into a topic already defined; ii) questions – they elaborate questions to elucidate concepts and better understand the topic; iii) dialogue – the questions are discussed in dyads and the best ones are reformulated and chosen; iv) questions’ discussion – in this step all the group can check, analyze, evaluate and give opinions on others’ questions; v) arguments - in this part of the process some arguments are presented; vi) discussed within the dyad - dialogue; vii) and debated in big group - arguments’ discussion; viii) after all that pathway it is now the moment to cross questions and arguments – association; ix) creation of a conceptual map in order to visualize doubts, explanations, arguments and reasons given for and against the debated topic – ArguQuest map.

It is important to remark that during all the stages of the questioning and arguing process the platform offers the students prompts or scripts under the form of “sentence openers” for the elaboration of arguments and / or questions. This option is connected with the proposals of authors who considered the inestimable help of such system support: they constitute guidelines that can positively interfere with the interaction, suggesting further formulation, facilitating discussion and achievement. This also leads to a self-regulating learning and to a facilitator of peer feedback [15], [16].

As it was mentioned before, in the dyad online interaction within the platform students are guided to learn by inquiring, searching, proposing, replying, reacting, discussing, supporting, refuting, agreeing, i.e., they refine their questions and arguments and build more sense about concepts or problems, through an active attitude of arguing and questioning. The fact that the platform allows to visit and revisit the scripts of students, with all their forward and backward movement, advances and retreats, corrections, additions and reformulations, i.e., the process, progress and setbacks and the own evolution and structure of awareness on knowledge acquisition by the meanings of a more reflexive and metacognitive competence, constitutes a major research asset in the research about the development of the cited competences and the process of knowledge construction.

2.1 1st Case Study

The first case study was led in the context of a community of practice, with online and face to face methodologies, in a superior institution of the state of Pernambuco, Brasil in the scope of a doctoral research. During the period of the investigation, 2011-2013, 70 university professors formally registered as participants in the community and used different interfaces for their communication and interaction, mainly Facebook and Skype.

In February 2013 the group was invited to participate in 3 training sessions about “ArguQuest pedagogical applications”. 16 professors showed their interest in the participation and made their sign in the platform. However, the time chosen for the training and the conjugation with Portuguese hour for the collaboration of one of the authors of the platform, corresponded to a time of high online traffic in Northeastern Brazil and the poor connections had unexpected consequences and only a few number of registered members attended and participated in the training.

After a content analysis in the 3 sessions with no more than 5 professors each, it was evident that in spite of the difficulties of connecting to the others, the fact that the session was guided in skype and the platform was a novelty motivated the professors who asked several questions concerning the functions of ArguQuest and understood its potential founded on the dynamic of learning centered on students and the possibility of integrate this software in their teaching and learning practices.

As referred, a lot of constraints occurred during the training and the professors who participated in the sessions had no opportunity to finish an ArguQuest learning episode in the platform. Only the 4 first steps of the platform were worked, until the discussion of the questions made about the topic proposed: “Quotes for the end of discrimination in Brazilian Education”.

However, after the training and thanks to the PDF of the interaction’s registration, it was possible to verify that the number of questions and their level of refinement was much bigger than in the other platforms. The fact that the sentence openers support the questions elaboration and that the system guides the participants in the formulation, discussion and refinement of questioning, is a valid way to improve the capacity of enrich questioning by filtering and converting it into a more suitable, complete, subtle and complex formulation.

As a matter of fact, these participants were grownups, educated, professors, and the level of questions in ArguQuest could be attributed to these reasons. Nevertheless, being adults, those participants are not informatics natives, so the platform and its interrelated parts could appear to them like complex and make them dismiss. It was exactly the contrary and the prove that, in this context, ArguQuest made them improve the questioning competence, is the comparison with the written interactions in skype and facebook.

Moreover the interaction between participants became richer, once there was an evolution from categories connected with “declarations of agreement” and “formulation of questions” to “clarify statements” with “proposals and negotiation” for “the knowledge construction”.

The software was also evaluated by the participants in the sessions, through a Likert scale questionnaire, and they all agreed that the platform was easy to use and operate with. They also stated that the users’ tutorials and the administrator of the projects were very helpful in understanding the functioning. Some of the constraints pointed out by the users, were about the lack of time to work in the platform and to develop the project, as well as the fact that lots of colleagues didn’t show up which was not easily understandable for the present little group, because they found the platform very interesting and with plenty of possibilities for the teaching and learning procedures.

2.2 2nd Case Study

The second case study was lead in the context of a graduate students' master in the teaching of 1st and 2nd cycles of basic teaching, which means, 6 to 12 children teaching. The 15 graduate students of the University of Aveiro, were attending the curricular unit "Integrated sciences didactics". Two of authors of this study were the professors of that unit. The discipline occurred during the second semester of 2013 and the data collection happened in March.

On the scope of the curricula contents, a project was beginning in ArguQuest platform under the topic of "Genetically Modified Organisms", "GMO". The problem/question was: Should we adopt in Portugal "GMO"?

The aims of the research study were to identify i) the perception of users about ArguQuest and its impact to promote questioning and arguing skills; ii) the promotion of critical thinking thought the discussion in ArguQuest and iii) the evolution of argumentative and questioning skills.

The methodology used in this bLearning specific case was a qualitative and exploratory one witch data were collected on the basis of a survey group interview and the scripts analyzes registered on the platform background with all movements of the intervenients, teachers, tutors and students.

The data were submitted to a content analysis based in categories of the questions and arguments formulated in both contexts: individual and dyad or group work, as well as the final product, the ArguQuest map which was moreover the target of a face to face debate.

The analyses of critical thinking was based in the several categories and moments [17] and they concluded that the categories the more used were connected to elementary and elaborated clarification, highlighting the capacity of analyses of arguments and the elaboration or answer to questions of clarification or challenging and to define terms or analyze definitions, in a first place.

It is a logical evolution that, while the discussion follows up, the students tend to turn to a more evaluative attitude, estimating the integrity and significance of deductions and making and evaluating value judgments. In the end they mainly took decisions and reformulate principles in an implicit and strategic way to obtain agreement within the dyad and the group and arrive to better results in the discussion and in the conceptual map they aim at developing in a rich schematically metaphorical representation.

In what the questions and arguments are concerned, the analyses of the growth of these competences was based in a SOLO (Structure of Observing Learning Outcome) adapted for this propose [12]. In this case study the first four dimensions of the hierarchy's levels in the capacity of understanding the contents' complexity were showed in different levels according to the development of the work and the progress of the dyads and group discussions.

The lower level, i) the pre-structural, that corresponds to very poor or usual questions; ii) the uni-structural, were questions and arguments establish basic relations with isolated contents; iii) the multi-structural , a more complex one were questions and arguments are connected to more than one content; iv) the relational,

were questions and arguments are mainly use to enlarge knowledge and relate the parts with the wholly domain in discussion. The last dimension related to v) abstraction allows to generalize knowledge and moreover to transfer it to new complex situations and problem solving.

In this use of ArguQuest the first four dimensions were verified in students reasoning and, as for the domains about critical thinking, the tendency of argumentation and questioning skills' use, was to deeper and deeper the organization and the complexity of inquiring, suggesting, retorting, reacting, refuting, agreeing augmented and turned into a more complex thinking and cognitive exercise with satisfactory outcomes.

3 Conclusions

The platform ArguQuest, despite the constrains showed in both situations, mainly connected with i) the lack of time to a better dedication to the projects developed which led to a poor use of some of the components and steps of the platform, namely the argumentative part, in the case of the first group, and the argumentative map, in the case of the last one, and ii) the technical problems due to bad internet connections, different time zones in the case of Brazil, and de the bugs still existent in the platform because of the novelty of this work interface in both cases, it has still proven to be a very stimulating interface to promote interaction and deeper skills and the richness of the discussions developed in both cases. Moreover it proves, mainly in the second case, that argumentation and questioning skills have a strong interaction and interdependence that promotes each other's development and refinement.

These studies confirm what recent studies by [14], stand for: argumentation is considered a verbal, social and rational activity, important to convince about the acceptability of ideas and statements, as well as questioning, which is also fundamental for the process of question-generation and for the use of quality questions, having the two competences a very important role in the training and development of critical thinking skills.

Moreover the two studies, developed in completely different contexts, reach conclusions similar to the ones found in literature, as questioning is considered a complementary process that supports argumentation by helping to stimulate cognitive disagreement [14]. When we think about other contexts, in areas where argumentation is highly demanded like philosophy, law, languages, marketing and publicity, we realize that those areas will gain with the use of such tools that help to develop transversal competencies to such different areas of knowledge.

In what further studies are concerned, a group of 25 Brazilian Chemistry teachers and professors are, in this moment, attending an internship in Aveiro's university where they are already using the platform for their course's report. In the first session, there was no technical problems and all the teachers began using ArguQuest easily so, the first conclusion, is that the platform is quite user friendly.

Another project that will take place during the second semester of the present school year consists in doing an experimental use of the platform with young

students, whose teachers are the undergraduates that were a part of the second study described in this paper. This experiment will allow to test the platform with the youngest and will also eventually help us to monitor how the first year teachers transfer their behavior, in what the use of the platform is concerned, from the role of students that they had, to the one of teachers, monitors and facilitators that they have this year.

Furthermore, the authors of ArguQuest expect the different testing contexts to foster a better perspective about the platform's strengths and weaknesses in order to improve its development in the future. Summing up, although it will take some time, we shall strive for a high quality product which should safeguard and guarantee excellent level learning processes able to promote argumentation, questioning and critical thinking competences effectively.

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