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Teachers' interactions in a virtual learning environment: A comprehensive approach

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Summary

The goal of studying interactions in online environments is to know the kind of interactions which take place in discussion forums. This article contains the results of an exploratory, descriptive research that analyzes, with both quantitative as well as qualitative approaches, a virtual learning environment for comprehensive teacher training in their whole: the course, the platform, the tutor's role, the exchanges between the tutor and the participating teachers in the discussion forum, analyzing those exchanges, to whom they are addressed and their collaborative or personal natures. Regarding this experience, the results show a positive evaluation for the course, the tutor's role and the platform; as to the interventions which arise between the tutor and the participants in an interactive context, at the beginning, the participants' interactions are personal, though, little by little, they become more collaborative.

Keywords

Virtual teacher training; analysis of virtual interactions; virtual environment for learning.

INTRODUCTION

As Information and Communication Technologies (ICTs) become more interactive and collaborative, we see the birth of new opportunities to create learning experiences relying on approaches based on interaction and collaboration. The use of the interactive potential of ICTs allows us to substitute methodological approaches which have been developing for a while in pedagogy. Most of these virtual

training systems, focused on collaborative work and construction of knowledge in a network, originate in theoretical frameworks built on the notion of constructivism, especially social constructivism.

Virtual Learning Environments (VLEs) are spaces relying on a system of communication through a computer, in order to facilitate interaction between the participants and the tutor. Such interaction is key in educational processes present in the social construction of knowledge (Garrison & Anderson, 2005). In an environment which encourages the construction of knowledge in a network, interactions are essential to achieve quality learnings (Schrire, 2006, Stacey & Rice, 2002). These virtual environments are used preferably in pre and postgrade formation, although they are starting to become valuable spaces to help in professional development, like continuous teacher training, making it necessary to analyze virtual interactions, in the particular context of the formation of that body of professionals. The research on interactions and collaborative work is done using different methods and reliability levels (De Wever et al. 2006).

This article features the results of an exploratory descriptive research which analyzes, with quantitative and qualitative approaches, the virtual learning environment for comprehensive teacher training: the course, the platform, the tutor's role and the interventions between the tutor and the teachers present at the discussion forum, examining the contents of those interventions, to whom they are addressed and their personal or collaborative nature.

ICTs and Communication

The impact of ICTs on communicative aspects is such that we call "Computer-Mediated Communication" to all instances of synchronous and asynchronous communications carried out through technological resources. Research has demonstrated that computer-mediated communication can affect communication models, organizational systems, identity and society as a whole Dahlberg (2004). These communicative instances facilitate agreeing on ideas, sharing, reflecting, developing cooperative and/or collaborative tasks, having feedback and guidance from the tutor (Cook, 2002; Nussbaum et al., 2004; Murphy et al., 1998). The correct insertion of these communication tools into learning and formation processes, when they are well assisted, can favor collaboration. The advantages of online collaborative learning are well-known, however, it is also clear that, due to a series of reasons, some implemented learning experiences have different degrees of success (Macdonald, 2003).

Among communicative tools, there are discussion forums (Computer-mediated Conference), an asynchronous communication mode that allows for a dialog based on written text (Ryan, et al., 2000). Discussion forums have a great potential to transform teaching-learning processes, allowing for group discussion and other participants' access to socialization and communication (Salmon, 2000; Harasim et al., 2000; Bates, 1995).

The use of discussion forums creates learning environments based on constructivist models of a socio-cultural nature, resulting in collaborative work and the construction of knowledge in a learning community. These communication tools play a key role by helping participants reduce a lack of interaction, typical of distance education, as there are more exchanges between the students and the

teacher, as well as between the students themselves (Ryan et al, 2000, Salmon 200; Wallace, 2001). Interactions in virtual environments are fundamental to generate formation instances based on computer-supported collaborative learning (CSCL).

Virtual interactions

ICTs offer ways that ease and enable communication, but this sometimes occurs at a level of participation which does not mean interaction. It is necessary to establish a difference between these two concepts as sometimes they are understood as being synonyms. "*Whereas by participation we understand the presence and virtual contribution of the teacher's, but above all of the student's, the interaction adds the reply and the chain of mutual understandings realized through the language*" (Barberá & Badia, 2004, p.26). The interaction is vital for the construction of knowledge through the exchange of messages with other participants and the tutor, revolving around the topics discussed, messages which are, initially, built from the personal experience, and, later, enriched with other people's contributions. In contrast, the participation only supposes a simple "being there and intervene"; it does not require a reply or encourages one, necessarily. Several studies have shown that a great deal of the messages exchanged in discussion forums are mostly situated at the level of participation than interaction (Cabero, 2004). We need to relocate virtual interaction within completely psychopedagogical coordinates, so as to improve the processes of teaching and learning in virtual environments (Barberá & Badia, 2004).

Technologies facilitate interactions which are relevant for virtual teaching and learning processes, as they foster collaboration and the social construction of knowledge, key factors to achieve quality learnings (García Aretio, 2003; Stacey & Rice, 2002; Schire, 2006). The communicative potential of ICTs incorporates the decisive feature of the formal educational model: interaction between teachers, students and contents (Garrison & Anderson 2005). ICTs' communicative potential unites this learning modality with the positive impacts that interactions have had on the learning process of face-to-face environments, incorporating the merits of online interaction, too. However, we also have to bear in mind that technology itself does not create communication or learning (Gros, 2007).

Asynchronous interaction in virtual environments is different from that interaction occurring in a face-to-face class as the former has characteristics not seen in the latter; it is neither better or worse, it lacks some verbal aspects, but it has advantages in the gaining of time and space; certainly you lose on emotions but you win in permanence of contents. The time and space dimensions on which the interactions take place suggest different forms of support to construct knowledge (Barberà, & Badia, 2004).

Some factors affect the frequency and quality of the interaction in a virtual environment (Barberà, Badia & Momino, 2001). Such factors are grouped around 3 areas: the *teacher* whose highlights are the control and the skill, the help provided and his social presence; the *student* with his previous knowledge, the sense and meaning he gives to his task and the type of evaluation; the *task* with its characteristics, the size of the virtual classroom and the time involved. In more globalized training processes, or in multiculture countries, it is important to know and care for, from the discussion design and its later moderation, the students' cultural differences which sometimes are manifested in

discrepancies; their learning styles; their communicative styles and forms, social interaction and use of the language.

Among the successful features of asynchronous online learning environments, there are 3 factors which dramatically favor interaction: a transparent interface, an instructor who interacts often and constructively with the students, and a dynamic and appreciated discussion (Swan et al. 2000). The tutor's role is crucial for the success of an online training experience, for he has to operate on pedagogical, technical, social and management aspects. He has a major role as a moderator in a discussion which promotes collaborative learning within a learning community. Both the frequency and quality of interventions in a discussion forum are, to a great extent, the result of the teacher's role as a moderator (Berge, 1995; Salmon, 2000). Finally, the platform must stimulate interactions, providing differentiated spaces for social, pedagogical, technical and administrative actions (Pérez, 2004).

Interaction analysis

Analyzing the interactions produced in online discussion rooms aims at understanding how the teaching and learning process happens in a collaborative virtual environment. It is necessary to analyze online discussions to determine how it is that the social construction of knowledge is produced through them. *"So that collaborative learning processes are visible to the researchers, the interactions between participants must be available for careful study, and the researchers must be able to interpret them appropriately"* (Stahl 2002, 178 in Puntambekar & Luckin 2003).

In online discussion forums, the text that shows those interactions is digitally available for analysis from different viewpoints: the researchers', the teachers' themselves or for whomever develops these training experiences (Rourtko et.al, 2005; De Benito & Pérez, 2003; Naidu & Järvellä, 2006). Despite having those texts with interactions available in electronic format, their analysis is not trivial. It looks simple at the beginning, but it is a complex task: it takes time and needs clear theoretical and methodological frames (Rourtko et. al., 2005). A complex aspect in the analysis of virtual environment interactions is found in the need to establish analysis systems for the messages, so as to understand the interactions and how they are generated. The tools to evaluate the discourse produced in asynchronous interaction environments have had an interesting evolution, worth pointing out to understand the research methodology in this area (Gros, 2007).

To explain this type of interaction, especially the one going on between the students, between these and the teacher, either in a social or a cognitive context, several models have been developed to classify such interactions, built on the pedagogical conceptions their authors adhere to regarding online learning. In Gros & Silva (2006), there is a compilation of the main models, developed in the last 20 years, for the analysis of online interactions. Trying to explicit the pedagogical proposal they make, these are the analysed models: Bullen, Gunawardena and collaborators, Garrison and Anderson, Scardamalia and Bereiter, Järvelä and Häkkinen, among others. The proposed categorization models were created by different researchers or research groups. Those models were made from diverse theoretical frameworks: some of them are more explicit than others. In all of these studies there are varied alternatives, mainly in relation to the units of analysis being utilized, e.g. in some cases, they

chose topic units (Henri), in others, they analyze complete messages (Gunawardena), and in Jäverlä's case, the whole discussion constitutes the unit of analysis.

A revision and synthesis of the research on the online context interaction analysis concludes with the following results (Wallace 2003 en Marcelo & Perera, 2004):

- Researchers have been developing models for analyzing online teaching and learning by studying the records of online discussions. These models have incorporated variables related to cognitive and metacognitive social aspects. Some studies have tried to find out about the students' progress as to thought levels based on their online discussions.
- By using these models, the researchers have concluded that it is hard work for online teaching to take the students from the stage of sharing and exchanging ideas to the construction of knowledge. The students are willing to share ideas but not to deepen their knowledge through discussions.
- In online teaching, teachers take over different roles: they facilitate or moderate discussions, they give answers to individual students and to the class as a whole, they manage the flow of contents through homework, etcetera.
- There is plenty of evidence to highlight both the importance of social interaction as well as the teacher's presence in online courses.
- An online community is a most important variable in online teaching. But, even when the community may have an important role, not enough research has been done on how this is produced.

THE RESEARCH

In Chile, the Enlaces Network has made it possible for 88% of primary education centers and 85% of secondary education establishments to have access to IT; 82.5% of current teachers were trained to use ICT, especially in digital literacy programs and integration of ICT into school syllabuses (Enlaces, 2005). Starting from that base scenario, the Centro de Perfeccionamiento Experimentación e Investigaciones Pedagógicas (CPEIP) from Chile's Ministry of Education (MINEDUC) has carried out 5 massive distance teacher training experiences in fields like: maths, sciences and English (Arellano & Cerda, 2006). The evaluation made by the CPEIP on these experiences is very positive regarding the transcendence of the courses and the number of people who passed them. There is a deficit in interactive processes, as they have detected an individual process that does not use interactive spaces; teachers prefer face-to-face interactions (Borrero, 2006). In order to better interactions in online formation experiences, it is necessary to understand the way that interactive process develops.

That is why we decided to do research with this goal: to describe the interactions in a virtual learning environment for continuous primary school teacher training, considering the general opinion on the formation experience, the importance of the tutor's role, the use and evaluation of interactive spaces provided by the platform, and the characteristics of the tutor's and the participating teachers' interventions in the discussion forum. Specific goals:

- To know the opinion of the teachers who take part in the course: resources, attendance, factors, positive aspects and sections that need to be improved.
- To know the use and evaluation of participants in spaces of interaction provided by the course platform.
- To determine the opinion of participants on the tutor's role as a teacher and conductor in a discussion forum.
- To know and describe the interventions of the tutor and teachers participating in discussion forums.
- To determine the sort of interaction aimed at based on the messages published by the participants in the forums.
- To determine either the personal or collaborative nature of the interventions published by the participants in the forums.

THE EXPERIENCE

In 2005, at Universidad de Santiago's Centro Comenius, development a course denominated "Geometría.cl: Aprender Geometría Creando Soluciones" [Learning Geometry by Providing Solutions] was given to teachers who are in the second phase of Primary School. Such course was given in a b-learning mode and was funded by Chile's Ministry of Education. 786 teachers from all across the country took part in it (Silva, 2006). All the participants were subdivided into 26 subgroups of 30 teachers each.

The research was done by tracking one of those groups, constituted by 38 teachers who work in the second phase of primary education in the Chilean school system (fifth to eighth grades). From those teachers, 84.2% are female; 55.3% have more than 12 years' experience; 68.4% are general primary education teachers, so they do not have a specific formation in Maths; 84.2% work as in-room teachers. As to the use of ICTs, they have good use of Internet surfing, information searching and resources. However, their use of discussion or conversation spaces, like forums or discussion groups, is low or nil. 63.2% of the participating teachers have no experience of distance learning via Internet. Regarding the place where they connect to the platform, 63.2% does it from their homes and 73.7% from their schools.

The tutor in the group being tracked is a Secondary Education Maths teacher with a lot of experience. He has been a tutor in two previous courses and received positive comments from the participants. Within the experience's coordinating team, he was the tutors' tutor.

METHODOLOGY

To understand the process of interaction and construction of knowledge in a network, we need a comprehensive approach that allows the analysis of the several dimensions that come into play: interaction patterns; the characteristics of the discourse; how the process of construction of knowledge takes place and what the role of the teacher in the interventions is (Gros, 2007). The quantitative aspects provide data related to the number of sent messages, the topics in the interventions, the type of intervention, among others, and allows to have a general view of the amounts and flows of

interactions without having to go into the contents of them and the consequences on the students' work (Shire, 2006). It is necessary to analyze the interaction contents and how they are built. Only through a combination of quantitative and qualitative methods, the collaborative construction of knowledge in a network can be well studied (Hmelo-Silver, 2003; Puntambekar & Luckin, 2003).

In order to assess the results obtained from the study on interactions and the conclusions drawn from it, we used the *reliability* between the testers, that is, to what degree the different testers assign the same category to a given unit of analysis. This is a crucial aspect to give validity to the results obtained and the conclusions derived from them. Whenever a study on content analysis presents its reliability data, it will be possible for the research community to quote and use those findings and/or results with a scientific support. To measure reliability, one of the simplest and commonest methods is percentage agreement, which informs the number of agreements related to the total of analysis units categorized by both the researcher and the experts.

The work methodology used in the study (Table 1) featured both qualitative and quantitative elements to cover all the different aspects under inspection. These are developed at different stages in the study and involve several processes and roles.

Aspects	Methodological elements
Opinions from teachers participating in the experience 1. Evaluation of the Platform 2. Evaluation of course 3. Evaluation of Tutor's role.	<ul style="list-style-type: none"> • Building of questionnaire • Validation with Experts • Questionnaire at end of course, answered by the 34 participants. • Focus Group with 4 participants • Analysis of the information • Triangulation of the information
Quantification of participations	<ul style="list-style-type: none"> • Recording and quantification of interventions by teachers participating in interactive spaces • Recording and quantification of interventions between teachers and tutor participating in interactive spaces
Characterization of tutor's and participating teachers' interventions	<ul style="list-style-type: none"> • Definition of analysis categories for tutor's and participating teachers' interventions. • Validation of categories with experts • Categorization in the 3 intervention forums between tutor and participating teachers. • Validation with Experts in one of the forums. • Analysis of tutor's and participating teachers' interventions
Interaction of interventions and nature of texts.	<ul style="list-style-type: none"> • Definition of type of interventions: tutor, class or general. • Definition of nature of texts: personal or collaborative. • Those two tags were added to each teacher's intervention across the 3 forums.

Table 1: Methodological Aspects and methodologies used

Some instruments (validated by experts) were built to characterize the participating teachers and to collect their opinions on the course, the role of the tutor and the convenience, level of use and usefulness of interactive spaces. The first instrument was applied in the first face-to-face meeting attended to by the participants at the beginning of the course and before they moved on to the virtual

environment; the second instrument was applied at the end of the course in the third face-to-face meeting, after 14 weeks had passed.

The information collected from both the questionnaires and the platform was systematized and analyzed independently. It was triangled with the info obtained from the focus groups which were asked about aspects related to the course in general, the tutor's role, the use of interactive spaces, the interactions as well as the platform and its interactive spaces.

To quantify the tutor's and the participating teachers' interventions in the different interactive spaces provided by the course, we used the statistics rendered by the Moodle platform involving activities in such spaces.

To analyze the interventions by the tutor and the participants in the discussion forum, we considered as units of analysis: messages and topic units, that is to say, considering the whole message or a single unit of thought or idea extracted from a segment of the content in the intervention, prioritizing the detection of analysis units which refer to the same idea.

We built categories to analyse the tutor's interventions (Table 2) and the participants' (Table 3), using both deductive and inductive methods. To build the categories of analysis we used elements from the literature referred to the interactions and the role of the tutor in virtual learning environments, as well as the observation of the interventions in the experience being studied. We did not use protocols of existing categories, because they account for regulated areas in pre and post grade formation, thus are not apt for the context of this study: interactions between teachers. These categories were validated by experts so as to have a clear definition of them and their application at the moment of the categorization. For this aim, the experts received an instrument with the categories and examples of their application. The categories were validated with examples taken from the 3 forums.

Category	Description
Start of discussion	Introduction of topic and questions which will trigger the discussion.
Partial synthesis	Summary of what is being discussed, highlighting main contributions and putting forward new questions to redirect discussion
Final Synthesis	Summary of what is being discussed, highlighting main contributions, bringing topic to an end.
Justification	The participant is invited to give more details for the topics he is dealing with.
Applicability	There is a reflection on how the class work may contribute in the teacher's professional development
Exchange of experiences and information	Interventions meant to make the participants share their experiences and information which may be useful for other participants.
Orientation	Interventions that guide the participant in the class work and use of resources.
Feedback	Positive responses to the participant's interventions, congratulating him and encouraging him to continue working.

Table 2: Tutor's Interventions categories

Category	Description
Theoretical elements	Introduction of theoretical elements related to learning theories, cognitive bases related to the course contents.
Previous Experience	Intervention from their own teaching-practice related experiences or from the ones of other participating teachers'
Evaluation of course	Course is evaluated and commented on how this will influence professional growth.
Transfer into classroom	This refers to how the different aspect seen in the course are transferred to a classroom: activities, materials, teaching strategies, among others.
New training needs	This refers to the need to have further teacher training in the contents of the course, didactic strategies for the teaching of that course, and mastering and integrating ICT resources.
Structural problems	This refers to structural problems which hamper both teaching activities and the implementation of innovation. They do not depend directly on the teacher, e.g. lack of technological infrastructure, time, materials and support from managers.

Tabla 3: Participants' interventions categories

For the categorization of tutor's and participants' interventions one forum was picked and classified by both the researchers and experts, using, first, the *agreement percentage* as a reliability factor, which reached a mean of 72.2% for tutor's interventions and 69.7% for participants'. After contrasting the differences between the values, the reliability turned to *consensus percentage agreement*, reaching 80.3% for tutor's interventions and 78.3% for participants'. The other 2 forums were categorized independently by the researchers, first; then, starting from the criteria set by the experts' validation, they were categorized again to unify the categorization in the 3 forums.

An element which was worth considering, in the light of the analysis to the texts from the participants' interventions, was to whom the interventions were addressed and whether these constructions were personal or collaborative in nature. These two aspects were incorporated into each unit of analysis already categorized. To determine the type of interaction (Table 4), we considered the addressee of the intervention: tutor, class (a participant or everyone), or general. The first two take place in an interaction context, but the third does not, as it is not possible to determine an addressee.

Interaction type	Description	Some examples
Tutor	Interventions aimed at the tutor	<ul style="list-style-type: none"> • Dear teacher • Teacher • Ricardo (tutor's name) • Hello, Ricardo
Class	Interventions aimed at another participant or at the class group	<ul style="list-style-type: none"> • Dear colleagues • Colleagues • Dear Participant • I was very interested in your reflection... • I do not agree so much with you... • I think you are dead right... • As to Mr X's opinion...
General	Interventions where it is not possible to identify addressee	<ul style="list-style-type: none"> • Geometry has to be taught because... • I use ICTs for ... • I think it is important to use real material ...

Table 4: Type of interactions in the interventions by participating teachers

To determine the nature of interventions (Table 5), we considered whether they were made on the basis of personal arguments or based on the tutor’s or other participants’ previous participations. This way, we determined whether the intervention of the participating teacher was personal or collaborative.

Intervention	Description	Some examples
Personal	Interventions built from the personal domain, they do not take into consideration other participants’ interventions, are built on personal beliefs or experiences.	<ul style="list-style-type: none"> • I think • In my opinion • I believe • According to my experience • I guess • I Consider
Collaborative	Interventions built on the contributions from other participating teachers.	<ul style="list-style-type: none"> • As they have mentioned this earlier • I agree with Ms Y’s opinion... • I’ve read your intervention. I agree on ... • I disagree with Mr Z’s opinion... • I was about to give my opinion, but Mrs A has just spoken for me • I totally disagree with Mrs B’s opinion...

Table 5: Nature of participating teachers’ interventions

All of the intervention analysis-related qualitative aspects, based on the categorization of interventions from the tutor and participants, as well as the nature of interventions and their collaborative character, were made using ATLAS-TI qualitative analysis software. The results were made into tables which contain the existence of each category used on a general level or a forum level. In the same way, it was also possible to view the whole set of texts in a given category to find characteristic aspects in each category and link these with representative examples.

RESULTS

The main results of the study show: a positive evaluation of the course, the tutor’s role and the platform; the tutor’s interventions focus on favoring interaction; the participants’ interventions are mainly made from theory and practice; the greatest percentage of participants’ interventions happen in a context of interaction, either with the tutor or the group, though they center on the tutor; the participants’ interventions are principally personal ones, though gradually they become more collaborative. Next, you will see these results in more depth.

Course evaluation

As a way to evaluate the course, teachers were asked to give their opinions on several aspects of it, especially those connected with: the resources introduced and their usefulness in teachers’ tasks, the work methodology and feeling as part of a learning community that grows through collaborative work in a network.

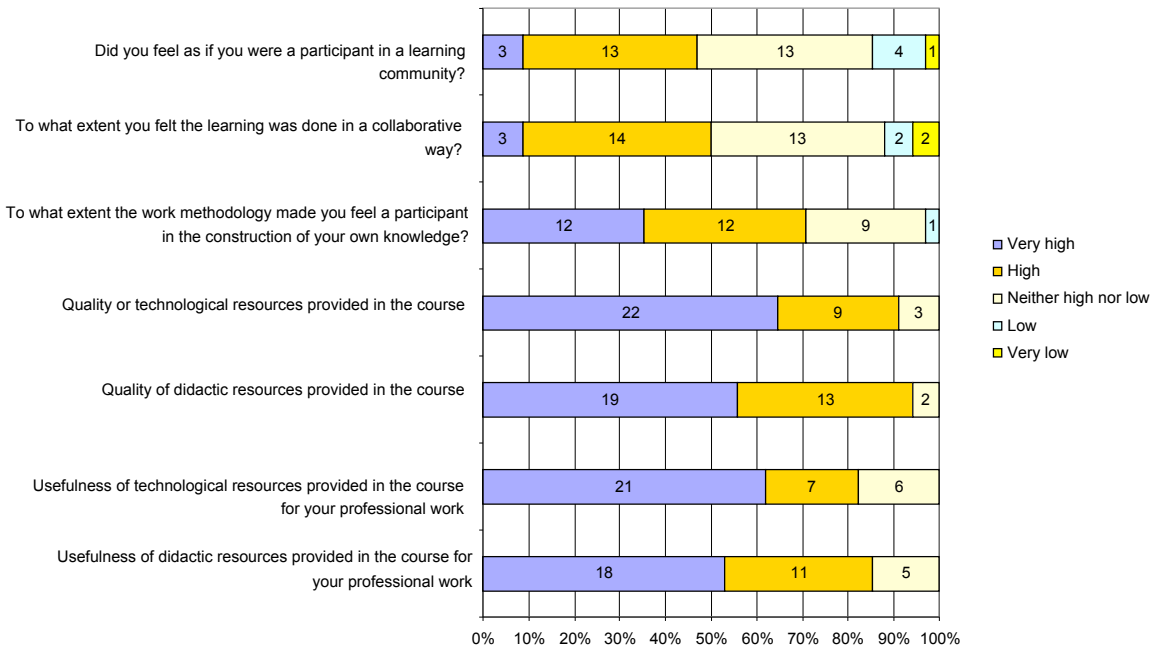


Figure 1: Course Evaluation

The factors which received the best evaluation were related with *the quality of teaching resources and the quality of technological resources* provided in the course: they were graded with 94.1% and 91.1%, respectively. Lower values were given to the *perception that the learning is done collaboratively and feeling as part of a learning community*: 47.1% and 50%, respectively.

The tutor's role

The tutor has an important role as a conductor in the discussion forum where he has to turn this into a space where knowledge is constructed, by interacting with participating teachers and facilitating the interaction among these. To determine how this component was perceived by the teachers, there was an evaluation on the students' level of agreement/disagreement regarding some tasks considered to be relevant when it comes to analyzing the tutor's behavior in discussions.

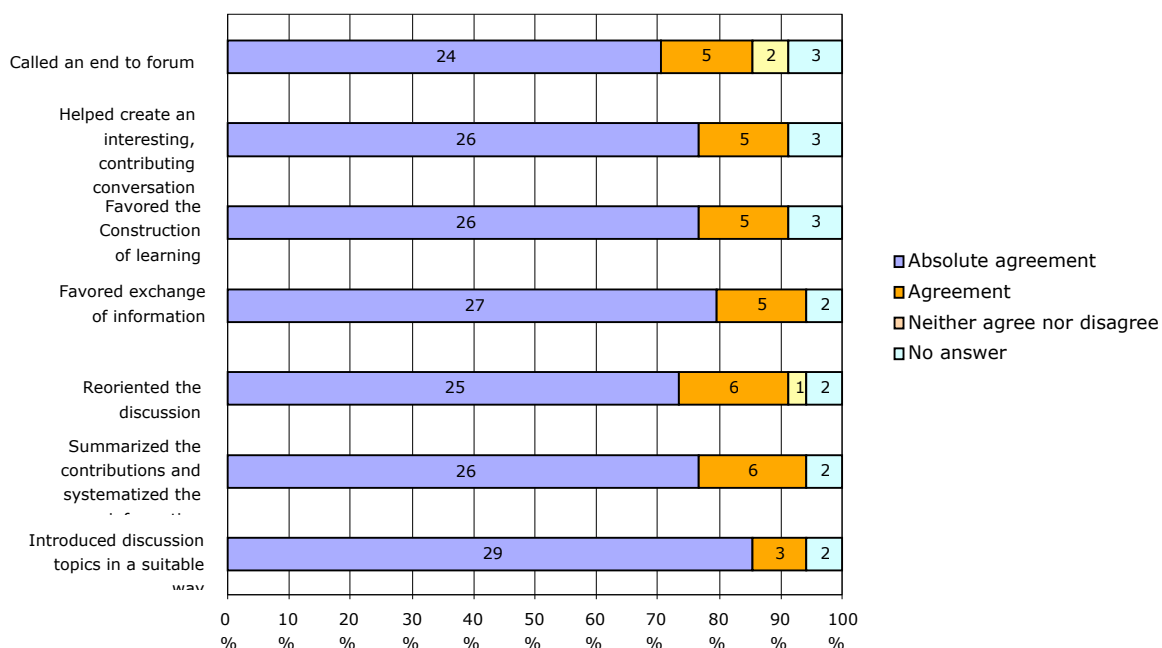


Figure 2: Evaluation of tutor’s role as moderator in forum

In all the items, high percentages show the teachers’ complete agreement or agreement with the statements. Aspects like *introduction of discussion topics, he summarized the contributions, he systematized the information* and *information exchange* reached 94.1% agreement. The lowest agreement was obtained in *calls end of session at the forum* with 85.2%. In the focus groups, its participants say: “clearly, he read the messages, as he knew Mrs A’s opinion, or quoted someone else, so you’d say he actually read it and is able to reply” (teacher 1). “He summarized everything, said “congratulations”, “nice job”, “I do share your views” (teacher 2); “He was always attentive and with a good disposition, trying to make you be involved” (teacher 3).

Platform Evaluation

A key factor in the success of the long distance courses is a platform which can be perceived as user friendly and easy to use (Pérez, 2004). Teachers were asked about different platform-related aspects.

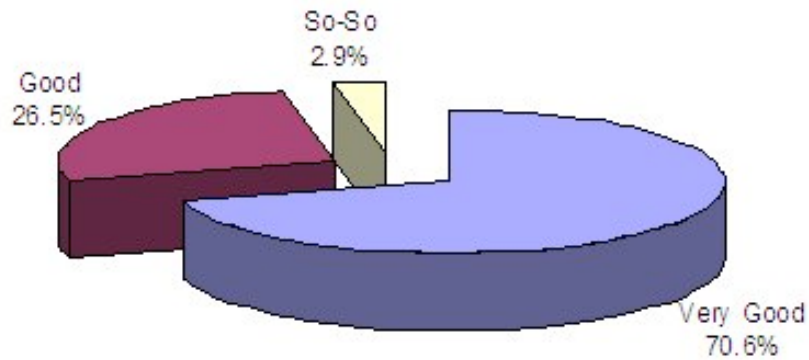


Figure 3: General evaluation of platform

Figure 3 shows that 97.1% of participating teachers find the course’s platform either good or very good; only 2.9% think it is so-so. Somehow, teachers appreciate the virtual work space which was designed in the course’s platform, its functionality and ease of use.

Quantification of Interventions

There are three stages in a discussion forum: topic introduction, making of summary and reorientation of discussion, and end and final synthesis.

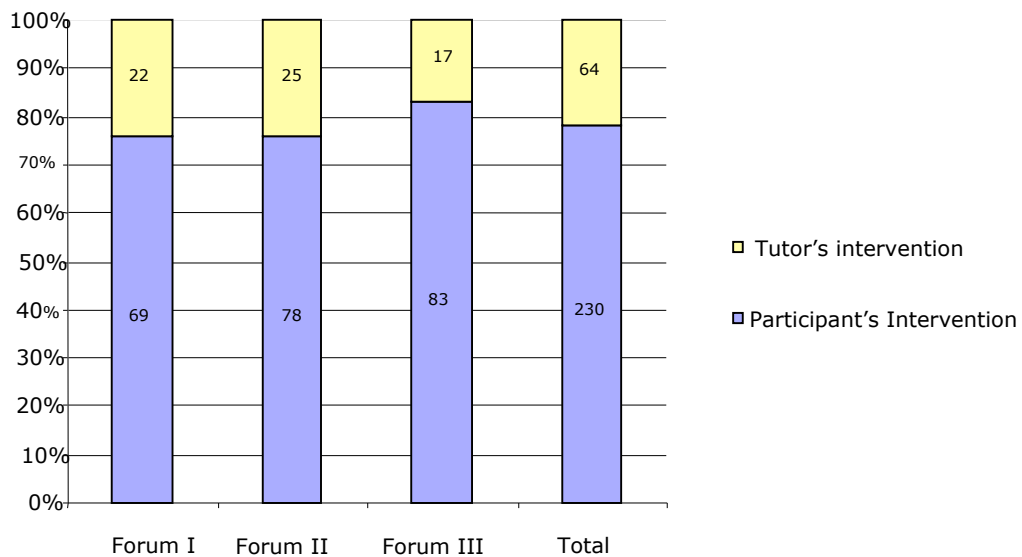


Figure 4: Interventions in Discussion Forums

In the three forums (Figure 4) there were 294 interventions altogether. From these, 78.2% were from participants, and 21.8%, from the tutor. The participants' interventions grow and the tutor's decrease as the forums develop. In general, the tutor's interventions do not go over the 25% of the total suggested in the literature.

Characterization of tutor's interventions in Discussion Forums

In general, in the 3 discussion forums, 67 tutor's interventions were classified under 73 categories; 8.2% of them (6) were given 2 categories.

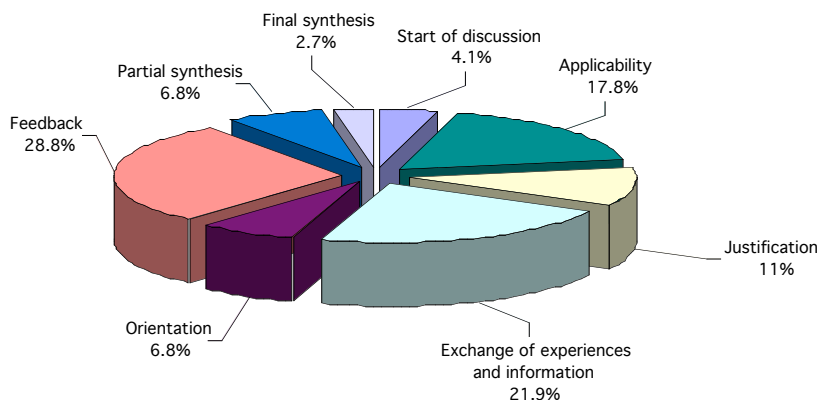


Figure 5: Categories of tutor's interventions

When analyzing the type of interventions (Figure 5), we can see there are 2 big families: the ones addressed to the class, found at the start of the discussion, the partial synthesis and the final summary, which make up for 13.7% of all interventions; the remaining 86.3% happen in the context of an interaction between the tutor and the participant.

The interventions addressed to the class group are not so numerous as they only happen once or twice in each forum. Thus, *start of the discussion* accounts for 4.1% _ there is an intervention at the beginning to introduce the discussion _ ; *partial synthesis* accounts for 6.8%; and to make a general summary to close the discussion, i.e. *final synthesis*, accounts for 2.7%. These categories are related to specific moments in the forum's moderation. They are interventions addressed to the class group, and in the cases of *start of debate* and *final synthesis*, they can occur once in each forum.

Interventions addressed at one participant arise in different ways in a forum; depending on its length they tend to be more frequent. Consequently, *feedback* in the form of congratulations and encouragement to keep on participating concentrates 28.8%; exchange of experience and information, 21.9%; *Applicability*, aiming at reflecting how the course work may contribute to the participant's professional growth, represents 17.8%; *Justification*, where the participant has to give arguments to support his interventions, 11%; *Orientation*, to lead the teacher through the different tasks in the course, 6.8%.

Categorization of participants' interventions

In general, in the 3 Discussion forums, 236 participants' interventions were categorized and 276 categories were assigned to them; 16.9% of interventions were given 2 categories.

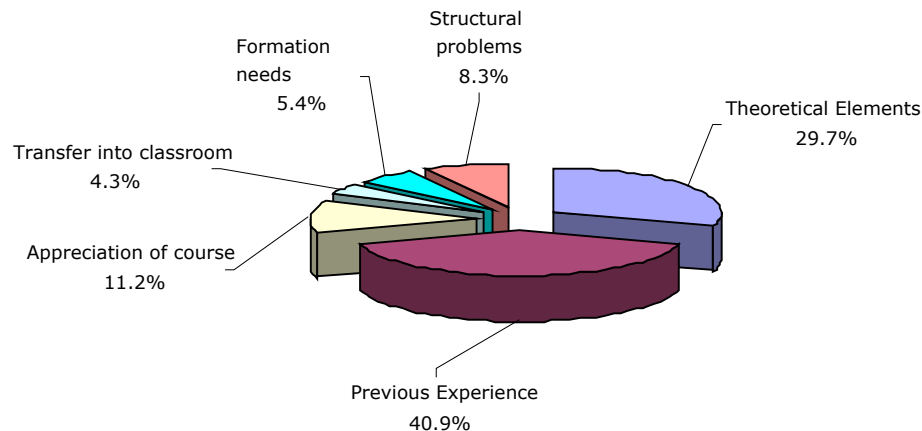


Figure 6: Categories of participants' interventions

When analyzing the categorization of participants' interventions in the 3 discussion forums (Figure 6), we can observe that the *Previous Experience* and *Theoretical Elements* categories concentrate most of the participants' interventions with 40.9% and 29.7%, respectively. These 2 categories make up 70.6%, so the bulk of the teachers' discourse is built on either their previous teaching experience or on theoretical elements, aspects which allow teachers to give a basis to their interventions which, in turn, inform about the teachers' firm beliefs and ideas. The *Course Evaluation* category shows 11.2%. This category is related with the effects of the course on the teacher training, from the dimension of methodological changes, management of contents, incorporation of different resources and the experience to be trained with peers in a virtual environment.

There is a group of 3 categories which present percentages below 10%. This is the case of *Structural Problems* (8.4%), related to difficulties found within the educational system: lack of time, shortage of materials or being unable to afford technology, as well as problems connected with the actual practice of being a teacher; *Formation Needs* (5.4%), dealing with the teachers' detection of needs to access training for improving their knowledge on how to manage contents and be given new teaching approaches. Those two categories have a direct impact on current teaching practices; *Transfer into Classroom* (4.3%) has to do with transferring of course proposals into the classroom: activities, materials and resources. This is also reflected in proposed approaches. There are Concrete Transfers and there is also Planning of the Transfer.

Type of interaction

To identify the kind of interaction for an intervention, it was necessary to determine the intervention's addressee: either *tutor*; or *class*, which is for the class as a whole or for another participant; or *general*, interventions where it is impossible to determine an addressee. The first two happen in an

interaction context whereas the third one does not. In the first two, there is a clear intention to interact with the tutor or with a classmate or with the class, approaching the addressee either directly or indirectly.

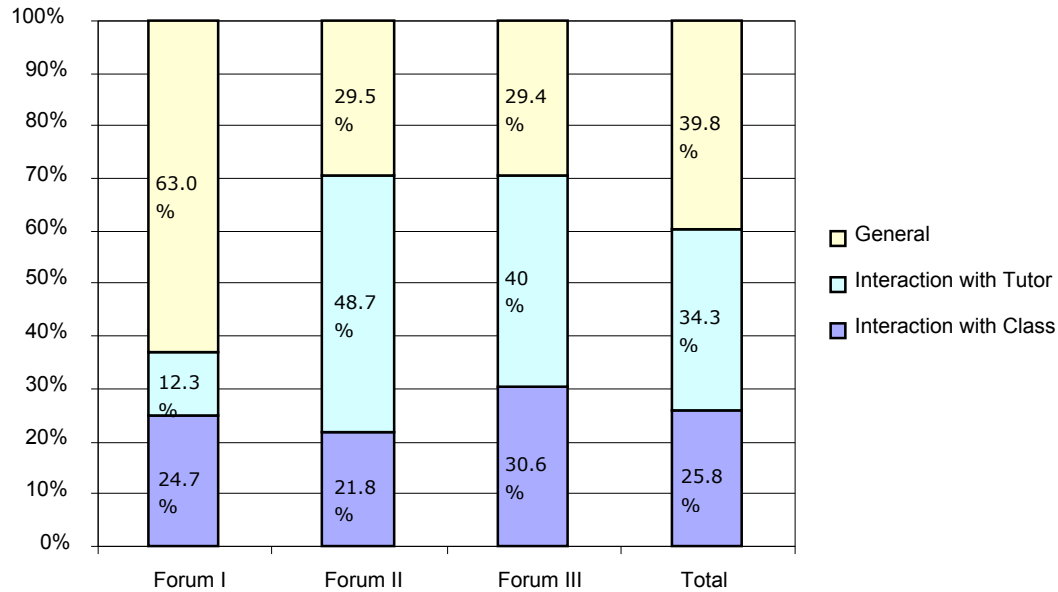


Figure 7: Type of interaction

On a global level, Figure 7 shows that 60.1% of all the interventions happen in an interaction context _ with the tutor or the class _, the remaining 39.8% of interventions are general. Interactions with the tutor represent 34.3% of the total. We can also observe there are two ways to address the tutor: either using his name, "Ricardo", or as "Teacher". In no intervention he is called "Tutor".

Interactions with the class represent 25.8% of the total. They could be classified in 2 big families: the ones in which the other person or the class is directly mentioned, and the ones which do not name the receiver, although we can clearly understand they refer to a specific participant or to the class.

Nature of Interventions

An additional approach on the interventions has to do with their nature: *personal*, based on personal arguments, unrelated to previous interventions; and *collective*, triggered by other participants' previous interventions.

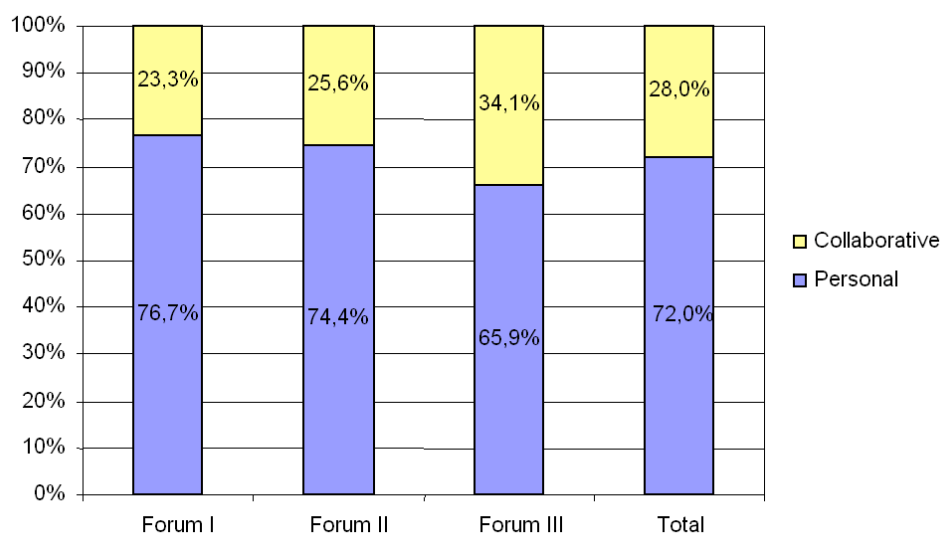


Figure 8: Nature of interventions

Generally speaking, 72% of participants’ interventions are personal and only 28% collaborative. But we can see that there is a growing tendency for the latter in forums. Collaborative interventions allude to some other participant’s previous contribution.

CONCLUSIONS

The participants appreciate the course in general and its different aspects, as well as the materials, the contents and the varied resources provided. They recognize its usefulness for their teaching work and its possible transfer into a classroom. The least valued aspects deal with a perception to build knowledge collaboratively and feeling as part of a learning community. From this, we can conclude that teachers perceive the experience as more of a personal experience than a collaborative one.

The role of the tutor is key for the course’s success, as there is a very positive opinion on his operation as moderator and encourager in forums. The participants realize the tutor is actually reading their interventions, summarizing them and enlivening the discussion. The role of the tutor is rated very highly in social, technical and general management tasks, and in his presence as a moderator, too.

There are also very positive comments on the platform and the way interactive spaces are provided. Participants remark its ease of use, they find it friendly. The spaces are frequently used, and “useful” in their words. Providing differentiated spaces for discussions, sharing resources, clarifying doubts and interacting in free topics, as in the “social forum”, all assist to increase and organize interactions. When the participants were asked about the platform, they ended up talking about the course (a clear signal that the platform was invisible); it merged into a single element: the course.

The analysis approach which was used supposes a categorization process that implies a double analysis. Firstly, once the categories are established, the researcher must let them be studied by other experts in the area. Once they are analyzed and contrasted, the researcher has to analyze the

messages against those categories. There is a second level of contrast which incorporates the approach we propose, and it is about validating this second analysis level with experts. In other words, there is a validation of the categories and of their applications. This second validation level allows to secure a consensus on the application and interpretation of the data. In the research we did, as to tutor's interventions, there is an average consensual percentage agreement of 80.3%; in the case of participants' interventions, the average consensual percentage agreement was 78.3%. With these reliability values, we analyzed the 2 remaining forums to inform on the tutor's and participants' interactions at this teacher training experience.

The tutor's intervention categorization clearly depicts that most of his efforts go to favoring the interactions with the participants. However, there are some aspects which happen at specific times and are key for the discussion development: to start the discussion, to make a partial summary and to make the final summary. In the case of participants, their interventions spring from theoretical elements or from their teaching experiences.

From the perspective of interactions, the main percentage of interventions is interaction with either the tutor or with the group, either with all of this or with one participant. The level of interaction is growing from the first to the third forum. To study this type of interaction is fundamental, as there are several studies which report that the bulk of interactions is between the tutor and the participants, and there is not necessarily interaction between peers (Cabero 2004; Adrián, 2003). To inform on the nature of the intervention is crucial for understanding to what extent the teacher is involved with the group work in a virtual learning community, where he can make contributions with his personal interventions and can also benefit from the ones by other participating teachers'. These indicators also reflect the tracking of the development of the discussions held by participating teachers, for it is necessary to read the others' interventions to start building from them. The field literature shows that the interactions between peers goes up along with the course development, because there is more commitment to it and to the classmates (Lipponen, 2002; Macdonald, 2003).

One of the aims of these training experiences is the creation of learning communities where it is necessary to receive help from others to construct knowledge collaboratively. In this context, we have observed that the participants' interventions go from being personal, at the beginning, to being more collaborative. One of the aspects to highlight in the study of online discussions is the capacity to construct knowledge in a network (Harasim et al., 2000; Murphy et al., 1998; Salmon, 2000). But also many studies show that this collaboration is not easy and that it is common to find discussion forums built on personal contributions (Macdonald, 2003; Lipponen et al., 2002; Cabero, 2004).

No matter how many provisions are taken to favor interactions in virtual learning communities, we cannot disregard the teachers' cultural and social aspects as they may conceive their profession as an isolated activity, even within the same school. This is manifested in their interventions which are more personal than collaborative in nature. This tendency is modified, though, as the course unfolds.

Presumably, as the teachers use virtual communication spaces more systematically, the interventions will be more and better. It is recommendable that initial teacher training includes this type of learning experiences, because young people are better acquainted with an interactive culture.

This research presented concrete results as to the analysis of teachers' interactions in virtual environments. Starting from this work, new studies may be launched to know, for instance: what results could be obtained with teachers coming from subjects closer to the use of language? What happens with teachers in other countries? What would happen with students who are studying to be teachers as they are better inserted in a communicative culture which is encouraged by ICTs? In all these cases, are the proposed categories for analysis useful? Will there be a similar or different level of collaboration? Are there more personal or more collaborative constructions? The ones who interact and collaborate are many or just a few?

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