

ASSESSING PARTICIPATION IN ONLINE DISCUSSION FORUMS: A PROPOSAL FOR MULTIDIMENSIONAL ANALYSIS

EVALUACIÓN DE LA PARTICIPACIÓN EN FOROS DE DISCUSIÓN ONLINE. UNA PROPUESTA DE MULTIANÁLISIS

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El objetivo del presente trabajo es el de evaluar los foros de discusión de un curso de Especialista Universitario online sobre Tecnologías de la Información y la Comunicación de la Universidad de Alicante basándonos en la propuesta de análisis de Kay (2004). En este análisis es fundamental graficar la actividad de los foros para mostrar, una representación visual que facilite su estudio. La investigación ha permitido obtener resultados definitorios sobre la actividad del foro y ha aportado una propuesta de multianálisis en el ámbito de estudios sobre la evaluación de la participación en los ámbitos de comunicación definidos por los foros de discusión online.

Palabras clave: evaluación, aprendizaje en línea, comunicación interactiva, aprendizaje activo

This paper aims to assess the discussion forums being used in the programme Especialista Universitario online sobre Tecnologías de la Información y la Comunicación, taught at the University of Alicante, on the basis of the analysis model suggested by Kay (2004). In such a model, it is essential to represent graphically the forum activity so that the visual representation may improve analysis. This research has allowed reaching results which define the forum activity and has contributed with a proposal for multi analysis in the area of assessing participation in communication within online discussion forums.

Keywords: Education, E-learning, Interactive communication, Active learning

1. Introduction.

Discussion and debate forums constitute an excellent platform for learning through moderated interaction between equals (peer to peer) and are based on the idea of the student being the center of the learning

environment and oriented towards the development of critical thinking skills (Sahu, 2008). Peer to peer interactions provide a wide learning spectrum in which, besides the moderator's orientation, students are exposed to their colleagues' ideas and perspectives. The strength of these forums is based on

getting the student involved in learning activities, encouraging interaction between equals, allowing the student to play the major role in the (learning) process and the teacher that of the mediator-moderator of the activity (Sahu, 2008; Silva, 2004).

Thanks to this process, students internalize the orientations and guidelines of their more qualified colleagues when they write in a collaborative way (García & Perera, 2007). Even though student participation in a forum can be assessed in different ways, the authors agree that a more active participation does not necessarily imply a more insightful and collaborative learning, or a better quality of the interventions (Gros & Silva, 2006; Ornelas, 2007).

There are some disagreements regarding the use of discussion forums as a learning tool and their influence on achieving a significant learning. Some scholars consider them a ground-breaking tool and some others think their effective and significant use is minimal (Kay, 2006a). The main reason behind this divergence could be the lack of a solid and comprehensive tool to assess forums, which should be consistent, integral and based on theoretical concepts (Kay, 2006b).

Based on an extensive revision of previous research, Kay uses the following variables to assess traditional discussion forums: thread, position of the message within the thread, author (learner vs. educator), clarity of the subject field, time of publication, lapse of time since the previous message, number of times that a message has been read, number of words, main purpose, quality of the message, level of complexity of the subject, level of knowledge and level of usage and processing of external resources. All these variables have been put in conjunction in a table, and for each of them we have specified the possible

assessment values. These variables have proven to be effective in the assessment of the 12 key areas of discussion forum usage. Kay claims this type of metric is essential to improve our understanding of online discussion boards.

2. Methodology.

2.1. Research design.

This study has been developed with registered information from an activity carried out in the discussion forum of the Specialization Program on Applied ICT in Education taught at the University of Alicante and developed on the university's Eduonline platform. Because of its characteristics, the research is descriptive and does not intend to generalize results (Arias, 1999). The main aim is to use a predefined assessment tool in order to describe the activity in virtual discussion forums.

Using Kay's metric (2004 and 2006) to analyze virtual discussion forums, we have carried out the assessment in two parts: one dedicated to describe the forum using Kay's metric (and to understand the metric better, adapting it if necessary to a specific university environment) and to suggest a way of representing the forum's activity graphically. We have decided to use this metric and to perform a manual assessment. However, we haven't ruled out the possibility of developing a similar research study in the future performing a qualitative assessment (with tools such as AQUAD, NUD*IST, etc.)

2.2. Participants.

In order to carry out the investigation we have taken into account the total number of

students (N=17) and teachers (N=6) in the aforementioned Specialization Course. These participants have published a total number of 720 messages, out of which a representative sample has been selected.

The student group was formed by graduate students of different disciplines and occupations, from both a scientific and a humanities background, ranging from computer programmers or IT engineers to secondary school music teachers, social sciences teachers, or English and primary school teachers. Once the size of our sample was clear, we selected the items (messages) which were meant to be our object of analysis. The sampling has therefore been made in a non-probabilistic and unintentional way, following some criteria based on the revision of related bibliography.

The course is divided into topics and for each topic several discussion threads were suggested and developed. Based on this structure, we have selected arbitrarily one thread for each of the topics. The items selected are the ones which show a significant social learning based to the level of activity, student and teacher participation and number of active participants in the discussion (Kay, 2004).

2.3. Data collection.

The data has been obtained following two different procedures 1) logging into the online course and then entering the online discussion forum; 2) accessing Eduonline's database tables for this specific course. These tables include data about the topics, threads, number of messages, message sequencing within the thread, message author and message date, among others. Due to the point in time in which this study has been planned and developed,

we have not conducted any surveys as the analysis has been performed after the closure of the course.

The assessment has been carried out with two perspectives: a quantitative and a qualitative one. The data received about forum participation has been treated with Microsoft Excel in conjunction with SPSS Statistics 17.0 and Statistica 8.0 for the graphs.

2.4. Forum activity graph: a proposal for analysis.

When trying to represent the different interactions established in a discussion forum, there is an element which must be taken into account which acts as a unifier of the participant interaction. This element is the discussion thread. Therefore, taking as a starting point the article by Rallo and Gisbert (2008) and taking into account the importance of the thread in the current study, we suggest the following guidelines to construct the graphs which will to show visually the board's activity: (1) There are two types of nodes: Type 1: participant (user); type 2: thread; (2) All the nodes represented in the graph have at least one edge; (3) The type 1 nodes (user) are represented with an ellipsis or a round corner square; (4) The type 2 nodes (thread) are represented with a straight corner square; (5) The type 1 nodes (user) are labeled with the name of the user which might be either a student or a teacher. The type 2 nodes are labeled with the thread name, taken from the subject field, or the thread number, taken from its identification number in the original database; (6) Type 1 nodes and type 2 nodes are presented in a different colour so that they can be easily distinguished (optional). In this study the «student» participants are also different in colour from the «teachers» or

«tutors»; (7) If there is a connection between two different type 1 nodes this will be indicated through a type 2 node, which is to say – the users are interacting between themselves through the threads; (8) The edges are not directed and therefore the graph is not directed; (9) The size of the nodes (of both types) will increase with the number of edges which come to (or go out of) them. The nodes with more activity will therefore be bigger and will stand out visually; (10) User participation is measured by the number of edges in the node representing it. (11) The interest generated by the thread can be measured by its number of edges. The more edges there are in the node, the more interesting we can consider the thread to be, as it has stimulated more participation. There are different ways to indicate who started a thread: (1) Adding in the corresponding node the numbers of the threads started by that user; (2) Adding the tag «1» in the edge that connects the user to the thread. (3) The edges can be numbered with the participation order of the users in a particular thread. By doing this we will be able to track whenever a user took part in the discussion. Multiple posts by a user in the same thread can be represented as follows: (1) Each participation generates a new edge towards the thread; (2) An only edge is shown and we increase its thickness with the number of interventions; (3) A type 2 node (thread) with one edge represents a thread which did not get any replies; (4) The most “heavy” nodes are placed towards the centre of the graph (optional).

2.5. Forum content: the thread selection.

In order to analyze the forum by surveying the content of the posted messages, we have taken as a starting point the graphic

representations previously shown, from which we have selected the threads which seem to be more interesting according to the number of active participants and the number of messages published in it.

These selection criteria allow us to observe two different dimensions: when the criterion is the number of edges connected to a thread, that is to say, the amount of messages published, we can assess whether this discussion has been active or not. The bigger the number of messages, the more intense the activity is, and we can therefore say that the thread reflects the development of an interesting discussion. On the other hand, the number of participants which have taken part in a discussion comes to reflect a bigger (or smaller) social reach of a particular discussion. If the number of participants is big, the topic is considered of interest for a larger number of users which have wanted to take part in it and make a contribution. In any case, both dimensions can co-exist and, in fact, a thread with a high number of participants publishing a substantial amount of messages should be reflecting the personal and social growth of the group and the personal growth of its members, and should be an indication of a meaningful and notable discussion in its socio-educational dimension.

Another key element which has been taken into account is the «subject» field. Sometimes a thread with a more intense activity (higher number of edges) has only made a small contribution to the course. An example of this is the thread number 3991: the topic about mailing lists is the most active one (according to its number of edges: 8 messages) and the one with the highest number of participants involved ($n=5$), but the content of the discussion only serves to find an answer to a specific doubt about how to use a computer

application. Another negative aspect of this thread is the lack of a close up. One positive aspect about it, though, is related to its social dimension, as several students offered their help in order to solve another student's problem.

3. Results.

A total of 720 messages have been published (see Graph 1), distributed in 237 threads on about 15 topics ($M=15$, $SD=8.72$, $Min=5$, $Max=37$ threads per topic).

- The published messages (720 in total) are distributed between 15 topics and have an arithmetic average of 48 messages per topic ($SD=17.94$, $Min=14$, $Max=82$ messages per topic). The average thread length (measured by the number of messages in it) is 3 messages. The maximum thread length is 24 messages (on the topic of digital blackboards).

- The average word count per message is 91.64 ($SD=101.52$, $Min=1$ word and $Max=989$ words).

- The average response time to the messages is 3.39 days ($SD=10.71$; $Min=0$; $Max=73$). A total of 96 messages have been answered on the same day (13.33%) and a total

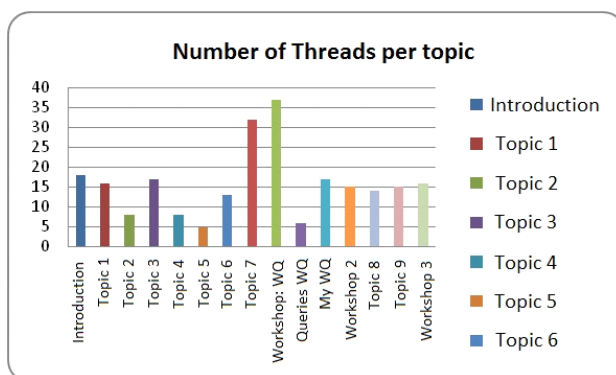
of 85 messages have been replied to the following day (11.80%). In some cases there has been an extreme response time such as 66, 79, 54 or even 118 days.

- The number of threads which have five or more messages is 34 (14.35%). In 48 threads (20.25%) the students and teachers have taken part more than once in the discussion, with a maximum of 7 comments made by the same person.

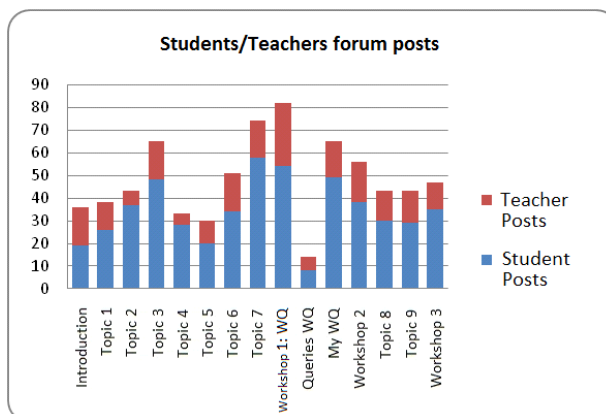
- The messages published by the teachers constitute a total of 29.63% of the messages and represent almost a third of the participation. The introductory topics to the course have a teacher participation rate of 47.22% and a topic about Webquest inquiries has a 42.86% (see Graph 2). The peculiarity of the presentation topic is that the teacher replies to each of threads started by students with a welcome message.

3.1. The forum seen through graphs.

Following the guidelines explained in the previous section we can represent graphically the discussion forum's activity, taking into account the more relevant elements: users, threads and the interrelations between them.



Graph 1. Number of threads per topic



Graph 2. Students/Teachers forum posts

The graphical representation of the threads in this particular forum has been created manually, but supported by a computer application. Therefore, we have generated the graphs in two stages: in the first stage we have revised every single course thread and have generated the first outlines manually, following the guidelines stated above. Then,

with the help of the tool *Cmap Tools* developed by the Institute for Human and Machine Cognition in Florida, we have digitalised the manually-created outlines. *Cmap Tools* is an application which allowed us to work with concept maps effectively.

These are some examples of the thread graphs:

Topic 0: Course welcome.

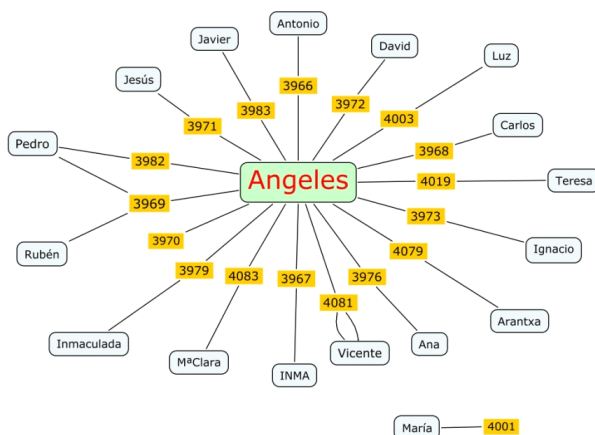


Figure 1. Forum participation - Topic 0

This activity involved posting a brief message in the forum about the student's foreknowledge and experience, etc. As we can see in Figure 1 this was basically a one to one interaction between each participant and the course tutor, whose answer was a *welcome message to the course*.

In this topic there is a very discreet teacher participation (see Figure 2), which can be interpreted as a positive strategy to let the students be the protagonists of the discussion and the learning. Moreover, a more interesting discussion structure can be noted due to the high number of students involved in the threads with a more active participation. We can also appreciate a possible trend – whoever starts the thread is usually the most active participant in the thread. It could be said that the users who start the threads feel in a way responsible for their evolution or that they might have to stand up for the ideas originally stated. After observing this diagram we could say that in this topic the threads play a fairly

bigger role than the participants.

In the topic about teacher roles, we can again appreciate an important participation of the moderators, and an interest in it from a part of the student group. Moreover, as we can see in Figure 3, three of the users involved in the discussion made up to 4 contributions to it. The rest of the threads are less outstanding. It is interesting to see in the graph the interaction between all the students, regardless of the threads that got no reply or were not very active. Practically all the students registered in the course were active in this topic, which makes it an illustrative example of social learning.

We can generally observe that the forum has been used a direct asynchronous communication tool between two interlocutors which also allowed the rest of the students to follow the discussion. When seen in the graphs, we can appreciate that there are very few threads with a discussion involving all the students actively.

Topic 2: ICT and education in the society of information.

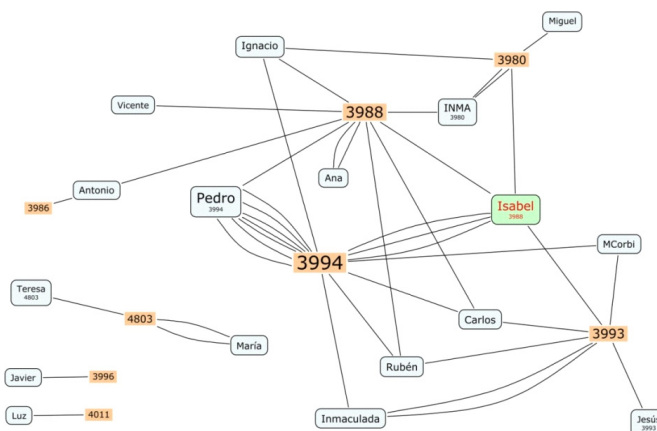


Figure 2. Forum participation - Topic 2

Topic 3: Functions, roles and competences in the current technological context.

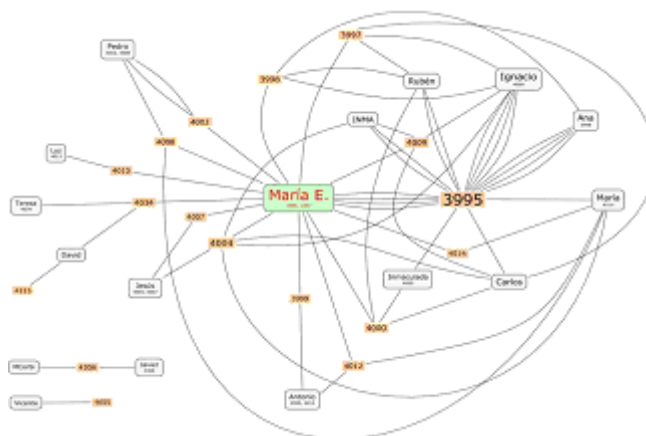


Figure 3. Forum participation - Topic 3

We must also emphasize that in most topics it was one of the teachers who participated more actively in the forum, taking part in almost every thread and leading, maybe excessively, the current discussion.

3.2. General analysis of the selected threads.

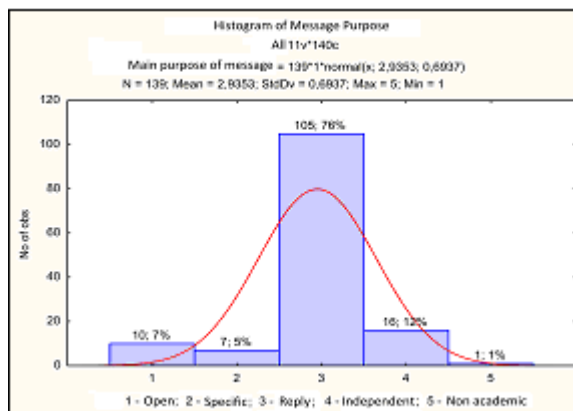
After carrying out an assessment of each of the selected threads, we have displayed the results in a table and have performed a brief general analysis.

Clarity of the Subject field: in most cases ($n=87$; $N=140$; 62%) the thread's subject field is not clear enough and is usually made up of two or less words. It seems to be a common pattern to use two words in the subject field which do not indicate clearly the content of the message: 13% ($n=18$) are somewhat clear, 19% ($n=27$) are quite clear and 6% ($n=8$) are very clear.

Main purpose of the message: (see Graph

3) following the pattern of the field «question easily answered by using other sources», 76% of the messages ($n=105$; $N=140$) are answers to questions asked at the start of the thread or to activities suggested as course material. 7% ($n=10$) of them are open response questions, presumably seeking an involvement in the activity of all the members in the group even though, regardless of the question's complexity, as we have seen in the previous section: 7 messages (5%) involved a student query about the discussion; 16 messages (12%) are independent and unrelated to the thread discussion and just one message (1%) of the ones under assessment has been a comment unrelated to the discussion and with no educational value. To sum up, practically all the messages were related to the course, regardless of their contribution (which we will discuss later).

New information added: almost half of the messages ($n=65$; $N=140$; 46%) do not add any new information to the discussion.



Graph 3. Main purpose of message (all of them)

Sometimes the messages are published in order to support or confirm something previously stated. Other times, once the discussion threads have become lengthy, the messages have become repetitive and have acquired a social dimension because of the use of greetings and anecdotes in them. These messages are usually related to the topic but they don't always add any new knowledge: 15 messages (11%) add some knowledge in an indirect way and 60 messages (43%), quite a considerable percentage, provide an answer to the questions or activities suggested.

Quality of the message: in 19 (14%) cases we haven't found in the table the conditions required for the messages to be assessed within the scale and there is no incorrect message: 20 messages (14%) provide some information which is not related to the discussion topic or to the course; almost half of the messages ($n=69$; 49%) are acceptable because they reply in some way to the question or to one of the suggested activities; 24 messages (17%) are valid because they respond to a part or to the whole thread question; only 8 messages (6%) are excellent

as they provide an answer in a clear and relevant manner and also add significant details. These excellent messages have been published by the teachers. On several occasions the questions and activities were open and they encouraged the students to give their opinion or reflect on their own experience. In such situations, the answers could be taken as correct, but depending on how pertinent they were and on the information they provided they were marked as either good or acceptable. Very few threads had specific questions, and that is why the assessment of this line should be considered to be very subjective and dependent on the experience and knowledge of the assessor.

Type of knowledge: due to the nature of many of the questions and activities, there is a high percentage (41%) of messages ($n=57$; $N=140$) which contribute with facts (anecdotes and comments with little elaboration, among others); however, 27% of the messages ($n=38$), are more elaborated and draw a connection between two or more facts; 9% ($n=13$) of the messages provide information about which procedure to follow

in order to carry out a specific task. These messages are generally replies to equally specific and punctual questions. Finally, a 12% ($n=17$) of the messages have been characterized as being metacognitive, because the students are reflecting on how to find a possible solution to a problem. This last result can be seen as a very positive aspect which suggests evidence of the students' ability to provide solutions.

External resources: in general terms links to external sources are rare in the messages ($n=97$; $N=140$; 69%). In some cases ($n=12$; 9%) the course information or a post written by a teacher is referred to; 16% ($n=23$) make reference to the information posted in another message; 3% ($n=4$) mention a website.

We can interpret this as a result of the teachers' having provided enough information to cover the topics, but it could also be a sign of the students either not being familiar with making references to external sources or not making the effort to do any further research on the topic beyond the information provided.

We must also take into account that some threads were asking the students to narrate their personal experiences with the use of ICT on their own work, while in other threads they had to comment on the material provided.

4. Discussion.

The metric suggested by Kay (2004) has been very useful in order to systematize the analysis of forum activity. Kay's guide is practical in nature and allowed us to structure our assessment, and to take into account many variables which are put into practice in threaded discussion forums. However, we had to make a prior revision and updating of the guide in order to define the variables that could

be assessed in the forum. Despite having ruled out some of these variables, by using Kay's guide we had to add the value NA (Does Not Apply) for some fields which did not apply to the messages under study. Even though the guide allowed us to systematize the analysis, it should be noted that the assessment of the content was at the discretion of the researcher. This manual task involved reading each and every thread message, assessing some of their characteristics and attributing different values to them according to Kay's table. In some cases the message was in the borderline diving the two categories, and the assessor had to lean towards one of the two options. There is a level of subjectivity in this task and it thoroughly depends on the assessor's interpretation of the guide and messages. Performing this work manually implies a substantial effort as the selected discussion messages have to be read several times in order to assess all the variables at play, and to determine in which category they should be placed in. At the beginning of the analysis the assessment is even more complicated as the assessor has not yet memorized all the indicators that allow evaluating the message according to the metric. This situation gets solved as soon as the forum assessment proceeds and it eventually evolves into a mechanical dynamic.

After carrying out this manual assessment, we consider of great importance the use of a measuring tool in order to organise and expedite the process. We also wonder how would the analysis be carried out if we were to emulate Ezeiza and Palacios (2009) and do it in a semiautomatic (or even automatic?) way using software tools such as NUD*IST or AQUAD.

One of the aims of the current study is to suggest –and we say this with all humility- a

good way of showing graphically the activity of a thread so as to facilitate its visual interpretation. In these graphs we can clearly see the more active threads, which threads outstand from the rest because of their activity, which user has taken part in a discussion, which threads didn't get any replies, etc.

All in all, the guide to turn data into graphs has been very useful in order to begin the forum analysis, but we recommend its revision and improvement, as well as encouraging its regular use in the analysis of virtual discussion boards. On this topic, we must also say that that even though *Cmap Tools*, the application used to generate the graphs, has been of great help, we consider it necessary to look into the creation of new software designed specifically for this purpose. A starting point in the creation of such a tool could be the analysis of the information registered in the database and using each register to create the structure of the graph automatically.

Generally speaking, and regarding the forum analysed, we would like to reflect on some interesting observations. First of all, we think the students haven't made the most of the learning possibilities which online forums can provide, as we have seen in the theoretical frame of this study. An average of three messages by thread is a considerably low number of messages. According to Kay (2004) social learning happens after the 5th message, and this situation has only happened in 14% of the discussions. It seems a common practice among the students to start a new thread every time they have a contribution to make, which implies that they have not been following the discussions closely. In general it can be perceived that the forum has been used as a direct asynchronous communication tool between two interlocutors, where the conversation can be

read by all the members of the group. When seen graphically, there are not many discussion threads in which every user gets actively involved.

Sometimes there is a very active teacher participation in the discussion. We must remember that the student should play the leading part in the learning process (García & Perera, 2007) and that the role of the tutor should be to stimulate the group, organizing the activities, motivating the students, creating and sustaining a pleasant discussion environment and facilitating the teaching-learning process (Silva, 2004).

The quality of the messages published (according to Kay's table) is overall «acceptable» (49%) and only 6% of them are excellent. Based on García and Perera (2007) this is not rare, as encouraging the students to share their ideas to build their knowledge through debate entails a considerable degree of difficulty.

We can also appreciate after having made the analysis with the graphs and the aid of Kay's metric that, as noted by Gros and Silva (2006) and Ornelas (2007), discussions with a more active participation are not necessarily the ones with a better quality. We can observe in this study after using Kay's metric that threads with an interesting participation didn't show any quality messages or arguments. In addition to this, many of the first messages in the threads were interesting and focused on the initial problem, while the rest were social commentaries and anecdotes (without taking into account the threads which involved narrating their personal experience with ICT in learning).

In any case, there are some examples in which the students have made the most of the forum's possibilities. In topic 2 (ICT and education in the information society), threads

3988 and 3994 are good examples of what social learning should be like, as it allows the student to play the leading role and to internalise the orientations and guidelines from the most able students when writing in a collaborative way (García & Perera, 2007). In these cases, the initial topic questions asked by the teacher have encouraged dialogue among students as well as social learning. Later on, the teacher has made a couple of interventions to keep the discussion active and to clarify some aspects so as to lead the conversation back to its original purpose. This could be read as the teacher allowing the students to be in charge of the conversation, always keeping track of its development but stepping back and making contributions only when necessary.

In order to make the best use of online discussion forums in the learning environment, it is advisable that the teachers and tutors should previously define the characteristics and the use they will make of the forum (inquiries, discussion, bulletin board, etc.) and plan in detail the topic that will be discussed in the forum, the orientation the discussion should be following and, most of all, where the discussion should lead to (conclusions and thread close up). This way the teacher will be able to guide and moderate the discussion and make the minimal interventions necessary in order for the students to be the ones who construct knowledge and be the key of the learning process.

On the other hand, it is recommended that students should lose fear to participate and cover the topics in depth. As we have mentioned before, according to García and Perera (2007) it is very difficult to make students go from sharing their ideas to building knowledge, and therefore the students should be aware of their

responsibility in the learning process and remember that the better the quality of their interventions in the discussions, the better results they will obtain.

We wouldn't want to bring this study to an end without remarking that communication is essential in the teaching-learning online processes. Beyond technology, it is human communication and the changes in the social interaction patterns which are the key (Roig, 2009). Taking this consideration as a starting point, discussion forums could then be valid tools in order to establish the necessary communications channels needed to achieve a significant learning.

5. Research funding sources.

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