ASSESSING MESSAGING ACTIVITY IN AN ONLINE DISCUSSION FORUM USING AN INNOVATION ADOPTION APPROACH

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Abstract: This paper aims is to validate which of the students, involved in this study, are in the initial and the majority market of adopters and also classify what type of messages do these different kind of students send when using an online discussion forum. One hundred and twelve students in a higher education context were involved in this research. This study is based on the categories proposed by Roger (2003) for the adoption of innovations theory, and by Mesquita (2007) proposal for the classification of messages. In terms of adoption of innovation we concluded that the first 16%, i.e., the initial market contains 14 respondents and the next 84%, which are those that belong to the market majority, consisted on 67 respondents. Regarding the number of messages sent by each kind of students in terms of innovation, we concluded that the students that belong to the initial market, sent more messages, in terms of the average messages sent, than the students that belong to the majority market.

1 INTRODUCTION

The use of computers in classrooms brought a significant change to the teaching and learning process, i.e., learning focuses more on the student's needs and knowledge, where teachers act as mentors rather than "talking heads" (a clear allusion to the prevalence of transmitting knowledge) in front of a live audience. This process of teaching and learning promotes an attitude of exploration and discovery and also where the access to education is transcended by the barriers of time and space (Geoghegan, 1994).

Information and communication technologies have already been integrated in our current education systems. Some teachers have adopted those technologies in classroom context, modifying the traditional education system, based on a board, chalk and a set of slides. However, there are still teachers who tend to resist to the new information and communication innovations.

Despite the potential that the information and communication technologies brought to our today's education, the use of these in schools have been shown as incoherent and in many cases, ineffective (Reinders, 2009).

One reason for this is the challenge for teachers to integrate technology into their classrooms. The use of technology in the classroom requires both pedagogical and technical knowledge and therefore a substantial investment of time and resources, both for the institution and teacher (Reinders, 2009).

The adoption of technologies for teaching and learning is an innovation that challenges the structure, culture and practice of universities and higher education institutions (Anderson et al., 1998).

The introduction of the information and communication technologies, by some teachers, in a given environment, has a long tradition of being based in knowledge transmission throughout a classroom, which can be seen as a classic case of a diffusion of innovation (Anderson et al., 1998).

Due to the increased use of information and communication in the context of higher education,

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we can see a growing use of online discussion forums by those involved in education (Meyer, 2004). Also, more recently, a number of Web 2.0 tools are in place. However, the use of online discussion forums can provide a number of advantages for the teacher

Also, online discussion forums have the advantage of leaving all that was discussed recorded to then be analyzed and discussed later (Meyer, 2004) – allowing the realization of studies like the one presented here.

The problem of evaluation, associated with the use of online discussion forums, has been a relevant aspect when instilled in the process of evaluating a particular course. Evaluation may be considered a very complex process leading to several questions and uncertainties for the evaluators.

2 EVALUATING ONLINE DISCUSSION FORUMS

Although the use of forums in the context of higher education is already widely used, some issues associated with its utilization arise, such as, what is its potential and how can we make its own evaluation.

The evaluation issue is quite complex and raises many questions and uncertainties to the evaluator. According to Santos (2003), this fact "... *certainly has to do with the meanings and concepts of assessment practices that each teacher has, as well as their own evaluative experience*" (Santos, 2000).

So what does the term "evaluate" mean? In the dictionary (Priberam, 2009) the term "evaluate" means "to determine the value of", "understand", "judge", "appreciate". Evaluating student's results is an understanding, appreciation and judgment of their work, by the teacher, using different set of instruments in order to determine a qualitative or quantitative value.

Another important issue, for this research, will be the evaluation of students participating in online discussion forums. There are a number of studies using various forms of assessment to get in use in online discussion forums (Drops, 2003, Mesquita, 2007, Meyer, 2004, Maor, 1998).

With the simple counting of posts of each participant in an online discussion forum, you cannot measure the quality of interactions. Moreover, we can state that quality is not synonymous with quantity (Drops, 2003).

Meyer used four different kinds of methods to analyze seventeen online forums of a doctoral program in order to validate its efficiency (Meyer, 2004). In particular, for the present study, we considered the approach proposed by (Mesquita, 2007), who follows a model that basically follows three steps:

Classify each message of each student as being significant or not significant. This is, messages like "Thank you", "until tomorrow", "Hello", are classified as non-significant and other messages that are related to the content of the topic in question are classified as significant.

Once each message has been classified, we should classify each one according to a scale of 1 to 3 (1 - Positive, 2 - Good, 3 - Very Good). Finally, calculate the number of meaningful messages through their multiplication factor, this is, multiply the number of messages with a classification of very good by three, multiply the messages with a classification of good by two and finally multiply the messages with a classification of positive by 1, adding in the end, all these components. After this operation is performed, it is necessary to convert these values to a qualitative classification. As for the conversion of these values we can use as basis, the student who has more meaningful messages, this will be awarded with 20 points and the others will use the direct proportionality. In this model, the student who has written more posts does not necessarily have better ratings than the student who has participated less.

This is the algorithm described by Mesquita (2007) that serves as the base for the current evaluation of the quality and the participation of the students in an online discussion forum. This approach assumes that we are in a collaborative learning environment and that the teacher has with him an evaluation grid in order to grade each of the messages of the various participants.

In conclusion, the formula follows:

Partial classification of the student = nrespx * ntipo1 + nrespx * ntipo2 + nrespx * ntipo3.

Where nrespx represents the number of significant responses and ntipo refers to a scale of 1 to 3 (1 - Positive, 2 - Good, 3 - Very Good)

The student's final grade is calculated on the basis of the student who has more meaningful messages (partial classification of the student) who will be awarded with 20 points and the other using the proportionality rule.

3 INNOVATION AND DIFFUSION IN TECHNOLOGY

The diffusion process can be understood as a communication of a innovation through certain channels over time among members of a social system. Diffusion is a special type of communication in which messages are perceived as new ideas (Rogers, 2003).

The decision of an innovation is not an instantaneous act, but a process that occurs over time and consists on a series of actions (Rogers, 2003): Knowledge, Persuasion, Decision, Implementation and Confirmation.

Users seek efficiency, reliability, low cost and convenience. Besides this, new customers enter the market as the technology matures. In the early stages the pioneers are willing to invest in new technology because they felt that the benefits exceeded the costs. Customers more conservative wait until the technology proves itself as being a reliable product (Norman, 1998).

The adoption of innovation has been a research subject studied by Everett M. Rogers, who identified the individuals in a range from innovators to laggards (Figure 1) (Rogers and Scott, 1997).

Individuals who adopt an innovation at different points over time, differ from one another in a series of social and psychological characteristics, which is their willingness to accept and adapt to the changes inherent in innovation, and determine the attitude of the next user (Geoghegan, 1994).

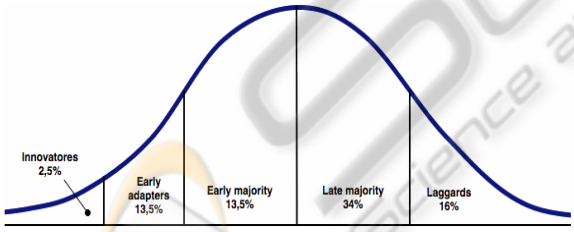

Figure 1: Categories of innovation (Rogers, 2003).

A successful innovation will be adopted by the members of these groups in order, starting with the innovators, followed by early adopters, early majority and the final and perhaps the laggards (Geoghegan, 1994).

Moore (2001) examined the issue of innovation adoption and stated that there is a "*break in the normal curve*", between the early adopters and the early majority.

Moore (2001) observes that there is a chasm between the innovators and the early adopters who are quick to appreciate the nature and benefits of new products, and the other categories, representing the rest of the adopters, these are people who want the benefits of new technologies, but they do not want to "experience" in all its complicated details. One can consider the transition between these two states difficult to achieve and time consuming.

More than anything else, this problem arises from the significant differences between the early adopters and the early majority (Geoghegan, 1994).

The crossing of the chasm means that when a product has just achieved great success in its initial release, it gains success at the initial market, but for this same product to be carried forward to the rest of the market it is required and extra effort and a radical transformation (Geoghegan, 1994).

This transition involves changes in the users habits, leading to an replacement of the existing ones (Moore, 2001).

While performance, reliability and cost of technology, is above the needs of customers, the market is dominated by the early adopters: those who need the technology and pay a high price to obtain it. But the vast majority of the customers belong to the early and late majority. These last two groups tend to expect that the technology has proven by itself, and insist on a good user experience and also a added value for them (Norman, 1998).

Our emerging markets and developed countries, are demanding more and more new adaptations and new continuous renewals, not only in times of difficulty, but also in order to have success (Moore, 2001).

To be able to cross the chasm, those responsible for the new technologies should listen to the customers and work with them, in order to take care of their concerns (Denning, 2001).

New technologies may never complete the cycle of adaptation of innovation, unless the marketing strategies are identified, in order to make innovations attractive to the early adopters, stabilizing after, for the first two groups of adopters and staying always in the final market (Elgort, 2005). (Geoghegan, 1994) identifies four factors that difficulties the crossing of the chasm (ignorance of the chasm; the alliance of technologists; separation of end market; and Absence of a compelling reason to adopt):

Also, (Geoghegan, 1994)) identifies four factors that might facilitate the crossing of the abyss (recognition; vertical orientation; convincing value; and Institutional commitment).

4 THE STUDY

This experiment was carried through, involving students from a university school. The main tool used was Google Groups, for this experiment. This section presents the carried through experiment, the data obtained, as well as the statistical procedures applied.

Previously to this study, a test with five students was done, to analyze the effectiveness of the survey. From this previous study, we concluded that some questions were ambiguous for the population studied.

The survey was passed through the Internet with the help of "LimeSurvey". The data collection was performed in the first week of November 2009.

The Instruments used were Google Groups, Google Docs and Facebook and a survey consisting on some questions, in order to classify the students in terms of innovation and also to measure the type of messages that these students send to a discussion forum.

4.1 Sample

This study intends to classify the students in terms of innovation and what is the quality of the responses given by the students. The data has been collected through one hundred and twelve surveys of students. The surveys have been submitted to a rigorous test, having not excluded any individual; therefore, the sample consisted on one hundred and twelve valid surveys. The criteria of exclusion of inquiries were: students who had not discriminated their sex or age in the survey; students with incoherent answers throughout the survey (e.g answers that always presented values in the extremities of the scales, or incompatible); students who left 80% of the survey in blank. Once, one hundred and twelve valid inquiries were obtained, the sample is considered sufficiently satisfactory.

4.2 Data Analysis

In order to classify the category of the respondents belonging to the initial market (innovators, early adopters) and the majority market (early majority, late majority and laggards), the scores of individual innovation developed by Anderson, Varnhagen and Campbell (1999) was used. This scoring process was developed based on the assumption that users of the initial market used the technology sooner and gained more experience when compared with the majority market (Anderson, et al., 1998). We used a scale (6 – none to 1 – Intensively) for each type of applications used (Google Docs, Google Groups and Facebook), before and after the completion of the project. The result is the sum of the six responses. The minimum value of total responses was 6, which would classify the most innovative. The maximum total number of answers would be 36, which would be the classification of the least innovative. The values of innovation were between16 and 31.

For the cumulative frequencies, we found that first 16%, i.e., the initial market contains 14 respondents. The next 84%, which are those that belong to the market majority, consists on 67 respondents. Those who belong to the latter group are those with the highest values, which mean they are less innovative than those belonging to the first 16% of the graph of cumulative frequencies.

4.2.1 Initial and Majority Market with Quality of the Messages

Relatively to the evaluation of the students for online discussion forums, we can concluded that there has been a total of 661 messages, where 238 where messages that has been classified as Very Good, 150 as Good, 203 as Positive and 70 of the messages has been classified as not significant, this is, these messages were considered not being valid for the discussion between the participants. Separating these messages for the students who have used do laptop and the desktop, we can reach to the conclusion that the students who have used the laptop have sent more messages (455) then the students who have used the desktop (136).

For the users who used the laptop, 185 were considered Very Good, 113 were Good, 157 classified as Positive and 45 classified as not significant. As for the users of the desktop, 53 were messages classified as Very Good, 37 classified as Good, 46 as Positive and 25 as not significant.

However, we need to consider the fact that the number of users using the laptop is greater than the number of the desktop users. As result, we provide in table 1 the average number of messages sent by each student for the laptop and desktop in order to allow a comparison based on relative numbers and taking into account the different dimension of the two groups.

As we can conclude from Table 1, the average number of messages sent by each student for the laptop is greater than for the desktop users.

Table 1: Average number of messages.

Average number of messages				
Nº	TWO[1]	MMW[2]	TW[3]	MMW[4]
81	455	5,617	938	11,58
31	136	4,38	279	9

[1] – Total without multiplication factor

[2] – Average messages without multiplication factor

[3] – Total with multiplication factor

[4] - Average messages with multiplication factor

When comparing the messages with the multiplication factor, sent by the students, belonging to the initial market and to the majority market (Table 2), it appears that students that belong to the initial market have sent less messages than the students that belong to the majority market.

Table 2: Number of messages/Innovation - (with multiplication factor).

	IM	MM
Nº messages (with multiplication factor)	189	749

Comparing the average number of messages with the multiplication factor, sent by the students (Table 3), belonging to the initial market and to the majority market, it appears that students that belong to the initial market have sent more messages than the students that belong to the majority market.

Table 3: Average number of messages/Innovation - (with multiplication factor).

	IM	MM
Average number of messages (with multiplication factor)	13.5	11.1

In Table 4 we can see the number of meaningful messages without their multiplication factor, having the majority market students sent more messages for the levels 1, 2 and 3 than the students that belong to the initial market.

5 CONCLUSIONS

In order to evaluate the potential of collaborative environments, it was performed an experiment involving higher education students. This study aims to classify our population in terms of innovation, using the scores for the individual innovation developed by Anderson, Varnhagen and Campbell, 1999. Another purpose of this study is to classify the type of messages sent by each of the different kind of users in terms of innovation (Very Good, Good, Positive and not significant).

Table 4: number of messages/Innovation - (without multiplication factor).

	IM			MM		
	3	2	1	3	2	1
Nº messages (without multiplication factor)	26	18	20	159	95	137
Average nº messages (without multiplication factor)	1.85	1.2	1.4	2.4	1.4	2

Despite the widespread use of collaborative environments today, there is a lack of reference to identify the advantages and disadvantages of these environments.

The analysis of data allows us to conclude that the majority of the students were males, had ages between sixteen and twenty four years and that most of the students have already used discussion forums.

For the case of the classification of innovation for the students, we verified that they had a set of scores that were in a range between 16 and 31.

Regarding the number of respondents in both groups of innovation (initial and majority market), the initial market contains 14 respondents while the majority market contains 67 respondents.

The research conducted can be further enhanced with more data and further services in order to deepen the promising findings already achieved, comparing mobile devices (laptop) and desktop use, within higher education institutions. This can provide further insight on how mobile devices can be used to enhance and empower learning initiatives for getting more users to become power users.

This report also proposed a formula that allows us to measure the quality of the interventions by the various participants in an online discussion forum. It can be considered, that this algorithm is one of the possible ways, among others, to assess the participation of online discussion forums.

To use this algorithm to evaluate a online discussion forum it is necessary that the evaluator has the following basic elements: a online discussion forum, a group of students that interact on the forum, a unique identifier for each participant, a set of messages sent by each of the participants and an evaluation grid, as described above, so that the evaluator can mark each intervention for each

participant. The analysis of data allows us to conclude that the students sent a total of 455 messages, being 185 were classified as Very Good, 113 Good, 157 classified as Positive and 45 classified as not significant. Considering the average number of messages, each user sent 5.617 messages.

Regarding the number of messages sent by each kind of students in terms of innovation, we concluded that the students that belong to the initial market, sent more messages, in terms of the average messages sent, of the students that belong to the majority market.

With these statements we can say that students, when using a collaborative environment, these kinds of environments, sends more messages classified as Very Good, Good and Positive than messages classified as not significant. Another conclusion is that the most innovative users send more messages than the other users.

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