ESTILOS DE USO DEL ESPACIO VIRTUAL DE ALUMNOS DE LA ENSEÑANZA SUPERIOR

STYLES OF USE OF THE VIRTUAL SPACE OF UNDERGRADUATE STUDENTS

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Resumen

Las Tecnologías de la Información y Comunicación (TIC) y más específicamente, la Internet, han traído nuevas formas de vivir la enseñanza y aprendizaje, tanto en la enseñanza presencial como en la enseñanza a distancia. Todavía, considerando que la enseñanza y el aprendizaje deben ser centrados en el alumno, se hace necesario identificar los estilos del uso del espacio virtual y desarrollar estrategias que tengan en cuenta esos estilos. Según Alonso y Gallego (2002), los estilos de aprendizaje son: activo, reflexivo, teórico y pragmático. Considerando estos estilos, se conceptualizaron los estilos del uso del espacio virtual, que Barros (2007) designa por: estilo del uso participativo en el espacio virtual, estilo de búsqueda y investigación, estilo de estructuración y planeamiento en el espacio virtual y estilo de acción concreta y producción en el espacio virtual. Con esta reflexión se evaluará la relación entre las modalidades de enseñanza presencial y a distancia de una muestra de alumnos de enseñanza superior y las variables uso de la Internet (años, frecuencia, sitio y objetivos del uso) y estilo de uso del espacio virtual. Los resultados obtenidos muestran que la mayoría de los sujetos utiliza la Internet todos los días, hace más de cinco años, en sus casas, para búsqueda de información. El estilo de uso del espacio virtual predominante es el estilo participativo.

Palabras-clave: Estilos de aprendizaje, Estilos de uso del espacio virtual, TIC

Abstract

Information and Communication Technologies (ICT), especially the Internet, have brought about new ways of living the teaching and learning process, both regarding on-site and distance learning. However, bearing in mind that the teaching and learning process should be centered in the learner, it is necessary to identify the student's style of use of the virtual space and to develop strategies which take these styles into account. According to Alonso & Gallego (2002), the learning styles are: active; reflective; theoretical; and pragmatic. Considering these styles, Barros (2007) conceptualized the styles of use of the virtual space and named them as follows: participatory style; search and research style; structuring and planning style; and concrete action and production style. Thus, this work intends to evaluate possible connections between on-site and distance learning modalities used by a sample of undergraduate students and the variables Internet use (number of years, frequency, location and aims of the use); and style of use of the virtual space. The results show that most of the

subjects use has the Internet on a daily basis, for more than five years, at home, and to search for information. The predominant style of use of the virtual space is the participatory style.

Keywords: Learning styles, Styles of use of the virtual space, ICT

1. INTRODUTION

Information and Communication Technologies (ICT), especially the Internet, have unlimited potential for the educational context. Amongst other possibilities, they enable to teach and learn in different ways, and define and redefine strategies depending on the students' needs and interests. A concern in defining teaching and learning strategies which could benefit from the potential of ICT, as well as from knowing students' learning styles, has driven many researchers to develop studies in the field of learning styles. Many of these research works are based on Keefe's definition of learning style "Los estilos de aprendizaje son los rasgos cognitivos, afectivos y fisiológicos, que sirven como indicadores relativamente estables, de como los discentes perciben, interaccionan y responden a sus ambientes de aprendizaje" (Keefe, 1988, cit. by Alonso, Gallego, & Honey, 2005, p. 48), as well as on the learning styles reported by Alonso & Gallego (2002): active, reflective, theoretical and pragmatic.

Following these theories, Barros has focused his attention on the way in which individuals use the virtual space. The studies revealed that the style of use of the virtual space is influenced by the learning style of each individual. Barros (2007) defined the types of use of the virtual space as follows: participatory style; search and research style; structuring and planning style, and concrete action and production style, associating each of these styles with the learning styles: active, reflective, theoretical and pragmatic.

Given the importance that the virtual space currently has in scientific, educational and social contexts, this article aims to identify the style of use of the virtual space of a sample of undergraduate students, and to look into possible connections between the variable learning modality (on-site or distance learning) and the variables Internet use and style of use of the virtual space.

What follows is the conceptualization of the styles of use of the virtual space, the methodology used, and the results obtained from the study.

2. STYLES OF USE OF THE VIRTUAL SPACE

The theory of learning styles greatly contributes to the development of the teaching and learning process, as it provides a range of perspectives on how to the learning process easier. It is a theory which, based on psychology, supports the arguments of diversity in the way of learning. We can also emphasize that there is a clear connection between this theory and ICT, as it covers the development of strategies which address all learning styles, including the use of digital technologies. By using technologies as well as the principles of the styles theory, it is possible to develop interfaces, tools, multimedia features and applications tailored to the students' preferences and interests.

Students succeed in environments which are related to their learning style (Mirasyedioglu & Peker, 2008).

As far as learning is concerned, different people may have different behaviors or combinations of behaviors. Students' performance in the teaching and learning context is reflected in very diverse behaviors when faced with proposals for task solving. While some argue that they must work individually, developing their autonomy and reflective ability, others prefer to work collaboratively, indicating different preferences and, consequently, different prevalent styles (Morais & Miranda, 2008).

Using the cornerstones of Alonso, Honey and Gallego's learning styles theory (2002) and considering them right, the theory of styles may provide us with many guidelines to understand how to learn and teach in the virtual space. These guidelines are: the emphasis on students' individuality; the emphasis on the methodological process and the expansion of evaluation procedures in the construction of the student's knowledge; the provision of multimedia applications that meet the individuals' learning needs; the improvement of learning opportunities in the online educational process; and the democratization of education. These claims are understood as we perceive that the theory of styles can provide guidelines regarding the way people learn and these guidelines can be used to understand the learning processes which use virtual spaces. Considering the student as the center of the teaching and learning process, the virtual space provides collaborative learning approaches in which learning is perceived as an active process in which students have the opportunity to build their own meanings about objects of knowledge, and to engage in contextualized activities with other colleagues, in a way that each group member shares and collaboratively develops knowledge, and makes sense of his own experience (Miranda, Morais & Dias, 2008).

Studies enable the perception that Barros's virtual space (2008) provides ways of learning which are different from the ways found in on-site learning. Meanwhile, learning styles displayed in the virtual space have characteristics which are perfectly identifiable within the paradigm of the virtual as well as its elements. Therefore, the studies carried out on this subject together with the theory of styles provide us with a profile of how people learn in the virtual space, as well as with ways to direct its didactic and pedagogical applications to the teaching and learning process.

According to research previously carried out by Barros (2012), the type of learning that occurs in the virtual space is one that starts with the search for data and information after a stimulus previously planned; after this search comes the organization of the material in a particular way, according to the development, organization, analysis and synthesis that the user performs, producing, simultaneously, a multimedia application of the tools available.

The learning in the virtual space involves a number of elements which involve the concept and the characteristics of the virtual. According to the analyzed bases of Lévy (1996), Horrocks (2004), Jones (2002), Woolgar (2002), Echeverria (1994), Hine (2003), Careaga (1996) and Hegel (1770-1831), it is possible to identify and summarize the following elements of the virtual space in the teaching and learning processes:

- The time and space which consists of elements such as differentiated time, differentiated space, continuous movement, constant updates, network, promptness, deterritorialization. These elements derive from the space and time features of the virtual space, its mutation and amplified dimension, which gives us the feeling of excessive speed and amount of innovation. This variable offers us several analysis criteria on the cognitive use of virtual space use;
- The language structured with elements from differentiated codes, communication speed, many communicating with many, hypertextuality, database, cyberculture and images. The language with its digital shape has come to represent a new way of thinking the contents. Besides, its virtualized expansion in a text may mean several texts at the same time, because of its hypertextual shape. The cyberculture produces a series of subliminal patterns which lead to the construction of behavior and action along with virtualized knowledge, trends and pleasures;
- The interaction is the individual's immersion, decentralization, relation subject-object-subject, social interaction and virtualization of the senses (hearing, touch and sight). Its action lies in the dimension of visual language, however, it currently means a visual tactile language and the senses are visualizing deeper dimensions through that experience;
- The easy access to knowledge is in the context of information and data, information mapping, information recovery, skills and abilities, non-linearity and transdisciplinarity.

Access to knowledge is currently beyond the common means, but it has been extended because information saw its value increased and is now a reference in the construction of knowledge. Furthermore, the mobilization of ideas and contexts has been considered as an essential skill, turning knowledge into guided action.
Based on these guiding elements of the virtual for education, and together with the theory of styles, the research carried out by Barros (2007) developed a tool that enables to identify the style of use of the virtual space.
This tool has been applied in several completed and undergoing research works whose results are interesting and enable to understand how people learn in the virtual space, thus, providing information to develop didactic strategies of online teaching and learning.
According to Barros (2012), the styles of use of the virtual space can be understood as levels of use of the applications and tools, online-based interfaces – among other features – in the search for information, in the planning and in the image. In this study, four trends of use of the virtual space have been categorized. They are as follows:

- *Participatory style of use of the virtual space.* It considers participation as a central element, in which the individual must have the ambiance of the space. Besides this, and in order to develop a learning process in the virtual space, they need methodologies and materials which enhance the contact with online groups, which require the search for online situations, the development of group works and forums, and which assigns actions to the developed materials.
- *Search and research style of use of the virtual space.* Its central element for the learning process is the need to do online research, search for information of all types and formats. This style was called search and research because the user learns throughout the search, selection and organization of the contents. The learning materials must be related to constructions and synthesis which involve the search of content.
- *Structuring and planning style of use of the virtual space.* Its central element for learning is the need to develop activities which value the applications to develop planning contents and activities. These activities must be based on theories related to what is being developed.
- *Concrete action and production style of use of the virtual space.* Its central element for learning is the need to develop online services and the speed of this process. Making something possible and available fast is one of the central axes of this style of use; using the virtual space as a space of action and production.

3. DESCRIPTION OF THE RESEARCH

Regarding the procedures, this research work can be classified as an enquiry research with quantitative features. Data was obtained from a survey carried out via the Internet.
In the statistical treatment of data we used the statistical IBM program SPSS (Statistical Package for Social Sciences) version 20.
The sample was obtained among a population of Portuguese undergraduate students, during the academic year 2011/2012. The sample consists of 147 subjects, 104 female and 43 male subjects.
Among the 147 students, 95 (64.6%) are enrolled in distance learning, and 52 (35.4%) in on-site learning degrees. The predominant degrees in which subjects are enrolled are: Social Sciences (31.3%), Education (29.3%), Management (28.6%), Other (7.5%), and did not indicate the course attended (3.4%).

The minimum age is 18 and the maximum is 65 years old, with an age mean of 35.4 years old, a median of 37 and a mode of 20 years old. Figure 1 represents the subjects' age distribution in classes.

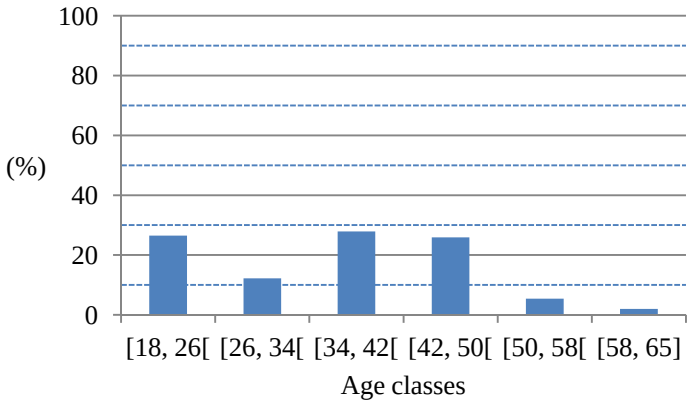

Figure1: Age distribution of the sample (n= 147)

By observing Figure 1, we verify that the sample is not homogeneous with regard to age; the amplitude of age variation is high; the difference between the minimum and the maximum age is 47 years. However, the majority of the subjects are less than 50 years old.

4. RESULTS OF THE SURVEY ON THE STYLE OF USE OF THE VIRTUAL SPACE

The results presented come from the answers to the survey on the use of the virtual space and the connection between the sample features and the dependent variables under study. Thus, we present descriptive data on the use of the Internet by all subjects in the sample, and we emphasize the connection between the learning modality of the subjects of the sample and the number of years, the frequency, the location and the aims of Internet use. We also present the sample distribution according to their styles of use of the virtual space.

4.1. Internet use by undergraduate students

For each of the dependent variables under study, we present tables with absolute and relative frequencies of occurrences according to the teaching methods, as well as the comparison of data distribution by applying the Mann-Whitney test. The Mann-Whitney test is the appropriate non-parametric test to compare the distribution functions of one variable, at least ordinal, measured in two independent samples (Maroco, 2010, p. 219).
Given the characteristics of the different learning modalities, on-site and distance learning, we compare data from on-site learning and distance learning students, which we called on-site group and distance group, respectively.
Table 1 shows the distribution of years of Internet use by on-site and distance learning students.

Table 1: Years of Internet use depending on the type of learning

Type of learning		Years of Internet use				Total
		"I do not know"	"2" or "3"	"4" or "5"	"more than 5"	
On-site learning	N	3	1	8	40	52
	%	5.8%	1.9%	15.4%	76.9%	100.0%
Distance Learning	N	1	3	17	74	95
	%	1.1%	3.2%	17.9%	77.9%	100.0%
Total	N	4	4	25	114	147
	%	2.7%	2.7%	17.0%	77.6%	100.0%

By observing Table 1, we see that most of the subjects have used the Internet for over 5 years (77.6%). Note that there are no students who have used the Internet for "0" or "1" years, and there are a few students who claim not to know the number of years that they have used the Internet for.
For data processing purposes, we agreed on naming the variable options *years of Internet use*, "I don't know", "2" or "3", "4" or "5" and "more than 5" for 1, 2, 3 and 4, respectively. Thus, as it was only possible to choose one of the options, the answer of each student assumes one of the values from the set {1, 2, 3, 4}. After checking the applicability conditions of the Mann-Whitney test and after its implementation, conclusions were that there are no significant differences (significance level under 0.05) between the distributions of years of Internet use among the on-site and the distance learning groups.
Table 2 follows with the presentation of the data concerning the frequency of Internet use in the two groups and in the sample as a whole.

Table 2: Frequency of Internet use depending on the type of learning

Type of learning		Frequency of Internet use			Total
		Several times per month	Several times per week	Every day	
On-site Learning	N	0	18	34	52
	%	.0%	34.6%	65.4%	100.0%
Distance Learning	N	2	7	86	95
	%	2.1%	7.4%	90.5%	100.0%
Total	N	2	25	120	147
	%	1.4%	17.0%	81.6%	100.0%

According to the data in Table 2, it appears that most of the subjects are using the Internet every day (81.6%). Only 1.4% of the subjects said to use it several times a month. The percentage of students who use the Internet every day is higher in distance learning than in on-site learning. After representing the fields "several times a month", "several times a week" and "every day" by 1, 2 and 3, respectively, and after applying the Mann-Whitney test, the results showed that there are significant differences (significance level under 0.05) between the distributions of frequency of Internet use between the group of subjects attending on-site learning and the group attending distance learning.

Table 3 presents the data about the place where undergraduate students are using the Internet.

Table 3: Places where students use the Internet

Type of learning		Places where students use the Internet			Total of students
		Home	University/Workplace	Other places	
On-site Learning	N	46	21	6	52
	%	88.5%	40.4%	11.5%	
Distance Learning	N	86	54	7	95
	%	90.5%	56.8%	7.4%	
Total	N	132	75	13	147
	%	89.8%	51%	8.8%	

As each answer admitted the possibility of choosing more than one option, 220 answers resulted from the 147 students' sample. By observing Table 3, we verify that among the sample of 147 subjects, 89.8% use the Internet at home, 51% use it at university or at work and 8.8% use it elsewhere. In both groups, most students use the Internet at home.
Table 4 presents the data about the aims of Internet use by undergraduate students.

Table 4: Aims of Internet use

Type of learning		Aims of Internet use					Total of students
		Communication	Entertainment	Search for information	Educational purposes	Work	
On-site Learning	N	33	20	37	29	20	52
	%	63.5%	38.5%	71.2%	55.8%	38.5%	
Distance Learning	N	54	30	77	75	64	95
	%	56.8%	31.6%	81.1%	78.9%	67.4%	
Total	N	87	50	114	104	84	147
	%	59.2%	34.0%	77.6%	70.7%	57.1%	

As each answer admitted the possibility of choosing more than one option, 439 answers resulted from the 147 students' sample.
Among the 147 subjects in the sample, 59.2% use the Internet to communicate, 34.0% for entertainment purposes, 77.6% to search for information, 70.7% for educational purposes and 57.1% use the Internet to work.
The most emphasized aim of Internet use is the search for information, both by the on-site group and by the distance learning group. The distance learning group emphasizes the educational and work aims more than the on-site group.

4.2. Styles of use of the virtual space of undergraduate students

The styles of use of the virtual space were obtained from the sample answers to 40 questions in the survey "style of use of the virtual space" developed by Barros and Garcia (2007). The survey consists of 40 statements, 10 regarding each style. In order to complete the survey, respondents are asked to tick the statements with which they agreed, in order to match such agreements with the manifestation of their style of use of the virtual space. The score of each subject in each style varies from zero to 10, with zero points when none of the options for this style was marked and 10 points when all the options have been assigned to that style. The four styles of use of the virtual space are: participatory style; search and research style; structuring and planning style; and concrete action and production style.

A summary of the data provided by the sample from the survey of the style of use of the virtual space is displayed in Table 5. Thus, we present the absolute frequencies and the relative frequencies obtained by the on-site group and by the distance learning group.

Table 5: Styles of use of the virtual space

Type of Learning	Participatory style		Search and research style		Structuring and planning style		Concrete action and production style		Total answers		Total of students
	n	%	n	%	n	%	n	%	n	%	
On-site Learning	204	31.0	175	26.6	156	23.7	124	18.8	659	36.7	52
Distance Learning	395	34.7	311	27.4	238	20.9	193	17.0	1137	63.3	95
Total answers	599	33.4	486	27.1	394	21.9	317	17.7	1796	100	147

According to the data obtained it appears that in both groups the participatory style of use of the virtual space is predominant. The concrete action and production style is the least evident in both groups.

Considering all the scores obtained by subjects in the sample in each style, we verify that the scores in the "participatory style" range from 1 to 10; in the "search and research style", from 0 to 9; in the "structuring and planning style", from 0 to 8; and in the "concrete action and production style", they range from 0 to 7. The average in each style is, respectively: 4.1, 3.3, 2.7 and 2.2.

Figure 2 presents a graphical representation of the trend of the sample profile regarding the styles of use of the virtual space.

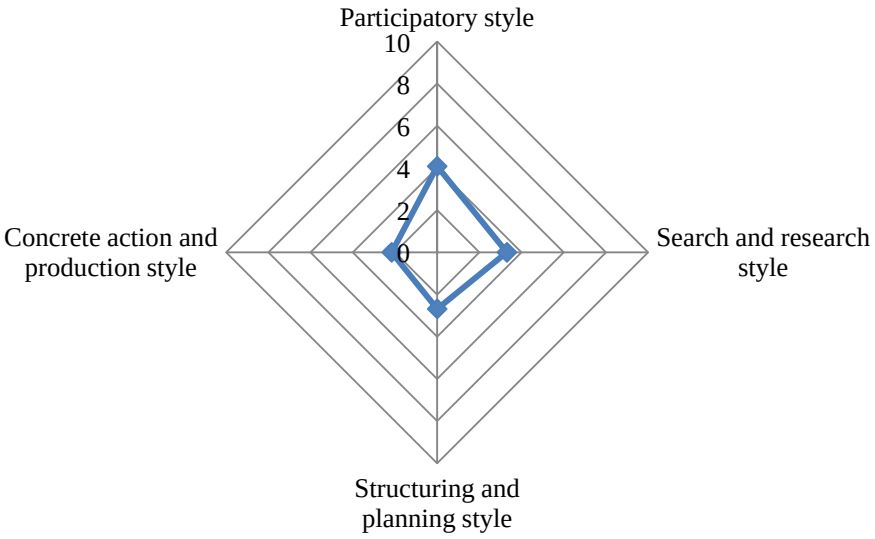

Figure 2: Representation of the profile of the style of use of the virtual space

The average scores of the on-site group and the distance learning group in each of the styles of use of the virtual space is shown in Table 6.

Table 6: Average scores obtained by students in each style

Type of learning	Participatory style	Search and research style	Structuring and planning style	Concrete action and production style
On-site Learning	3.9	3.4	3.0	2.4
Distance Learning	4.2	3.3	2.5	2.0
Total answers	4.1	3.3	2.7	2.2

Given the data presented in table 6, and assuming that the higher the skills to use the virtual space are, the higher the scores are, the results show that the average values in each style are very low, which means that there is still a long way to go so that undergraduate students can benefit from the potential of the virtual space.

5. CONCLUSIONS

The use of ICT in the educational context and the attempt to make the best of them considering the students' learning styles continues to be a challenge for which a variety of solutions are experimented. Thus, taking into account the characteristics of a sample of 147 undergraduate students and the study variables, the results of this study showed that:

- The majority of undergraduate students have used the Internet for over 5 years, with no significant differences between the years of Internet use by on-site students and distance learning students;
- The majority of undergraduate students use the Internet every day, with significant differences between on-site students and distance learning students;
- The places where the undergraduates use the Internet are at home, for the vast majority, and at university / work. There is a very small number who use the Internet elsewhere;
- The purposes of Internet use are assumed with different levels of importance, being the goal of "search for information" the one selected by the largest number of students, followed by "educational purposes ","communication", "work" and finally "entertainment".

With regard to the style of use of the virtual space, the results show that the most representative style is the participatory style, followed, according to representativeness, by the search and research style, the structuring and planning style, and the concrete action and production style.

The average scores obtained by the students for each style are low, which implies the need for further research on the styles of use of the virtual space, so that methodologies and resources can be defined according to the students' profile, thus enabling them to improve and fully benefit from the potential of virtual environments.

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