Computers in secondary school: analysis of student attitudes

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ABSTRACT

The attitude of students in secondary school towards educational informatics has been observed. A basic questionnaire and two attitude scales were applied to 142 males and 275 females, 417 students in all, between 12 and 18 years old. The main results were the following: most of the students had positive attitudes towards Educational Informatics (E.I.): they found it “useful”; the perceived skill in using personal computers is related with the attitude toward E.I.; knowledge of educational software knowledge induces a higher attitude score.

Main conference themes: informatics as study topic

Educational areas: secondary education

Study topics:

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INTRODUCTION

Present times show a transition from industrial society to information society. This change began with the sending of information by electronic methods, at the same time producing more information. From that moment on informatics acquired a main role in our society. If we consider education as the basis of a civilization, we should take into consideration the essential bond between education and computers.

Previously research was needed to establish a effective integration of transmitter (the teacher), receivers (students) and message (theme) so that introduction of computers into the classroom was not based on improvisation.

In the history of education four intellectual revolutions can be discerned. In the first experts took over the teaching of a group of children founding their teaching on initiation and traditional ceremonies brought over from parent to son. The introduction of the written word announced the arrival of the second revolution. The third was based on the invention of printing. And in our century we are witnessing the fourth revolution which is made possible by the technological advances of electronics technology and imposed by social directions of development of urban and industrial society [1].

In our view the attitude towards this new situation is very important, because it will make it easy or difficult to use the technology which we will employ.

ATTITUDES TOWARDS INFORMATICS: PREVIOUS RESEARCH

The attitudes towards the informatics environment are important subjects for many studies in several countries. Scientific research on this subject gives rise to the following conclusions:

Sex: Here we observe similarity and divergence. Both males and females are equally interested in technology and view computer knowledge as important for their academic achievements as well as for future employment [2]. Both groups show attitudes favourable towards computers [3]. Boys view computer knowledge as being more valuable for future employment than girls. On the other hand girls believe much interest in computers reflects loneliness and sexual identity problems [2].

Age: Little children (between 4 and 8 years old) are interested in the essence of computers (what is a computer?) and in what way these are similar or different from other things (toys, persons, other machines). Older children (between 8 and 10 years old) are interested in their control (how to use a computer)

Adolescents are more reflective. Their view a computer as a white paper on which to express personal expressions. The computer as a way of projection and construction [4].

Personality: The relationship between human beings and computers is depending on personality. Differences are not quantitative but qualitative. Knowledge of computers and computer skills are another factor of divergence. With an increase in this knowledge and skills also favourable attitude towards informatics [5] grows, as well as positive feelings towards computers [6]. Many tested people who do not have computer knowledge, show unfavourable attitudes towards computers; after they have begun using these computers, their attitudes change in to favourable [7].

Preferences: Students studying for nonhumanity careers have a better attitude towards computers than students who study for humanity careers [5]. Changes to more favourable attitudes are more significant in group teaching than in individual teaching [7].

Selfevaluation of skills: Those persons who believe themselves to be more competent in certain subjects, have more favourable attitudes to these subjects than others [8].

BASIC CONCEPTS

The study described in this paper investigates attitudes towards educational informatics.

Educational informatics is the integration of processing, conservation and transmission of information through automatic machines in the teaching-learning process.

Attitudes towards educational informatics are defined as long lasting structures of beliefs and cognition connected with favourable or unfavourable feelings (towards E.I. as a tool in the teaching-learning process) and as preparation for coherent action on the basis of this [9].

In secondary schools, as well as in the whole of society introduction of computers has an ambivalent character. In one way these are accepted as a just a result of technological advances, but at the same time these are received with anxiety and fear. This is mainly due to the way in which human relations and the relationship between teacher and students will take their place in such an informatized environment.

There are different opinions about the bond between attitude and behaviour. The question we ask ourselves is the following: Is certain behaviour the necessary consequence of a certain attitude? Or does an attitude influence human behaviour in a less direct way? One might say that those attitudes which arise from our own experience, are judged more reliable (about behaviour prediction) than others which are based on experiences of others [10].

Our view is that attitudes towards an object influence the responses we collect from it, but do not necessarily predict the concrete action which will be carried out [11]. However, attitude and behaviour are just two among other variables.

Objectives

In this research we had two aims:

- To describe the attitudes and opinions towards computers as tool of the teaching-learning process in secondary school (in a quantitative and a qualitative way).
- To analyze the influence of certain variables (such as: sex, computers at home, computer knowledge, courses of informatics and so on) on attitudes related to this subject.

METHOD

Instruments used

To collect information from students a questionnaire of 13 items was constructed (favourite subjects, computer knowledge, courses of informatics, computer at home, knowledge of educational software, selfevaluation of skills in computer usage (from 1 to 10).

Then other items were introduced with respect to the school: whether students have classes on computer usage at school or not, whether teachers use computer assisted learning methods or whether there are no computers in school.

We selected the attitudes scale towards educational informatics constructed by Rodriguez Feijóo and Stefani [12], but introduced some alterations for our own purposes. The 'running intervals' method was used as proposed by L. L. Thurstone. A scale of attitudes toward educational informatics consisting of 24 items was used; each could be placed at some point on the unfavourable-favourable attitudes scale which, from Thurstone's perspective, represents opinions symbolizing an attitude. This technique allows qualitative evaluation of the different aspects of attitudes.

Another method was also used based on the Semantic Differential proposed by Osgood. The method integrates 15 bipolar adjective scales for measuring three dimensions: evaluation, potential and activity. This scale supplies relevant information as well as a predicts of student performance.

Sample

The basic questionnaire and both scales of attitudes towards educational informatics were given to 417 students in the 12-18 age group from secondary schools. Of the sample 34.1% were male and 65.9% female. The sample was taken from private schools in Buenos Aires City and the students belonged to middle and middle to high economic and social level.

Statistical techniques

First a descriptive study of the sample was made with respect to the frequency and percentages of answers. Gender, informatics courses, computers at home and knowledge about computer use were interrelated. Chi-square was used as association test.

In order to compare the obtained scores the sample was divided in two subsamples according to gender, preferences of humanities or nonhumanity subjects. Then a comparative profile of the arithmetic mean was related to the different groups and to each of the 15 scales of bipolar adjectives of educational informatics.

Finally the arithmetic mean and the standard deviation were calculated from the subsamples: no computer courses at school, computer courses as optional subject and computer courses as obligatory subject; educational software knowledge; knowledge about computer use; computer as a learning tool.

Results and conclusions

Most of the students of the sample showed favourable attitudes towards educational informatics. According to the score obtained with the running intervals method those who had a score higher than 6.46 were considered to have a favourable attitude towards educational informatics (70.3%); those who had scores between 4.39 and 6.46 were considered neutral to E.I. (27.6%); those who had scores between 2.57 and 4.38 were considered to have unfavourable attitudes towards E.I. (1.7%).

The score obtained on the scale of the Semantic Differential method confirmed these findings (mean = 5.08 in a scale from 1 to 7).

Educational informatics was qualified by the following adjectives in order of importance:

Useful (83.7%), important (80.1%), necessary (79.6%), entertaining (78.9%), positive (75.3%), profitable (71.5%), powerful (68.3%), pleasant (62.4%), opportune (61.2%), rapid and complex (both 55.9%), unstable (51.3%), fertilizing (47.7%), consistent (46.3%) and deep (39.1%).

The survey also showed that gender has an influence on the following: computer courses, knowledge of computer use and a computer at home.

Of the group of students who knew how to use a computer 61.3% was male. Nearly 60% of the boys had a computer at home, but only 37.8% of the girls. Of the boys 43% would take computer courses outside school, only 9.1% of the girls.

Also there were differences between the scores in the attitudes scales between males and females. In the running intervals scale the scores of those two subsamples were nearly equal, but in the semantic differential scale males scored 5.33 and females 4.96.

We may suppose that boys have the greatest knowledge and familiarity with the use of computers, so we may say that gender influences indirectly influence the attitudes.

Research which has been done on mathematics, shows that skill is correlated with attitude [8]. Students who consider themselves more competent in a subject, have more favourable attitudes towards it. In this case the results are similar: those students who considered themselves more competent in computer use showed more favourable attitudes towards educational informatics (Table 1).

Table 1 Arithmetic means and standard deviations of scores of attitudes towards educational informatics: students of secondary school depending on selfevaluation of the ability to use a computer

	<i>Self-evaluation</i>		<i>t test</i>
	from 1 to 5	from 6 to 10	
Attitudes			
X	6.68	7.25	* 6.89
s	1.14	1.07	

* Level of significance: 1 %.

Something similar showed with students who had a computer at home. The degree of familiarity with the computer grew proportionally with selfevaluation: 59% who did not have a computer, scored themselves from 1 to 5, but those who had a computer at home (60.4%), scored themselves from 6 to 10.

With respect to preferences to other subjects there were more favourable attitudes towards informatics in those who chose nonhumanity subjects (mathematics, biology, physics and chemistry) than those who chose humanity subjects (art, literature, language, philosophy, psychology, geography and history) (Table 2).

Table 2 Arithmetic means and standard deviations of scores of attitudes towards educational informatics: students of secondary school depending on preferred subjects

<i>Thurstone's scale</i>			<i>t test</i>	<i>Osgood's scale</i>			<i>t test</i>
	Human	Non-human		Human	Non-human		
X	6.90	7.08		5.05	5.13		
			* 3.60				* 2.89
s	1.17	1.05		1.00	0.87		

* Level of significance: 1%

Although learning to use computers at school (computer as a study object) invites less favourable attitudes than computer assisted learning, the difference is not statistically significant. Students who do not take computer use courses, show more favourable attitudes than those who had this as an obligatory course (Table 3).

Table 3 Arithmetic means and standard deviations of scores of attitudes towards educational informatics: students of secondary school depending on learning of computer usage at school

<i>Thurstone's scale*</i>			<i>Osgood's scale*</i>		
	No learning	Obligatory	No learning	Obligatory	
X	7.01	6.99	5.19	4.98	
s	1.21	1.16	0.98	1.00	

* Tendency. Results are not statistically significant

On the other hand those who used computers as a tool for learning, showed more favourable attitudes (in both scales) than those who did not. The results were statistically significant (Table 4).

Only 26.9% of the whole sample said that they knew educational software, but most of the students pointed out items of software which were not specifically educational (text processors, data bases and so on).

Table 4 Arithmetic means and standard deviations of scores of attitudes towards educational informatics: students of secondary school depending on computer assisted learning

<i>Thurstone's scale</i>			<i>t test</i>	<i>Osgood's scale</i>			<i>t test</i>
	No	Yes		No	Yes		
X	6.88	7.10			4.97	5.26	
			* 4.26				* 5.45
s	1.20	1.03		0.93	1.03		

* Level of significance: 1%

This is evidence to the fact that students are ignorant about the resources they can use. Anyway, those who said that they did know, had more favourable attitudes than those who did not know this software (Table 5).

Table 5 Arithmetic means and standard deviations of scores of attitudes towards educational informatics: students of secondary school depending on educational software knowledge

<i>Educational software knowledge</i>			<i>t test</i>
Attitudes	No	Yes	
X	6.85	7.27	
			* 5.68
s	1.17	0.98	

* Level of significance: 1 %.

Finally we should mention the following, chosen by more than the 60% of the sample: "From first grades onwards we should use the computer as an essential tool for the learning-teaching process" (70%), "Although computers are sometimes dry stuff, these can teach you how to work in a methodical and systematic way" (66.9%), "With computers mathematics, languages and geography exercises become more quick and pleasant" (61.8%).

On the other hand a little group marked the following items: "Computer usage at school must be delayed to the future" (12%), "Computer assisted learning is only a fashion, then we will return to traditional methods" (11.5%) and only 9.6% agreed to this item: "If students learn how to use computers, they will be far from their parents".

We can group the items on the running intervals scale according to the different aspects these explore:

- educational aspect (quality, motivation and efficiency);
- technological aspect (impact of change and novelty);
- psychological aspect (relationship between computer users, other persons and the environment).

Most of the students in the survey seemed to be more worried about the first aspect (educational)—mainly because of student motivation and the efficiency of study. A less important aspect was the influence which this informatics environment could have on their relationship with other persons.

As a conclusion, we can state that the fear felt by many adults about the computer as a generator of negative changes in interpersonal relations, is not equally perceived by adolescents.

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