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Portuguese Student Teachers' Experiences, Perspectives and Expectations Regarding the Use of the Internet: The Impact of a Preservice Program.

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Abstract: This paper reports on one specific Portuguese university's student teachers' opinions, experiences, perspectives and expectations regarding Internet usage. Data was collected using a questionnaire which was anonymously answered by 189 student teachers from 9 different preservice programs. Some differences were found between males and females and between the diverse program groups concerning opinions about the Internet and how they use it and expect to use it in the future. Some reflections are made about the effectiveness of our students' technological preparation.

Introduction

The growth of the new information technologies and their spreading uses in education have been enormous. Educators' concern with mathematics teacher education (Grouws and Schultz, 1996) along with the increasing availability of both virtual information and modes of communication (Hughes and Hewson, 1998) led us to rethink mathematics teachers' pre-service education. Furthermore, as collaborative work (Wallace, Cederberg and Allen, 1994) as well as the use of technology (Balacheff and Kaput, 1996) have long become two of the focuses of the recommendations for mathematics teachers preparation and professional development, we cannot but envision its context within a framework of new information technologies. The avalanche of available resources on the Internet as well as one's access to it, is rapidly changing both one's views of a worldwide community and one's conceptions of Internet usage (Schrum and Lamb, 1997).

Making changes and breaking barriers require courage and creativity. This seems particularly true for the people responsible for teacher's in-service and pre-service education. The Internet seems to be the answer to the problem of finding and giving information, because it is easy and fast. However the large amount of available information brings new demands on the teachers for whom being able to select what is relevant becomes critical. Therefore the intervening agents in the teacher education process must contribute to open up perspectives so that students take advantage of all the information that is available, both in their lives and in their careers. In Portugal there has been research on the Internet usage in the context of both the mathematics classroom (Morais et al., 1999; Almeida et al., 2000; Ponte et al., 2001) and the professional development of teachers of mathematics (Ponte et al., 2001; Ponte, 2000; Miranda et al., 2001; Almeida et al., 2001; Almeida et al., 1999). However more has to be known about our students' Internet experiences and how they may influence their perspectives and expectations. Only with this knowledge may we seek further action into creating new learning communities as well as helping our prospective teachers to fully integrate them.

In this paper we will talk about one specific Portuguese university's student-teachers' experiences, perspectives and expectations on Internet usage.

Sample and Data Collection

Our data stem from a questionnaire for which there were 189 anonymous responses from our 2000/2001 academic year 360 entire student-teachers population. The sample's ages range from 22 to 44

with mean 24.74, mode and median both 23, and the third quartile 25. There were 159 females and 30 males distributed by a total of 9 pre-service education programs. Only 29 of the respondents reported having had previous teaching experience. From a total of 181 who reported having a computer at home, 92 say that they are connected to the Internet. Most schools where the student teachers do their teaching practice have computers and Internet which can both be used by teachers and students. Table 1 shows the distribution of students by pre-service programs and sex. There is 1 missing answer from a female student.

| Pre-service Education Programs | Females | | Males | | Total | |
|--------------------------------|---------|------|-------|-------|-------|------|
| | n | % | n | % | n | % |
| Biology and Geology | 18 | 11.4 | 1 | 3.3 | 19 | 10.1 |
| English and German | 18 | 11.4 | 1 | 3.3 | 19 | 10.1 |
| History | 11 | 7.0 | 4 | 13.03 | 15 | 8.0 |
| Mathematics | 40 | 25.3 | 12 | 40.0 | 52 | 27.7 |
| Physics and Chemistry | 20 | 12.7 | 7 | 23.3 | 27 | 14.4 |
| Portuguese | 10 | 6.3 | 1 | 3.3 | 11 | 5.9 |
| Portuguese and English | 22 | 13.9 | 1 | 3.3 | 23 | 12.2 |
| Portuguese and French | 8 | 5.1 | 1 | 3.3 | 9 | 4.8 |
| Portuguese and German | 11 | 7.0 | 2 | 6.7 | 13 | 6.9 |
| Total | 158* | 100 | 30 | 100 | 188 | 100 |

Table 1: Distribution of student teachers by pre-service programs and sex

During their 5-year pre-service education programs all prospective teachers have the same general education courses, along with courses specific to each program: *History and Philosophy of Education* in 1st year; *Psychology of Education* and *Pedagogical Practicum I (Teacher-pupil interaction analysis)* in 2nd year; *Educational Sociology, Curriculum Development and Teaching Models* and *Pedagogical Practicum II (Technology)* in 3rd year; *School Organization and Administration* in 4th year. As far as technology preparation is concerned, only the Mathematics and the Physics/Chemistry students have more than just the *Pedagogical Practicum II (Technology)*: Physics and Chemistry students also have an *Introduction to Informatics* course in their 1st year; the Mathematics Education students have an *Introduction to Programming* course in 1st year and *Informatics in Teaching* in 4th year. In their 4th year all students have a didactics course specific to their area.

What student teachers think and feel about the Internet

The student teachers answered a nine-item semantic questionnaire. In each item they were to indicate, on a five-point scale, their inclination (or neutrality) towards one of two opposite adjectives. For analysis purposes, items were code so that in each of them 1 is the most negative opinion and 5 the most positive opinion. Table 2 summarizes the results for the entire sample.

| The Internet is | N | Min. | Max. | Mode | Median | Mean | Std. Dev. |
|------------------------------|-----|------|------|------|--------|------|-----------|
| Boring -- Fun | 185 | 2 | 5 | 4 | 4.00 | 4.01 | .75 |
| Hard -- Easy | 184 | 1 | 5 | 4 | 4.00 | 3.53 | .97 |
| Useless -- Useful | 185 | 1 | 5 | 5 | 5.00 | 4.52 | .79 |
| Uninteresting -- Interesting | 186 | 1 | 5 | 5 | 5.00 | 4.39 | .75 |
| Complex -- Simple | 184 | 1 | 5 | 3 | 3.00 | 3.33 | 1.00 |
| Unimportant -- Important | 184 | 2 | 5 | 4 | 4.00 | 4.14 | .71 |
| Harmful -- Beneficial | 184 | 2 | 5 | 4 | 4.00 | 4.12 | .75 |
| Discouraging -- Motivating | 185 | 1 | 5 | 4 | 4.00 | 4.02 | .84 |
| Confusing -- Clear | 183 | 1 | 5 | 4 | 3.00 | 3.37 | .95 |

Table 2: Summary of all student teachers answers to the semantic questionnaire

It can be seen that, in general, student teachers characterize positively the Internet in all items considered.

Differences between males and females

Lack of homogeneity of variance (found by Levene's statistics) induced us to use chi-square tests to find differences between males and females in each of the 9 items of the semantic questionnaire. However care must be taken as there were cells with expected values less than 5. Males and Females generally agree that the Internet is useful, interesting, important, beneficial and motivating. But males seem to find it funnier, easier, simpler, and clearer than their female counterparts do. Figure 1 shows differences between males and females.

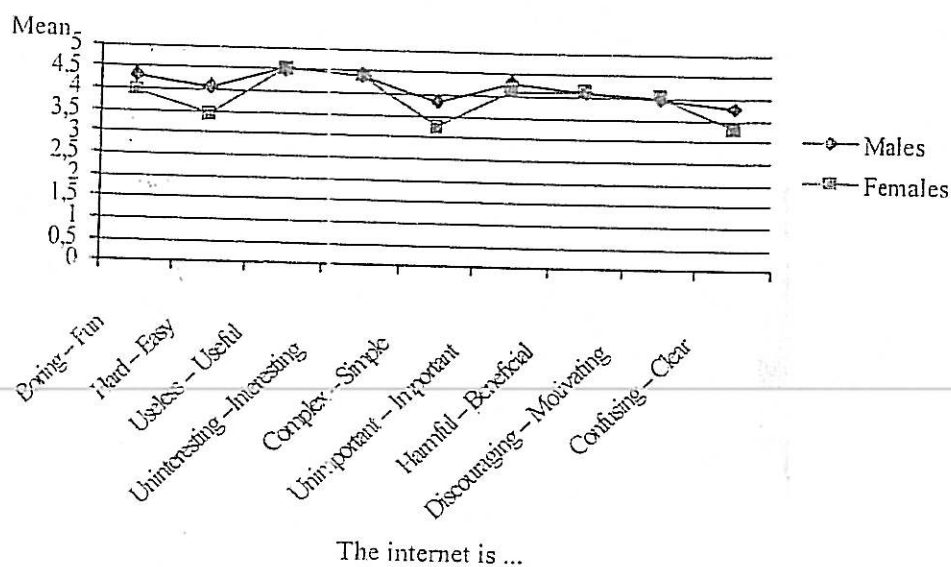


Figure 1: Differences between males and females

Further investigation into this matter shows that, when asked to indicate simple words to describe advantages, disadvantages and difficulties, females' answers are more consistent than those of males. Furthermore they refer more frequently to the ease of access to information and of communication as advantages of the Internet, while being costly (not being for everybody) and giving access to obscene information are indicated as disadvantages. Too much information, assessing/selecting the right information not being so easy, lack of information in Portuguese, and technical issues (like software installation and working with chat and e-mail) were the difficulties most referred specially by females. As far as these female-male differences are concerned we hypothesize that causes may be socially bound.

Differences between education program groups of student teachers

For the semantic questionnaire and the education programs it was found that the degree of heterogeneity was not significant in any of the cells at the .05 level. Therefore a one-way analysis of variance was used to find whether student teachers from different programs had different views of the Internet regarding the nine items of the semantic questionnaire. There were significant differences only in the *Complex - Simple* ($F=3.499, p<0.001$) and *Confusing - Clear* ($F= 2.365, p<0.019$) items. Some differences were also observed in item *Hard - Easy*, although significance was not clear ($F=1.799, p<0.80$). Figure 2 shows the means plots for these three items.

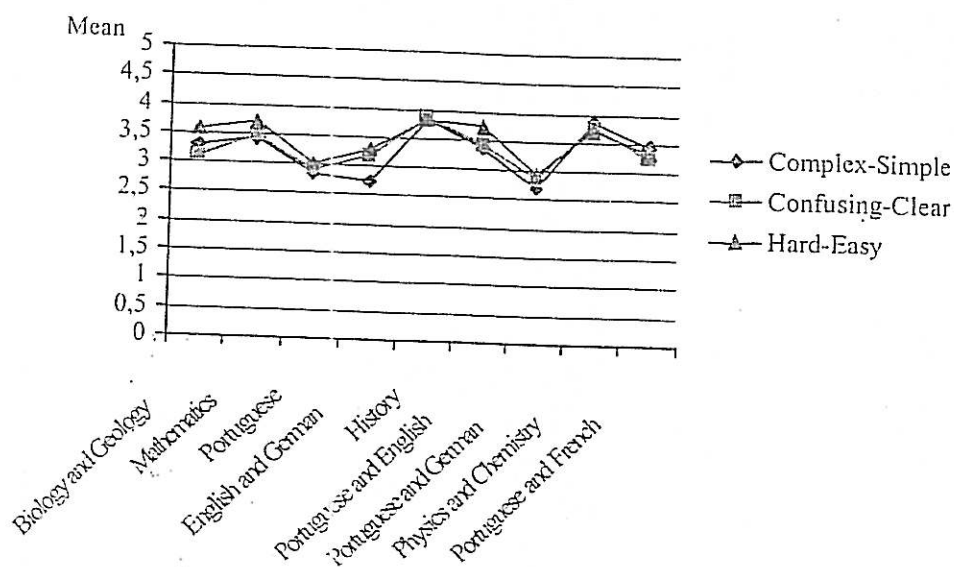


Figure 2: Means plots for the Hard – Easy, Complex – Simple and Confusing – Clear items

Internet usage by student teachers: perspectives and expectations

From the other items of our questionnaire we can see that these student teachers' global usage of the Internet seems to have increased from the 1st to the 5th year. One factor which cannot be ignored is the growth of computer and Internet facilities in our campus. More and more the Internet is being used as a means of communication even at the official level. Students now also have to enroll for the exams on the university web page.

In their answers to the questionnaire most student teachers reported never having used the Internet to chat, to construct a WWW page, to communicate with colleagues from other schools. Most also admitted having seldom discussed with their colleagues about Internet applications in teaching. Most also denied ever having used the Internet in some way by suggestion or requirement from the part of their school or university supervisors. In general it seems that the Internet was not a very frequent presence in the student teachers' lives. However they expressed the idea that in the future they will frequently use the Internet: mostly to search for bibliography and for information about their field of work, and to find ideas for their teaching. They also think that they may quite often show things from the Internet and suggest sites to their students. It is revealing that the Internet is not yet used by student teachers as a potentially fast and efficient means of communication, but that they expect to use it in their future professional lives. However to construct web pages does not seem to be in their future perspectives.

Conclusions

From our investigation we can infer that in general the university's student teachers have high expectations and quite favorable opinions about their Internet future usage. It can be seen from our data that a high percentage of students with a computer at home are connected to the Internet. However they report a very limited actual use of the Internet as a means of communication and interaction in their academic activities.

Surprisingly for us mathematics educators, this is also true for our mathematics student teachers. Considering the contents of the mathematics education program, we would expect the mathematics student teachers to be better acquainted and to feel more comfortable with computers and particularly with the Internet. Therefore we should reflect on the weak effect technology courses seem to have on students and on what the causes of found differences may be. Also we should not forget that there is a longer history of computer usage in mathematics education than in any other field. This fact had previously led us to expect

that the mathematics student teachers would feel more at ease with computers and with the Internet than students from other programs. But such does not seem to happen. Why? Might there be too much pressure on the mathematics students teachers? Knowing mathematics, knowing about calculators and about computers, dealing with kids' negative attitudes towards mathematics in their teaching practice, and a lot more, all seem to take too much time and energy to leave any room for new cyber discoveries. Might there be also a reflection of faculties' own ideas and expectations about the Internet? These are questions that we cannot answer now.

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