

Temptations of the Web: Estonian Science Student Teachers Reflect on their Relationship With the Internet

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The Estonian government strongly supports educational uses of the Internet by the Tiger Leap Programme. So there has been an administrative push to use the Internet even if teachers have only a short or limited experience of it. The aim of this study was to find out what kind of opportunities, challenges and problems Estonian science student teachers saw in the educational uses of the Internet. The answers were obtained by questionnaire in 2001 from 45 students at the university of Tartu. The questions were focused so that the student teachers considered themselves as forthcoming teachers as well as putting themselves in the shoes of their future pupils. Also student teachers' emotional attitudes towards the Internet and their views about the adoption of the Internet as an innovation were asked. The student teachers believed in positive consequences for themselves and for their pupils when using the Internet. They did not expect to have any serious problems from it. They liked the Internet and wanted to find something interesting about it. When judging their own

innovation adopter category they chose early adopter categories more often than would have been predicted by the innovation diffusion theory.

Key words: The Internet, science student teachers, Estonia, Tiger Leap Programme, attitude, innovation adopter categories

1 Introduction

1.1 The Internet in Estonia

The use of the Internet began in Estonia in 1992 when the national country domain “ee” was registered (Zakon 1996). Since then the use of the Internet has increased substantially and in 2002 there were about 400 000 Estonians online – about 30 % of the whole population. Simultaneously, there were about 544 million people globally connected to the Internet (Nua Internet Domain Survey 2002).

The widespread use of the Internet in Estonia is due to efforts of the government. In 1996 it launched the Estonian Tiger Leap Programme (Tiger Leap Foundation 2000). Its aim was to develop the Estonian educational system with the introduction of modern information and communication technologies. The implementation of the program has included acquisition of hardware and educational software for schools, training of teachers and research into its implications.

Due to the short history of the Internet in Estonia only a little research on the educational uses of it are available. Liiber & Roosaare (2001) list web-based material useful for geography, some of which could also be used in earth sciences. Preliminary information on educational uses of the Internet in biology education are available (Kankaanrinta & Marandi, 2002).

1.2 Emotional attitudes towards the Internet

In Finland, Tella (1995) created a classification of end users’ emotional attitudes towards modern information and communication technologies in general. His categories include the pioneers; those who love the

technologies at first sight; those who are skilful enough to adapt to them: hackers or crackers; those who slowly become fond of new technologies; those who imitate others by following the suit; those with a superficial attitude; those who are worried about or scared of them; those who dislike even the very thought of using information technologies, and finally those who are left by the wayside: the dropouts.

Tella's (1995) classification can also be applied when studying the attitudes towards the Internet. It was noticed, however, that people with superficial attitudes and those following suit were, at least in Finland, rare (Kankaanrinta 2000). It was also noticed when analysing open-ended questions that it is necessary to add a two new categories to the list: those who are waiting to find something interesting on the web and those who feel ashamed of their poor skills. So the classification of attitudes used in this study was as follows: immediate liking (approval), little by little liking, expecting something interesting, imitating, worrying about, dropping-out, feeling ashamed of poor skills, immediate hating (rejection) and, wanting to hack the secrets of the Internet.

1.3 Innovation adopter categories

The theory of innovation diffusion, developed by Rogers (1983, 1995) consists of several subtheories, one of which concerns adopter categories. According to the theory, these categories are proportionally constant in a population and consist of, in the sequence of adoption, Innovators (3 % of population), Early adopters (13 %), Early majority (34%), Late majority (34 %) and Laggards (16 %). This theory can be applied to the adoption of the Internet in education. Studies on Finnish kindergarten student teachers (Kankaanrinta 2000) and biology teachers (Kankaanrinta 2001) have shown that the proportions in the early categories were significantly higher than could have been assumed from the theory.

2 The empirical study

2.1 Aim of the study and research problems

The first aim of the study was to find out what kind of opportunities,

challenges and problems Estonian science student teachers see when they think of the Internet in education. The focus of questions was either in the work of teachers, in the studying or learning of pupils or in the special characteristics of the Internet.

The consequences of educational uses of the Internet	Foci of student teachers'		
	Thinking themselves as a teacher	Thinking of their future pupils	Thinking of the special characteristics of the Internet
Opportunities	Opportunities for teachers	Opportunities for pupils	Opportunities due to the characteristics of the Internet
Challenges	Challenges to teachers and pupils due to the characteristics of the Internet		
Problems	Problems for teachers	Problems for pupils	Problems due to characteristics of the Internet

Table 1. Foci of the study and consequences of educational uses of the Internet.

Secondly, the objective was to examine student teachers' emotional attitudes towards the Internet and thirdly, how they described themselves as an adopter of the Internet innovation.

The research problems were as follows:

1. What kind of opportunities does the Internet offer to Estonian science student teachers?
2. What kind of challenges do they see in the use of the Internet?
3. What kind of problems are they expecting when using the Internet?
4. What are their emotional attitudes towards the Internet?
5. In which adopter category do they classify themselves in the use of the Internet?

2.2 Materials and methods

At the University of Tartu, Estonian science student teachers have a one credit course in information and communication technologies. In addition to word processing and the use of spreadsheets, it also includes some basic uses of the Internet, e.g. searching for information and visits to educational web pages. The author of this article had a one credit course “Teachers on the Web” as a part of the Socrates teacher exchange at the University of Tartu Faculty of Education in 2001. The material for this study was collected during that visit, indeed some of the answering science students were also participants in this web course. The students (45) were in their second or third year in the university taking a bachelor degree in science. The data was collected with a questionnaire using mainly statements with a six step Likert scale from “I fully agree” (5) to “I do not agree at all” (0). Some open ended questions were presented as well. An Estonian colleague was present helping with possible language problems because the questionnaire was in English. The innovation adopter categories were obtained by presenting a line with a statement: “Some people begin the use of the Internet in education earlier than others. If people beginning to use it are described on a time line with number one representing the first ones to use it, and number two being the next in line and so on until number 5 is reached, which represents the last ones to begin its use. What kind of type are you in beginning the use of the Internet? The students answered by drawing their position on the line.

3 Results

3.1 Opportunities of the Internet

The science student teachers appreciated the opportunities of the Internet highly (table 2). They felt that they might always find something interesting on the Internet. That means that the whole work of the teacher grows more interesting. They appreciated the opportunity to learn new things and to show their capacities to the others and felt that knowing the Internet gave a good starting point for the future. The student teachers

were rather unanimous in these things. When thinking of their pupils they valued the opportunities for more methods and contents and stated that pupils like multimedia in general. They were more suspicious regarding whether the differences between the pupils are easier to take into account, or if the work of the teachers is respected more by the others.

Opportunity	Mean	St. dev.
As a teacher I can choose such contents that I like	3,7	0,91
For studying there are more methods which I can choose from	4,2	0,85
I can build new learning environments with the Web	4,0	0,98
Interaction with the pupils is more intensive	3,8	1,05
The differences between pupils are easier to take into account	3,3	1,14
My pupils can choose between contents	4,0	0,89
My pupils can choose between different methods of studying	4,0	0,89
My pupils become more active	3,8	0,99
My pupils can take more responsibility for their studies	3,7	1,04
Pupils like multimedia in general	4,3	0,76
Pupils like the structure of hypertext	3,9	0,89
There is always an opportunity to find something interesting on the web	4,8	0,49
Knowing the Internet gives a good starting point for the future	4,6	0,81
The work of the teacher becomes more interesting	4,5	0,59
The work of the teacher becomes more versatile	4,0	0,87
The work of the teacher is respected more by others	3,5	1,04
I can learn new things all the time	4,7	0,47
I can show my capacities and skills to the others	4,3	0,73
The work of the teacher becomes more relevant	3,8	0,92

Table 2. Opportunities in the educational uses of the Internet. Scale: 5 = I fully agree, 0 = I do not agree at all.

3.2 Challenges of the Internet

The challenges of the Internet were crystallised into six statements about communication culture, search for information, and the indexing

of it (table 3). The student teachers gave all these issues high scores. The biggest challenge for them were new ways of searching for and processing information, and the new communication culture. The students were unanimous about these issues. They also felt these skills were important in respect of their pupils.

Challenge	Mean	St. dev.
I must learn the new communication culture	4,5	0,63
I must learn new ways of searching for and processing information	4,7	0,51
I must learn new ways to make references to digital information	4,3	0,81
I must teach the new communication culture to the pupils	4,5	0,82
I must teach skills in searching for and processing of information to the pupils	4,5	0,76
I must teach to the pupils how to make references to digital information	4,3	0,99

Table 3. Challenges in the educational uses of the Internet. Scale: 5 = I fully agree, 0 = I do not agree at all.

3.3 Problems of the Internet

The number of questions dealing with problems of the Internet in education was the same as that of its opportunities (table 4). The student teachers did not see any serious problems in the Internet because the scores were low and mainly under the average. They thought that with the Internet there will be slightly more work for the teacher. They felt responsible for their pupils when entertaining the suspicion that children possibly might learn bad things from the Internet, or in case their comprehension of the real world became unclear, but these were not emphasized much either. The student teachers were a little bit

thoughtful when considering the huge amount of information and difficulties in choosing from it.

Problem	Mean	St. dev.
There will be more work for the teacher	3,6	1,39
The work of the teacher becomes more difficult	2,8	1,72
The role of the teacher becomes more diffuse	2,7	1,52
Learning something new all the time is boring	1,4	1,67
It is difficult to search for information on the web	2,2	1,35
Searching for information on the web takes so much time	2,3	1,33
The huge amount of information on the web is frustrating	2,9	1,39
It is difficult to choose the most relevant aspects from the information	2,9	1,36
Others sources of information will not be used any more	1,6	1,40
Pedagogical application of the Internet is difficult	2,6	1,08
Information technologies make the pupils passive	2,5	1,36
Pupils may learn bad things on the Internet	3,3	1,35
Pupils may get addicted to the Internet	3,4	1,17
Pupils' comprehension of the real world may become unclear	2,9	1,36
Using the Internet pushes humanity aside	2,5	1,37
Pupils do not like multimedia in general	1,3	1,24
The structure of hypertext is confusing for pupils	2,2	1,13
You never know if you can find anything useful on the web	2,9	1,49
Using the Internet is wasting time	1,4	1,38

Table 4. Problems in the educational uses of the Internet. Scale: 5 = I fully agree, 0 = I do not agree at all.

3.4 Attitudes Towards the Internet

The attitudes of the student teachers' were mostly positive (table 5) and 37 of them could be classified into a certain type characterised by Tella (1995) and completed in this research. They either liked the Internet at once or little by little, or were expecting to find something interesting on it. Because all the students could not be characterised into a single type, the number of maximum and next to maximum choices for each type

were counted. This method still emphasized the category of “expecting something interesting”. But also that of “little by little liking”. The category of students wanting to hack the secrets of the Internet could be seen as eager experts *in spe* thus indicating a positive attitude. The students were also asked if their attitudes towards the Internet had changed. Most of them reported numerous changes (30) in a positive direction and explained it as in such terms as “I learned to like the Internet step by step and now I just love it and use it every day.” for example. Of the remainder, two students said that their attitudes had not changed, while nobody confessed negative changes.

Attitudes	Number of predominant types	Number of maximum choices (6, scale 6–1)	Number of next to maximum choices (5, scale 6–1)
Liking at once	12	8	18
Liking little by little	9	13	16
Waiting for something interesting	12	27	11
Imitating		0	5
Worrying about		1	4
Dropping-out		1	2
Feels ashamed of poor skills	1	6	6
Hating at once		3	1
Wanting to hack the secrets	3	7	4
Total	37		

Table 5. Attitudes towards the Internet. Classification mainly from Tella (1995).

3.5 Innovation adopter categories and the Internet

The students marked their position on the adoption line. The number of students belonging to early adopters and early majority were considerable and, correspondingly, the number of late majority and laggards were small (table 6). The proportions of innovation adopter

categories differed from those described in the theory (Rogers 1983, 1995), but because of the limited number of informants, the results of this research cannot be overgeneralized to the population at large.

Category	Among science student teachers, %	In general population, %
Innovators	2,3	2,5
Early adopters	20,5	13,5
Early majority	52,2	34,0
Late majority	20,5	34,0
Laggards	4,5	16,0
Total	100,0	100,0

Table 6. The Internet as innovation: adopter categories.

4 Discussion and conclusions

The Estonian science student teachers believed in positive opportunities when using the Internet in education. They thought that the Internet meant great challenges for them and for their pupils. When thinking about the possible problems caused by the Internet, the teachers were again optimistic: no serious problems were expected. The students liked the Internet and eagerly expected to find something interesting there. They are presumed to be mainly among early majority or early adopters when taking the Internet innovation into use.

Student teachers' generally positive attitudes towards the Internet has been stated in some surveys in Finland (Kankaanrinta 2000, 2002). However, the detailed optimism of the Estonian science student teachers was different from that noticed in Finnish primary school student teachers (Kankaanrinta 2002). Finnish student teachers were more worried about their future pupils than themselves: about the huge amount of information, evaluation of its reliability, the creative use of information, and listing of references. Also learning undesirable things were seen as a problem in Finland. On the other hand the Finns admitted that the Internet contained useful and interesting information.

Typical characteristics of the Internet: the variation offered by multimedia, the huge amount of the information, even the instability of materials offer elements that are tempting especially to young student teachers. After that it is natural to ask if professional teachers who have experience of teaching at school had answered the questionnaire in the same way. In fact, this was examined soon after this survey (Kankaanrinta & Marandi, forthcoming). The results were parallel: the Estonian teachers had lots of positive experiences of the Internet, only few problems and their attitudes were optimistic. This implies that at least the Estonian teachers and student teachers covered in these two studies had a more flexible and open attitude towards teaching with the Internet than their Finnish colleagues.

The method used to classify the student teachers into innovation adopter categories was extremely simple: drawing one's position on the timeline. It can be criticised because it is easy to tell that one would adopt the Internet in school, but the reality could be different. The basic method chosen, however, offered the opportunity to include also this point of view into this survey. The proportion of early adopter categories showed the same trend that was noticed in surveys on Finnish student teachers (Kankaanrinta 2000, 2002). This trend gives the idea that either people who come into teacher education could be more innovative than the average population or they at least want to give an impression of being so.

The positive attitudes of the Estonian science student teachers offer an excellent starting point to give them more education on the uses of the Internet. The same was also noticed during the course "Teachers on the Web" in 2001 in Tartu. The students were enthusiastic to see, hear, search for and try the opportunities of the Internet. That could mean that Estonian science teachers may soon be ahead of Finnish colleagues in the educational uses of the Internet.

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