

PROBLEMS AND CHALLENGES IN THE USAGE OF ICT IN BIOLOGY AND GEOGRAPHY IN SCHOOLS AND TEACHER EDUCATION IN FINLAND

Eila Jeronen, Sirpa Anttila-Muilu

University of Oulu, Finland

E-mail: Eila.Jeronen@oulu.fi; sirpa.anttila-muilu@oulu.fi

Juha Jeronen

University of Jyväskylä, Finland

Email: jumijero@jyu.fi

Abstract

The purpose of this article is to introduce the Finnish education system and to describe how Information and Communication Technology (ICT) has been integrated into it, with a special focus on Biology and Geography education. In the article, we describe first how national strategies regarding education in the information society and the implementation of these strategies have promoted the use of ICT in the Finnish education sector. The authors then present an overview of the Finnish education system. Thereafter, we move into pedagogical studies in Biology and Geography in the University of Oulu. Finally, we discuss, based on a case study in Northern Finland, the conceptions, experiences and attitudes of senior high school and university students on eLearning in Biology and Geography.

Key words: *information and communication technology, pedagogical studies in Biology, class teacher education, subject teacher education, Finnish education system.*

Introduction

Finnish schools have performed well in recent international comparisons on educational achievements. For example, in the TIMSS (the International Mathematics and Science Study) 1999, Finland ranked above the international mean in mathematics (Mullis, Martin, Gonzalez, Gregory, Garden, O'Connor, Chrostowski, & Smith, 2000, p. 89) and in science (Martin, Mullis, Gonzalez, Gregory, Smith, Chrostowski, Garden, & O'Connor, 2000, p. 38). In the OECD PISA (Programme for International Student Assessment) 2006 the knowledge and skills of Finnish students in science, mathematics and reading were of the highest order. In science and mathematics they rated best of the OECD countries and in reading the second best (Ministry of Education, 2007). The use of Information and Communication Technology (ICT) in education has also been internationally compared. The International Association for the Evaluation of Educational Achievement (IEA) started in 1997 as a cross-national research programme, which was intended to provide policy-makers, educational practitioners and also private sector with information about the use of ICT in educational systems (Kankaanranta, 2005). The Economist ranked Finland in eLearning as 9th out of 60 countries in their education score (The Economist, 2003).

Finnish education policy is coordinated with the national vision to establish an information society. During the 1990s, the strategy was to develop ICT in education as part of its policy of build-

ing a Finnish information society. This meant there was a nationwide effort to create possibilities for ICT to meet the diverse needs of people of different ages (Kankaanranta, 2005). Strategic plans were launched by the Ministry of Education in Finland in 1995 and 1999. The latest was titled the Information society programme for education, training and research in 2004-2006 (Ministry of Education, 2004). It included primary, secondary and tertiary education in the same policy. The activities fell into three categories, 'knowledge', 'content' and 'the operating environment'. The programme is geared to

- • develop all citizens' information society knowledge and skills,
- • enable educational institutions to use ICT in a versatile way in their activities,
- • establish ICT-based procedures in education, training and research,
- • promote social innovation through the use of ICT (Atjonen, & Li, 2006, pp. 183-185).

It is thus clear that one of the priorities for using ICT has been to improve the equity of access to information, and to education that is essential to that access (cf. Ministry of Education, 2006, p. 8).

The National Board of Education commenced an ICT implementation programme in 1996, titled Information Finland. The programme has helped schools to acquire the necessary infrastructure, linked them to information networks, provided in-service teacher training and developed learning and teaching materials. In particular, one of its sub-projects, Ope.fi, was conducted to ensure that every Finnish school would have a strategy by 2002 for the implementation and use of ICT in teaching and learning, suited to the contextual characteristics and needs of the school (Kankaanranta, 2005). The sub-project was a three-level teacher-in-service training programme. The lowest level, Ope.fi 1, consists of basic skills of computing. Ope.fi 2 includes more specific skills of eLearning. A teacher of the highest level, of Ope.fi 3, should be fully competent both with eLearning media skills and with networking facilities in schools, and also capable of organizing and administering ICT development in his or her school (Halonen, 2002).

In the information strategy for education and research, the Ministry of Education had stated the following goals for teacher education: The departments of Teacher Education have to develop their curricula so that teachers will already be able to acquire the skills in Information and Communications Technology during pre-service education, and as a result will be independently able to study the use of new equipment and software at their work and to develop their usage in instruction (Koulutuksen ja tutkimuksen tietostrategia, 1995, p. 20). Teacher education was further emphasized in the in-service training programme called Finland as an Information Society, which provided a framework and guidelines for developing the pedagogical use of ICT in Finnish schools. Some of the main focus areas were collaborative teaching and learning, networking and teamwork. This policy emphasis resulted in various technology-supported school projects in different parts of Finland. The programme also produced online instructional materials in Finnish, which was in accordance with the Ministry's goal to produce Finnish content in the new media (Kankaanranta, 2005).

An overview of the Finnish educational system

The Finnish education system has three levels: basic education, comprising primary and lower secondary levels; upper secondary education and training; and higher education. Pre-primary education is available to children in the year preceding compulsory schooling. Basic education is uniform nine-year general education given in comprehensive schools. The upper secondary level comprises vocational education and training and general education. Higher education is provided at polytechnics and universities (Ministry of Education, 2006).

Compulsory education

As described on the web site of the Finnish Ministry of Education, the compulsory school system in Finland consists of a nine-year comprehensive schooling, including a six-year primary school and a three-year lower secondary school. Prior to starting their compulsory education, most

Finnish children will also have attended pre-school for one year. Children start school at the age of seven and the school-leaving age is sixteen.

According to the Ministry of Education, 99.7 % of the students in this age group complete compulsory schooling, which means that Finland has one of the lowest dropout rates in the world (Ministry of Education, 2006, p. 25). In 2006, 398 750 students from 57 countries participated in the PISA assessment programme (Programme for International Student Assessment), which measured the skills of 15-year-olds in science, mathematics and reading literacy. A total of 5,265 Finnish pupils from randomly chosen schools around the country, who were in their last grade of their compulsory comprehensive school, participated in PISA 2006. In science and mathematics they were rated best of all the OECD countries, and in reading they were the second best. The main focus was science literacy (Ministry of Education, 2007). Reasons for this top achievement have been seen to include the special attention given to pupils with learning difficulties, the equal opportunities given to all pupils regardless of their backgrounds or gender, and the high level of teacher education.

National curriculum reform at the beginning of 2000 brought new development targets for school education. Information management, co-operation and interaction skills are seen as skills of the future. Integration and new cross-curricular themes require the availability of unconventional learning materials, their management and the necessary skills for using them. Personally paced learning, individual study paths and personal study plans also require individualized choices regarding teaching plans and learning materials. The demand for knowledge about sustainable development, health and welfare is growing; material for common use and collaborative working methods that activate pupils are in demand. The proposition of teaching about cultural views as a part of ethics teaching is on the increase. It is common for the whole school to offer learners many-sided information sources about the multicultural world we live in. Teaching, studying and learning processes, in addition to the results, have become an object of evaluation (Frantsi, Kolu, & Salminen, 2002, p. 6).

After compulsory schooling, pupils can choose between a three-year upper secondary school (gymnasium) and vocational education. About half of the students choose to attend upper secondary school, which finishes with a national matriculation examination.

Upper secondary education and training

The post-compulsory upper secondary level is divided into general education and vocational education and training. Both forms generally take three years, and provide eligibility for further studies at universities and polytechnics.

The general upper secondary school (gymnasium) provides non-vocational all-round education. General upper secondary school studies are in the form of courses, which are 38 lesson hours on average. The entire upper secondary school consists of a minimum of 75 courses. The general objectives and allocation of lesson hours between different subjects, subject groups and guidance counseling are decided by the Government. The National Board of Education decides on the aims and core contents of instruction, recording them in a national core curriculum, which education providers and schools then use as the basis for their curricula. Towards the end of their schooling, students usually take the national matriculation examination, and receive a matriculation certificate in addition to the upper secondary school diploma (Ministry of Education, 2006).

Students in vocational education study to achieve vocational qualifications. Vocational qualifications provide extensive basic skills for jobs in their fields, and specialized competences required in a specific sector. It is possible to take the initial qualification and further specialist qualifications as a competence-based qualification, in which there are no requirements concerning the way in which the knowledge and skills have been acquired. A vocational qualification gives eligibility for further studies at university or polytechnic (Ministry of Education, 2006).

Higher education

The Finnish higher education system consists of two sectors: polytechnics and universities. There were in 2006 29 practice-oriented polytechnics. Most of these were multidisciplinary, regional institutions, which give particular weight to contacts with business and industry. There are altogether

20 universities in Finland, all state-funded. They comprise ten multidisciplinary universities, three schools of economics and business administration, three universities of technology, and four art academies. In addition, there is a National Defense College operating within the Ministry of Defense sector. Universities select their students independently by means of different types of entrance examinations. Universities confer Bachelor's and Master's degrees, and postgraduate licentiate and doctoral degrees. In the new degree system introduced in 2005, students first study for the lower Bachelor's degree, and then for the higher Master's degree. One year of full-time study is equivalent to 60 European credits. The lower degree is 180 European credits, and its normative duration is three years of full-time study. The higher university degree is 120 European credits, which is equivalent to two years of full-time study on top of the Bachelor's degree. Each student has an individual study plan, which facilitates the monitoring of progress. University postgraduate education aims at a doctoral degree, which usually takes four years of full-time study. In addition to the required studies, doctoral students prepare a dissertation, which they defend in public (Ministry of Education, 2006).

Teachers are educated at university, where they complete a Master's degree. Teacher education is provided by 11 universities. University teacher education aims to provide students with resources to function independently as teachers, instructors and educators. Class teachers teach all subjects in forms 1-6 of basic education (primary level). They may also work in pre-primary education and as instructors of extracurricular morning and afternoon activities. Class teachers major in educational sciences. The scope of the degree is 300 European credits. Class teachers can also study for a subject teacher qualification. A Master's degree is also the basic requirement for subject teachers working with year-classes 7-9 of basic education (lower secondary level), for upper secondary teachers, for teachers of general subjects in vocational education and training, and for teachers in adult education and training. The degree is 300-350 European credits. In addition to studies in the major and minor subjects, subject teacher qualifications comprise pedagogical studies of at least 60 European credits, including teaching practice (Ministry of Education, 2006).

Universities also educate special-needs teachers and guidance counselors. Special-needs teachers work in basic education and in vocational education and training. Guidance counselors mostly work with forms 7-9 of basic education, upper secondary schools and vocational institutions (Ministry of Education, 2006).

Teacher education in Biology and Geography in the University of Oulu

The Faculty of Education at the University of Oulu is an international multidisciplinary expert organization providing education and conducting research and development work in the field of education and pedagogy. The Department of Educational Sciences and Teacher Education is an active part of it. It has developed the curricula of teacher education concerning the use of Information and Communication Technology both in technology education and in integrative ways in different subjects since the beginning of 1990s.

The teacher education curriculum in the University of Oulu is based on the concept of pedagogical action which has four principles (cf. Kivelä, Peltonen, & Pikkarainen, 1996). The first principle, originally called in German "Bildsamkeit," refers to the initial ability of the student to learn and to develop him- or herself. The second principle, called "Aufforderung zur Selbstätigkeit," means that the educators act themselves in a way that later on requires the student to realize his or her ability. This demand does not have to be a straightforward command to the student, but can take place as a part of his or her whole environment or certain aspects of it. The third principle is where the student acquires awareness about the kind of behavior that he or she cannot spontaneously know. What is rational action in a certain situation depends on the whole cultural context and that is why, in education, we try to get the student to understand this context and to acquire the competence that is needed for it. We call this principle "Contextuality." This third principle must be constantly revised because the prevailing cultural context is not static. The direction of development is affected by a multitude of factors. That is why we simply cannot try to prepare our pupils for a certain or an unknown future, but we also have to think what kind of future is worth aspiring to. The fourth principle is called "Bildungs Ideal." It means that in education, we

must anticipate a better future. (Jeronen, & Pikkarainen, 1999, pp. 237-247; Jeronen, 2001, pp. 199-212).

Besides these four main principles, pedagogical studies are strongly influenced by a socio-cultural communicative perspective (Mead, 1932; Vygotsky, 1934), constructivist views of pedagogy (Dewey, 1938; Kolb, 1984), and the ideas of reflective teachers and learners (Schön, 1987). The learning conceptions also include new forms of assessment. The main ideas of the new assessment are to: (a) ask students to create, design, produce, perform, or do something; (b) stress complex thinking and problem solving or both of them; (c) use tasks that are instructionally meaningful; (d) use authentic or real world applications; and (e) require people exercising their own judgment, rather than machines. If the assessment is to support attainment of high standards, it must also be fair to all students; use accurate measures; be useful, feasible, and credible; and be aligned with standards or desired student outcomes (Herman, 1997, 198).

As a part of the educational studies, plenty of ICT projects have been carried out in both Biology and Geography education (Table 1.). The key aims of these projects have been

Table 1. International and national projects in teacher education in the Department of Teacher Education and Educational Sciences in the University of Oulu.

Timetable	Projects
2007 onwards	SPICA: A joint study programme developed by the Nordplus networks ICE (1078) and Ålka (1071). Nordplus. Jelling CVU Jelling, Denmark.
2006 onwards	Virtual Studies in Biology, Geography, Environmental Education and Health Education in Finnish Universities (Ympäristö- ja terveys yhteistyöverkosto (Myrtti), ViRMO - Virtuaaliset monialaiset opinnot). University of Oulu. Finland. http://virmo.jyu.fi/myrtti
2006 onwards	HERODOT II: Thematic Network for Geography Teaching and Training, 230402-CP-1-2006-UK-Erasmus-TN, http://herodot.net/
2003-2005	Thematic Network, HERO (DOT) NET. Liverpool Hope University, UK.
2002 onwards	Alka - Naturfagene I læraruddannelsen, kompetencer og almindannelse. Nordplus. Jelling CVU Jelling, Denmark. http://www.alkanet.dk/
2001-2004	HERO (dot) eNEWS, European Environmental News, 90199-CP-1-2001-1-FI-MINERVA -M. University of Oulu.
2000 onwards	NordMiPe, Nordisk Miljøpedagogik. Nordplus. Åbo Akademi, Vasa, Finland. Partner. http://www.vasa.abo.fi/users/ipalMBER/MiPeNatverk.htm
1998-2001	ESPACE European System for Particle and Astrophysics Cyber Education. (Socrates, Comenius 3.1.)
1998-2000	HERODOT Using the Web in Teaching Geography (Socrates, Open and Distance Learning ODL).
1998	EuMEDEA. On-line Teacher Training Course on Environmental Education (Socrates, Erasmus Programme). http://www.itc.staranzano.go.it/progetti/eumedea/index.htm
1997-1999	ECOSCHOOL (Socrates, Erasmus, European Module, EM).
1997-1999	TNTEE Thematic network on Teacher Education in Europe (Socrates, Erasmus Programme). http://tntee.umu.se/publications/v2n1/pdf/contr.pdf
1996-1999	EUROLAND Trans-national Co-operation Project (Socrates, Comenius Action 3.1).

Timetable	Projects
1996	TRIPPLE A (ICP-96-A-5005/05).
1996	PHARE. International Workshop on Environmental Education in Central and Eastern European universities: Experience and Challenge. Education Programme for Environmentally Sustainable Development. Project: Pedagogical Faculty. April 15 - 16, 1996. Prague, Czech Republic.

to promote the use of ICT in teacher education and in schools, to develop methods for distance education, and to train student teachers in Biology in using ICT. The resources and tools being used have been university e-mail communications, distance education equipment, and the resources provided for example by the Moodle and Discendum Optima systems. Moodle is a course management system (CMS) - a free, Open Source software package designed to help educators create effective online learning communities. Discendum Optima is a learning environment developed to support online studying and teaching. Optima can be employed:

- as a support for campus-based teaching and studying (e.g. for electronic distribution of course materials, saving and distributing students' course work, online interaction)
- as a Web-based environment for distance learning (e.g. during teacher training, student exchange or as a support for writing theses)

The cornerstones of the ICT projects have been learners, student teachers, and tutors (local teachers and supervisors: subject teachers at the training and city and rural schools in Northern Finland and a lecturer in Biology and Geography at the Department of Educational Sciences and Teacher Education), the technology used, and a certain culture for doing things in the learning community and organization. The elements necessary for learning have been built on these cornerstones. These elements are described in terms of the pedagogical action, appropriate technologies, and social organization of learning (Jeronen, 2001).

Pedagogical action includes the activities and methods of instruction. The actual instructional activities in the project have been primarily short teaching situations by teachers and student teachers via a videoconferencing system and individual or group study. Some of the sessions have also been Web and e-mail based. The learning activities have been mainly self-directed, but local teachers at remote classes and the teachers and the student teachers in the ICT class have guided the pupils, if needed. As learning material and activity guidelines the pupils have used textbooks, other scientific books, and the Internet. The evaluation activities have consisted of the validation of information and assessment of the pupil's results and studying and learning processes. The pupils have sent their answers and obtained feedback partly by e-mail, and partly in discussions during videoconferences. They have also participated in the assessment processes by writing their opinions, feelings, and observations in their study diaries and by group discussions concerning facts and concepts they have learned, group processing, and positive and negative instructional feedback (Jeronen, 2001).

Each learning community and organization has a culture of its own. Every school is different and has a school culture that is typical for that school. When planning the social organization, we have emphasized communicativeness, by which we mean possibilities for a meaningful, transformative communication between members of the teaching, studying and learning society (cf. Pea, 1994; Pulkkinen, & Ruotsalainen, 1998.)

In the following section, we describe the conceptions and attitudes of upper secondary students and student teachers of eLearning (ICT, information technology = IT) in Geography education. The results reported are based on the presentation given at the Annual Meeting of the Association of American Geographers (AAG), in 2007 in San Francisco (Anttila-Muilu, & Jeronen, 2007).

Case study of conceptions and attitudes of upper secondary students and student teachers in senior high school and teacher education of eLearning in Geography education

Methodology of Research

Extensive computer experience research indicates that computer performance is influenced by both direct computer experience, such as previous hands-on usage of different computer programs, and indirect experience, such as simply observing other people's computer-based activities (Anderson, & Reed, 1998; Jones, & Clark, 1995; Smith, Caputi, Crittenden, & Jayasuriya, 1999), and by both positive and negative experience (Reed, Oughton, Ayersman, Ervin Jr., & Giessler, 2000; Rosen, & Weil, 1995; Weil, & Rosen, 1995). Consequently, it is very important for teachers and teacher educators to know what students think about using computers in education. In our qualitative case study, we describe attitudes, conceptions and experiences of senior high school and university students on eLearning (IT, ICT) in Geography education. In addition, we wanted to know what kind of readiness Geography teachers need in eLearning. Readiness is defined as preparation – mentally or physically – for some experience or action. Borotis and Poulymenakou (2004) define eLearning readiness as “the mental or physical preparedness of an organization for some eLearning experience or action”. The research was carried out in the senior high school of Oulun Lyseon Lukio and the Department of Educational Sciences and Teacher Education in the University of Oulu in autumn 2006.

Research questions

The research questions were:

- What kinds of attitudes, conceptions and experiences do senior high school students and university students have about eLearning in general and in Geography education?
- What are the pros and cons of eLearning (distance teaching) according to the senior high school students' and university students' views?
- Which kind of readiness the senior high school students and university students expect teachers to have?
- How do the views of eLearning differ between senior high school students and university students?

Material and methods

The first part of resultant data was based on paper questionnaires completed by 72 Oulun Lyseon lukio students and 25 university students on September 2006. A Web survey was done using the Webropol program (<http://www.webropol.com/>). This was carried out for Oulun Lyseon lukio students and university students in September and October 2006. Both data sets were combined in November 2006 and the final data consisted of 252 forms (Table 2). The most important aim of the research was to add understanding of attitudes and conceptions of students of eLearning (cf. Stenhouse, 1988, p. 50). A five-point Likert scale consisting of the following options: 'very much', 'quite a lot', 'neutral', 'not much', and 'not at all' was used to measure the attitudes of the students and university students towards eLearning. Open-ended questions were classified using inductive and deductive content analysis methods when analyzing conceptions of the students (Ryan, & Ber-

nard, 2000, pp.769-802; Silverman, 2000, pp.821-833). Statistical tests were not made because of the small number of participants per group.

Table 2. The type and number of respondents who answered the questionnaire.

The type of respondents	The number of respondents (n)
Senior high school students of Oulun Lyseon lukio	125
Students studying Geography at the university	44
Students studying educational sciences	61
Students studying Biology at the university	22
Total amount of students (N)	252

Results of Research

Based on the results, it was seen that attitudes of the respondents towards computers as learning tools are mainly positive (Figure 1). Over 90 % thought that computers make studying more flexible. However, 50 % of respondents found computers too time consuming due to clumsy user interfaces in the software. 14 % did not feel competent and comfortable with computers. Over 80 % of respondents (Figure 2) expressed that they want to study Geography where the teacher is teaching face-to-face, although 40 % found distance teaching as a suitable method for studying Geography. 23 % (58 respondents) have attended videoconference sessions when studying Geography (Figure 2). 18 % (47 respondents) have received electronic feedback and 8 % (20 respondents) have taken a Geography web course.

Attitudes towards IT and computers as learning tools (N=252)

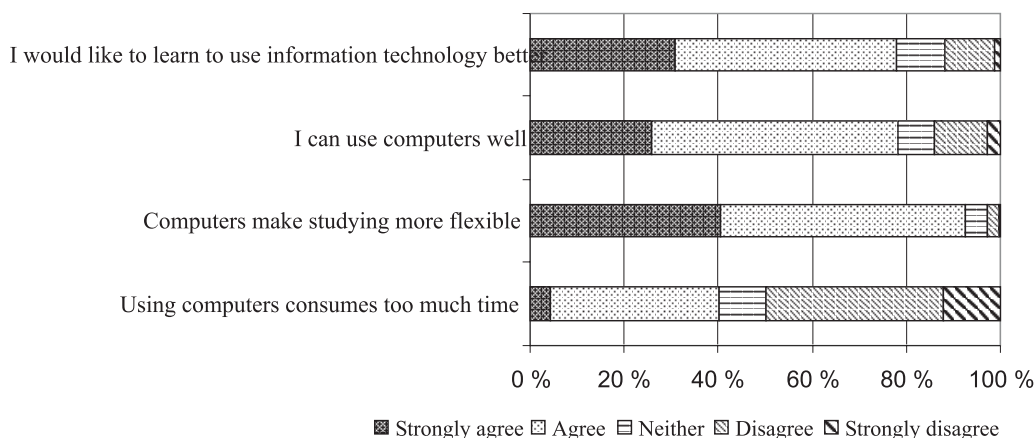


Figure 1. Attitudes towards IT and computers as learning tools.

As an advantage (Table 3), the respondents confirmed that eLearning is flexible because of time and space autonomy, but following it can also lead to lack of social contact and diminished interaction. When a teacher is located far away, and direct authority is

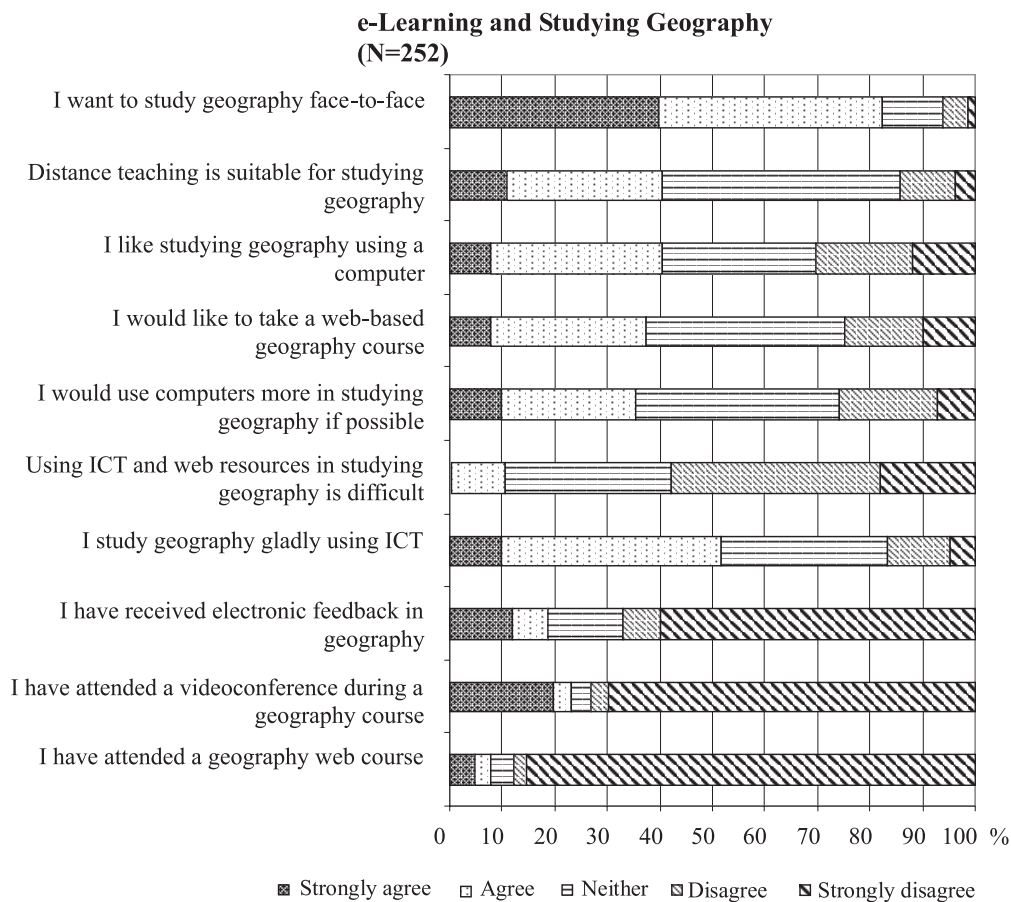


Figure 2. Conceptions and experiences on eLearning in geography.

Table 3. Pros and cons of ICT in Geography education.

Pros of ICT	Cons of ICT
Flexibility, not dependent on time or space	Lack of social contacts, interaction diminishes
Responsibility of own learning increases	Teacher is far away, direct authority is missing
Learning ICT skills	Misunderstandings occur more often
Enhances inner motivation	Technical problems
Easier to differentiate teaching	One-sided teaching methods

missing, responsibility of one's own learning increases. Misunderstandings occur more often, and technical problems can disturb studying and learning processes, but on the other hand, autonomy and learning ICT skills can enhance the inner motivation. In addition, the respondents thought that eLearning also supports learning maps and statistics, and helps to understand different cultures and interaction between natural and human worlds.

When asked which kind of readiness a Geography teacher should have, students and student teachers valued the most that teachers are able to create PowerPoint presentations (Figure 3). They also presented that the skills to use net based learning platforms and videoconferencing methods are important. The skills to plan and hold a web course were not as highly appreciated as the former ones.

A geography teacher should be able to... (N=252)

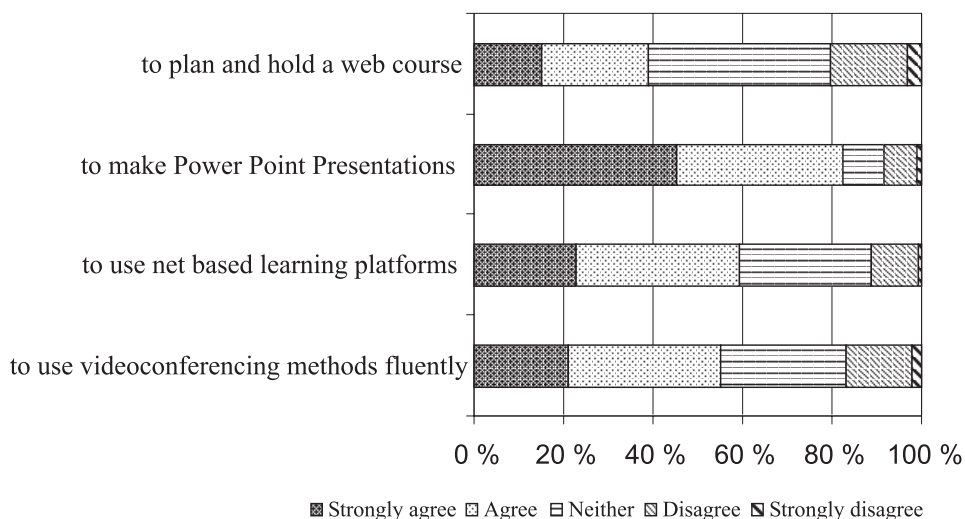


Figure 3. e-Learning readiness that a Geography teacher needs based on ideas of the students and student teachers.

In general, the views of senior high school and university students towards eLearning were quite similar. The senior high school students responded with longer and more versatile answers when asked to describe the positive sides of distance education, while the university students had longer and more versatile answers on the negative sides of distance education.

Discussion

As education has begun to shift from the traditional classroom to the technological web, more and more eLearning courses have become a part of the curricula both at schools and in universities. The potential benefit of understanding how attitudes and conceptions of students fit teaching ideas is enormous. This small study, in its part, is important for revealing the attitudes and conceptions of Finnish students.

Attitudes of the high school and university students towards computers as learning tools were mainly positive in our case study. However, in PISA 2003, it became clear that Finnish students had slightly more negative attitudes towards the use of ICT than, for example, Canadians, Germans or Koreans. The explanatory factors mentioned were gender, the availability of computers at home, and the frequency of use (OECD, 2005, 43-44). In our research, 14 % of the respondents did not feel competent and/or comfortable with the using a computer. Similar feelings were felt by 19 % of incoming university students in an American study (Schumacher, & Morahan-Martin, 2001). Most of the students in our research also wanted to study Geography in face-to-face situations with a teacher. A possible reason was that our respondents had very few real experiences of videoconference sessions, electronic feedback or Geography web courses although Finnish students are said to be average in terms of their self-assessed confidence in using routine ICT and the Internet (Statistics Finland, 2006). Many researches have indicated that learner system experiences positively correlate with

attitude to the use of the systems, and negatively correlates with anxiety (e.g. Smith, Caputi, & Rawstorne, 2000; Durnell, & Haag, 2002).

Nearly all of our respondents thought that computers make studying more flexible.

The result supports the findings of Atjonen and Li (2006, p. 189). The value of eLearning lies in the flexibility in the delivery of course material (Khalifa, & Lam, 2002). Students are allowed to learn in their own way to determine their own path through the material available (Barua, 2001) and to learn things at their own pace (Chen, 2002). However, with the increase in flexibility and freedom for the individual

may come potential problems for some users. One half of our respondents found computers too time consuming due to clumsy user interfaces in the software. They also stated that misunderstandings more frequently occur. Lastly, O'Donnell, and Kelly (2001) have suggested that a reason for these kinds of feelings is a lack of independent study skills, which leads students to think that eLearning is difficult. The students become confused, and so they may forget what they have already covered, and miss out on important information (McDonald, & Stevenson, 1998). This suggests that not all students will appreciate the flexibility and freedom offered by the Web, and that the individual differences of students are therefore important factors to be considered in the development of web-based learning systems.

Concerning the readiness of a Geography teacher for eLearning, our respondents most valued that the teachers were able to create PowerPoint presentations. They also considered that the skills needed to use Internet-based learning platforms and videoconferencing methods were important. These skills are indeed important when carrying out teaching situations. However, the methods of delivering an eLearning curriculum and the resultant teaching processes are much more complicated. They are new and very different from those used in traditional class teaching processes. Influential factors for eLearning processes are the IT infrastructure such as computer labs and access to the network, management support, and the school culture. In addition to the teachers' own readiness and their preferences for meeting face-to-face, the students' and their parents' preparedness are also crucial. Student preparedness includes the items related to students' and parents' preparedness, as well as access to the Internet; and teachers' preparedness includes the items related to teachers' willingness and degree of readiness for ICT. Limitations in the infrastructure can also hamper effective technology supported teaching and learning (So, & Swatman, 2006).

Future research should focus more closely on examining the reasons behind, and the factors motivating, the enjoyment of using eLearning. There are also other important questions which need to be addressed. One of those is: what exactly do we know about the learning processes and the results in technology-rich learning environments?

Conclusion

The need for distance learning possibilities in a sparsely populated country such as Finland is great. To move our educational practices forward, we will need an understanding of the students, as well as a willingness to experiment with new teaching and learning models. Teachers' ICT skills, attitudes, and general competences vary a lot, and the ICT skills of professors, lecturers and assistants needs constant establishing and updating. Kankaanranta (2005) has written:

“Innovative Finnish classrooms should promote active and independent learning and provide students with competencies to search for, organize, and analyze information, and communicate and express their ideas in a variety of media forms. The innovative classrooms engage students in collaborative, project-based learning in complex and real-world problems”.

It seems that the most viable way to achieve desirable educational goals is through building up a network of resources and expertise as well as encouraging collaboration between teachers and students in different parts of the country. It is also important to open the classrooms to external influences in various ways, especially through involving different participants such as parents, scientists, and business professionals in the daily work of the schools. Nevertheless, the schools themselves have to make efforts to ensure the continuous development of infrastructure and pedagogically relevant use of ICT (Kankaanranta, 2006). Robert B. Kozma (2005, p. 133-134) argues that Finland's educational approach is successful, because it is based on broad and decentralized decision making and collaborative knowledge creation. It is also characteristic to the Finnish approach that decisions on the curriculum and instruction are made by local schools and teachers. Kozma continues his analysis in saying that this kind of distributed effort is coordinated by a vision of a Finnish information society, in which technology and information sharing support economic growth and social development.

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Advised by Varpu Eloranta, University of Jyväskylä, Finland

Eila Jeronen	Docent, Senior lecturer, Department of Educational Sciences and Teacher Education, University of Oulu, P.O.B. 2000, 90014 University of Oulu, Finland. Phone: +358 8 5533702 E-Mail: Eila.Jeronen@oulu.fi Website: http://cc.oulu.fi/~ejeronen
Sirpa Anttila-Muilu	Researcher, Department of Geography, University of Oulu, P.O.B. 3000, 90014 University of Oulu, Finland. Phone: +358 8 5537848 E-mail: sirpa.anttila-muilu@oulu.fi Website: http://www.oulu.fi/geography/henkilokunta/tutkijat/sirpa_anttila_muilu.html
Juha Jeronen	Postgraduate student, Department of Mathematical Information Technology, University of Jyväskylä, Mattilanniemi, Agora, 40014 University of Jyväskylä, Finland. E-mail: jumijero@jyu.fi Website: http://www.jyu.fi/en/