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Teacher Training via Distance Learning Focussed on Educational Issues of Information Technology

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Abstract. This paper deals with the main problem of involving information technology in teacher education – structure and contents of teachers' training courses based on distance learning. In Lithuania, the Standard of computer literacy for educators has been developed. It should be the main source of all teachers' training courses on information technology. The Standard consists of two parts: technological and educational. The main attention of the paper is paid to the analysis and requirements of the educational part that becomes more and more urgent: it requires some psychological, cognitive, social, and pedagogical knowledge referring to the information technology usage in education. This paper comprehensively covers the problems of application of information technology in education, course planning, and implementation of distance teaching, it referring to the teachers' training course on educational issues of information technology via distance learning, carried out by the Ministry of Education and Science of the Republic of Lithuania and organized by the Centre of Information Technologies of Education, and summarises its results.

Key words: teacher education, information technology, standard of computer literacy, educational issues, distance learning.

Introduction

Information technology (IT) has become one of the basic building blocks of modern society. IT permeates into the business environment, underpins the success of modern corporations and provides governments with an efficient infrastructure. At the same time, IT contributes a lot value to the process of learning as well as organization and management of educational institutions. The Internet and World Wide Web (WWW) are a driving force for a faster development an innovation in both developed and developing countries (An Introduction . . ., 2002).

The world needs more and more teachers and more of better teachers that could use modern tools and work under conditions of an information society. The UNESCO Inter-

national Sub-Regional Seminar on 'The Use of Distance Education and Information and Communication Technologies in Teacher Education: Trends, Policy and Strategy Considerations' in November 2002 at Kiev revealed that there was a lack of more than 10 million teachers, and we need to raise the skills of the existing 60 million teachers. Besides, the skills and knowledge needed for all teachers in the use of information technology are constantly progressing. Therefore, teachers are forced now more than ever before to go on learning. One of the ways of strengthening the teaching proficiency is to use distance education (Kvaternik, 2001).

UNESCO initiatives in distance learning are based on its overall priority to ensure the right to education for everyone. New developments in Internet and World Wide Web have radically increased the demand for lifelong education but also provided new means to meet the demand. A great importance is attached to distance learning in teacher education, especially to in-service teacher training as well as for the training of teacher educators (Khvilon, 2002).

In Lithuania, the first obvious step forward was made in 2001, when the Government of Lithuania allocated over half a million Litas (about 150 thousand Euros) for the improvement of the qualification of teacher in the field of information technology. More than 5000 teachers attended seminars/courses of computer literacy per year. However, such process (or even more profound one) is required annually. In 2002, more attention on a deeper learning of psychological, cognitive, social, and pedagogical issues of information technology was paid.

Standard of Information Literacy for Educators

In order to integrate information technology into education, there has to be a consistent attention drawn to the training of teachers. All teachers have to be able to work using modern technologies and notice the changes in their subject.

Taking into consideration the strategy of implementation of information and communication technologies in the education system of Lithuania (Summary . . ., 2002), which provides that teachers should start using information technology means in the classes of their subject, in 2001 Teachers' Computer Literacy Standard (Teachers', 2002) was prepared. This standard defines what knowledge and skills are required for teachers. The requirements of the standards are closely linked to the programme for obtaining the European Computer User's Certificate (ECDL . . ., 2003; Otas, 2000, 96–97). Teachers have to obtain primary ECDL level (1, 2, 3 and 7 ECDL modules) knowledge. But this is the part of technical and technological computer literacy.

The content of the standard technological part is being developed in three directions:

1. Skills for hardware preparation for training: understanding of the main concepts of information and communications technologies, knowledge of main computer functions, and ability to properly handle computer work environment.
2. Skills in the preparation of text and video training and learning material using a computer.

3. Skills of Internet service use: ability of using Internet (or Intranet) resources, e-mail.

The majority of problems occur in relation to the part of educational use of information technology in education: how to prepare the training material and which ways of teachers' training should be selected.

The teachers have to be able to apply information technology in their work – teaching and learning. Therefore, teachers have to know perfectly the problems of usage of information technology (has to be aware with pedagogical-psychological, social, ethic, cognitive sides) and their impact on education. It has a particular complication: the emphasis is laid not on the final results, but on the process. Pupil is learning to study – this is the essential paradigm of modern education.

Therefore, the Teachers' Computer Literacy Standard is not restricted by the content of ECDL, i.e., a clearly identified educational part and defined its content. Attention is paid to the integration of information technology into education in respect of pedagogical, psychological and social aspects.

In order to implement the educational part of the Teachers' Computer Literacy Standard, in 2002 a draft on teachers' distance learning was prepared. The content of this course was drafted, teaching methods were selected, attendees selected, training material prepared with tasks and tests. In June–July 2002, a pilot teacher training was carried out. After satisfactory results had been received, in November–December of the same year the course was organised for over one thousand of teachers.

The Specific Features of Using Information Technology in Education

Does the use of information technology in education differ from its use in other fields? No doubt, every field has one or other particular features of which measures and information technology should be applied to it. However, the application of information technology in training and learning has a special feature: attention is paid here to the entire process. The organisation of the training process has a decisive impact on training results. And even on further training, i.e., the use of IT for any field of activities.

Therefore, pedagogical aspects of information technology are of a particular importance requiring due attention. Having taken into consideration the work and recommendations in the field of education novelties, the most important topics to be studied were formulated, in order to successfully apply IT in education (Cornu, 2000, 51–79; McCormick, 1992, 23–49; Schwartz, 1999; Williams, 2000, 307–320):

- methods and ways of IT application in education;
- psychological aspects, related to the most modern technologies;
- education of children with special needs and improvement of training by using technologies;
- problems of creation of information society and contact with education;
- social and ethic problems of using technologies;
- organisation of training and learning by using IT;

- preparation, dissemination, and presentation of training material using technologies.

These topics influence the drafting process of the educational part of the Teachers' Computer Literacy Standard, which provides the following main objectives:

1. Motivated IT importance to education.
2. To examine possibilities of IT use for training and learning, the ways and methods, and capability to apply them.

Having compared the content of the training material of the educational part of the Teachers' Computer Literacy Standard prepared in Lithuania (see a couple chapters below), we may see that the majority of the current topics recommended by world scientists have been incorporated in the prepared course. Besides, almost every topic takes into account the experience of Lithuania, a vision, provides the recommendations how to accelerate and improve the use of IT.

Features of the Educational Part of the Teachers' Computer Literacy Standard

The educational part of the Teachers' Computer Literacy Standard refers to the following two principles:

1. The Standard reflects knowledge and skills, that are not included in the ECDL basic course, but are indispensable for training and learning.
2. Particular attention is paid to social, pedagogical, legal, and ethic aspects of computer use.

According to these principles, the four main qualification requirements were stated:

1. To be able to use ICT in the educational process.
2. To improve systematically the information culture of students and oneself.
3. To know the methods for professional competence improvement by using ICT.
4. To know the main forms of educational information development and dissemination on the Internet and their importance as well.

The better part of topics was incorporated in the first trend of the requirements. Teachers have to be familiar with the models of information skills education (solving information problems), to realize and to be able to analyse the pedagogical and psychological peculiarities of ICT implementation in education, to be aware of ICT integration opportunities in children with special needs education and the types of the main software used for education, to analyse their advantages and disadvantages, to know how to adapt general purpose and teaching software in the process of education, to know the main methods and peculiarities of information presentation on the computer, to be able to adapt manifold setting and hypertext during lessons, to know how to prepare presentations and have skills to use them in the educational process, also to know the peculiarities of computer testing and to acquire skills in order to apply all that in the taught subject.

The second trend of requirements is the development of information culture. Standard covers this issue in a quite complex manner on a prevailing theoretical level. Here

the knowledge of the main national strategic documents is required: the national conception of information society development, and requirements of the Lithuanian students' computer literacy standard. Also, the comprehension of social and ethical peculiarities of ICT teaching and their implementation in the pedagogical activities are also emphasized.

The third and fourth trends of the requirements are, i.e., particular, directed towards practical knowledge of teachers. Here we speak about the main principles of distance learning, the main websites of Lithuanian education, the main methods of didactic material, and the main opportunities of education information dissemination in computer networks.

Having got an insight into the content of the educational part of the programme, its features become clear along with a variety of theoretical topics. Taking this into consideration, respective courses to teachers have been prepared very carefully.

Development of Courses for Learning the Pedagogical Aspects of Information Technology: Structure, Group and Individual Differences

The duration of distance learning is 40–60 hours; the scope of the material is approximately 400 pages. It was considered that a face-to-face meeting should take place only for the first time, in the very beginning of the course. Afterwards all the communication should betaken using the distance learning means: e-mail and discussion group.

The statistics of the pilot course attendance is following: 107 teachers of different subjects took part in the course; 85 of which successfully passed it, i.e., carried out homework, test and filled out the questionnaire.

In the pilot project there was a wish to continue the qualification improvement course expressed:

a) the teachers of informatics and ones of related specialities wished to make more profound knowledge of pedagogical-psychological, and social issues;
b) the teachers of humanitarian specialities wished more extensive explanation of the topics, related to technical computer use aspects;
c) the teachers of all specialities wished to extend the topics of computer support in report's presentations which wasn't covered in the technological part.

Teachers did not object to the distance training form, everybody had a possibility to use the computer and internet at home or at work. The training course has received a positive evaluation. According to the survey, about 90 per cent were in favour of such training structure and content. Therefore, considering certain remarks and having remedied the indicated weaknesses of the training material, it has been decided to use the experience of this training and to train more teachers (and to take in to account certain remarks as well).

It is very important to select proper supervisors who are able to work with groups of people. In the pilot course the groups of teachers were under the project designers, each of them worked with the 20–30 teachers. Since the project developers know much more shades, they knowledge was useful for pilot course attendees: they gave profound answers to questions, clarified more complicated places of the texts, pointed out the problems, etc.

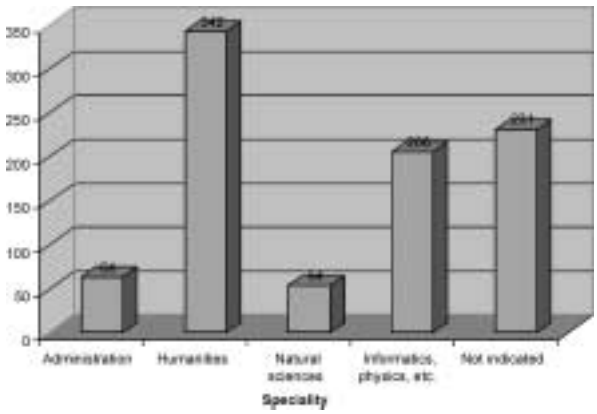

Fig. 1. Distribution of teachers within groups.

After a successful completion of the pilot course, new courses were organised, where the teachers of the whole country could get registered (no doubt, there was a requirement for them to undergo the course of the first part of the standard, i.e., technological computer user course). At first, 1247 teachers of different subjects got registered from all the regions of Lithuania, but only 897 of them took part in the training.

To participate in the courses was possible only for the teachers, who underwent the technological part of the Teachers' Computer Literacy Standard or an analogical one. All the attendees according to their work character and computer knowledge could be divided into the following groups: 1) administration, library employees; 2) teachers of humanitarian subjects (philology, history, etc.), 3) teachers of natural sciences and economics, 4) teachers of informatics, mathematics, physics, and technology. This division of teachers into groups is presented in the diagram (Fig. 1).

Course Model

The training was under the regional instructors, who were the former participants of the course of pilot educational part. Every instructor had to work with the number of teachers (between a dozen and one hundred). The main tasks for instructors were following: consultation of the trainees (e-mail, discussion group), homework evaluation, and overall assessment.

Training groups were formed on the basis of regional principle: this was more convenient to the instructors. Supervisor had a right to change course materials, agenda, make access rights for instructors and learners. Structure of communications is presented in Fig. 2.

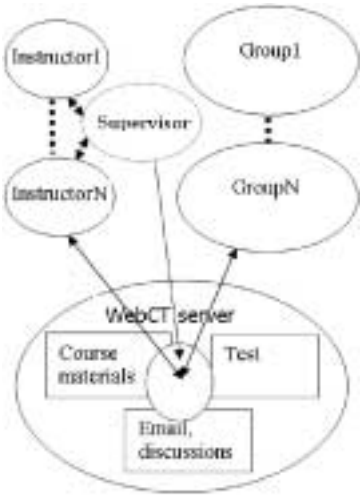

Fig. 2. Communications.

Development of Courses for Learning of Pedagogical Aspects of Information Technology: Contents

The form of distant learning was chosen for the implementation of the educational part of IT in education. The worksheet was placed in server of Vilnius Distance Education Study Center WebCT (`distance.nsc.vu.lt`), each teacher got his own username and password. In the project of distant learning the structure, the relationship and positions of the material were reflected. There are many criteria to adapt the material of distant learning, for example, illustrative images, presenting of schemata, choosing the language and style according the audience (An Introduction . . ., 2002).

First of all, there are two demands for distant learning material:

1. It has to be clearly structured, divided in small logical portions in order reader could easily intermit the learning process.
2. The attractive questions, exercises of self-control, images, and tasks in order reader could constantly check his understanding level.

Structure and content of educational part in fact corresponds with the goals of Teachers' Computer Literacy Standard. The worksheet is divided in to the chapters and rubrics; in each of them the exercises of self-control are placed. The right answer should be picked from two or more possible ones. There are two important aspects of such exercises:

1. All answers should have motivated ground in the material.
2. Inadequacy of the wrong answers should have reasonable explanations.

The worksheet was prepared according to numerous references (works of famous psychologists and educationalists), their connection with modern society and computer technology (Dagiene, 2003). The main contents of educational material for learning pedagogical aspects of IT are presented in Table 1.

Table 1

The contents of educational material for project

Main topic (chapters)	Subtopic (divisions)
1. Ability of use ICT in the educational process	1.1. Models of information skills' education (solving information problems). 1.2. Pedagogical and psychological peculiarities of ICT implementation in education. 1.3. ICT integration opportunities in education of children with special needs. 1.4. Types of the main software used for education, analyses their advantages and disadvantages. 1.5. Adaptation general purpose and teaching software in the process of education. 1.6. Practise of multimedia and hypertext for education. 1.7. Main methods and peculiarities of information presentation on the computer. 1.8. Peculiarities of computer testing and the ability to apply it for the taught subject.
2. Development of information culture	2.1. National conception of information society development. 2.2. The importance of educational institution in the development of information society. 2.3. Requirements of Lithuanian students' computer literacy standard. 2.4. Education the attitude to use ICT in teachers' and students' personal and cultural activities. 2.5. Social, ethical and cognitive aspects of ICT implementing in education.
3. Pprofessional competence improvement by using ICT	3.1. Main principles of distance learning. 3.2. The main websites of Lithuanian and word education.
4. Development of educational information and dissemination on the Internet as	4.1 Methods of development of didactic material and other educational information and ways of dissemination their by using ICT. 4.2. Opportunities of educational information dissemination in computer networks.

The worksheet and exercises of self-control is the main and the most important part of the course. Also important part is the evaluation of course attendants' knowledge. The evaluation can be based on different forms; still the test most acceptable for that purpose. Obviously all questions of the test have to be correct, embrace all material of the course, etc.

Test and Analysis of the Results

At the end of the course teachers get 30 questions those are selected from rather major pack. They have to correspond with all themes of the material still the correct sequence is not obligatory. Most of the questions have four possible answers.

Test was the main criterion to close the course successfully (other task is to make presentation on implementation of IT). In the exploratory project the homework (presentation on IT) was prepared by 93% of teachers, while the test was passed only by 84%. Only few teachers who passed the test didn't manage to make presentation.

In order to pass the test teacher has to choose 24 correct answers with in the space of one hour. Fig. 3 presents the pass-rate according the specialities.

The worst result of the last group could be explained by reluctance of the teachers whose attempts were not successful to point their data. Speaking about other groups, it should be noticed that the difference of average grades is very narrow (Fig. 4).

The test let us make quite unexpected conclusion that educational aspects of IT were understood equally by all teachers. Still, if we'd analyze how the best ratings (29–30 points) are spread we'll have to admit that the undoubted leaders here are the representatives of exact sciences (Fig. 5).

It's very possible that general lowness of their averages were determined by hyper-large self confidence of some of them. That is shown by large part of unsuccessful tests and lowermost grades (24–25 points) – 33%.

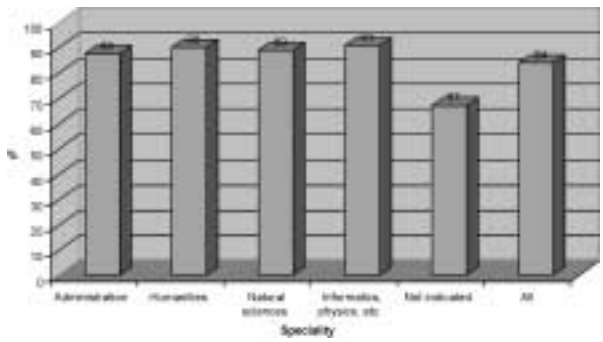

Fig. 3. The proportion of the pass-rate.

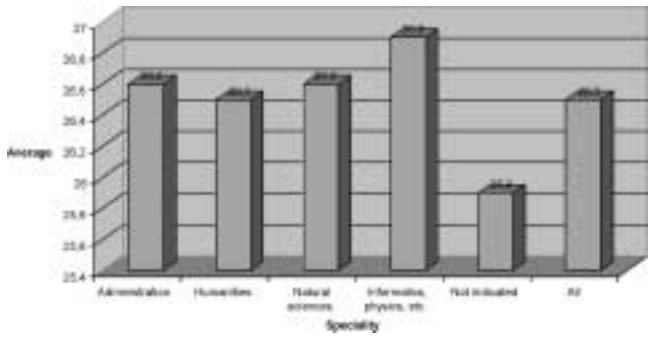

Fig. 4. Average grades.

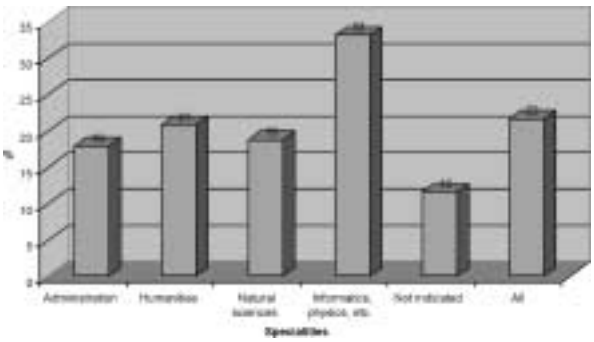

Fig. 5. Distribution of best grades.

Self-Dependent Work

It was noticed that the Lithuanian teachers have already enough skills to prepare the projects. However in this course the inducement to learn to use computer for presentations was made. The home works were analyzed and evaluated according to such common criteria:

1) how the current IT state in the school is described;
2) what advantages and disadvantages do they have;
3) what are the ideas about the future.

Almost all works met those criteria. At the moment the more exhaustive criteria are prepared:

1. The analysis of situation: the possibilities of IT implementation during certain subject or other school activity.
2. Particular aims and tasks for IT implementation in the subject.
3. Described employment of available IT measures.
4. List of the applied methods of teaching (learning).
5. Short analysis of the problems and achievements.
6. The guidelines of possible further activities.
7. The presentations without any technical rebuke.

Conclusions

A National Strategy for ICT Implementation into Education has been developed, in which the teacher's role and qualifications are one of the most important parts. The Computer Literacy Standard prepared a year ago is the most significant document in the teacher training of ICT. The attention of teacher training courses has been shifted from the development of technical skills to the educational aspects of integrating ICT in education.

The course that satisfies the educational part of teachers' computer literacy standard was prepared choosing the method of distant learning. On summer 2002, the pilot project

was performed; 107 teachers took part in it. The evaluation part was presented. 90% of attendants successfully passed it.

The special exhaustive questionnaire was made in order to get feedback. The questionnaires were filled almost by all course attendants. Agreeably to the results of questionnaires the analysis of all the worksheet was made. The material was corrected and some chapters even totally recomposed according to the results.

On November–December 2002 the first part of the teachers (approximately 900 people from all regions of Lithuania) took part in training. 84% of them were positively assessed. The training was supervised by regional tutors.

The analysis of the learning results let us to assert, that the educational part of IT implementation was understood equally well by all the teachers, despite of their speciality. Homework has showed that teachers have enough skills to prepare the projects and their computer-aided presentations. This course will go further; the total number of the Lithuanian teachers who plan raise their qualification in IT field is approximately 5000.

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Nuotolinis mokytojų mokymas informacinių technologijų naudojimo edukaciniais klausimais

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Straipsnyje aptariamas pedagogų informacinių ir komunikacinių technologijų (IKT) kvalifikacijos tobulinimas nuotoliniu būdu naudojant specialiai tam parengtą kursą, atitinkantį pedagogų kompiuterinio raštingumo standartą, sudarytą iš dviejų dalių: technologinės ir edukacinės. Technologinė dalis glaudžiai siejasi su Europos kompiuterio vartotojo pažymėjimo (ECDL) reikalavimais. Edukacinė dalis apima keturias kvalifikacinių reikalavimų grupes: 1) mokėti naudoti IKT ugdymo procese; 2) gebėti sistemingai ugdyti savo ir moksleivių informacinę kultūrą; 3) žinoti profesinės kompetencijos tobulinimo, naudojant IKT, būdus; 4) žinoti pagrindines edukacinės informacijos kūrimo bei sklaidos internete formas bei šios veiklos svarbą.

Edukacinei daliai paruošta mokymo medžiaga 40–60 valandų trukmės kursams naudojant nuotolinio mokymo priemones (WebCT). Pirmasis medžiagos variantas buvo išbandytas surengus žvalgomuosius kursus, kuriuose dalyvavo 107 pedagogai. Mokymo medžiaga buvo taisyta atsižvelgiant į kursų dalyvių pageidavimus: išplėstos kai kurios temos, prijungtas pateikčių naudojimo modulis.

Naujuose kursuose 2002 metų pabaigoje dalyvavo apie 900 mokytoju. Buvo registruojami tik tie dalyviai, kurie turėjo pakankamų standarto technologinės dalies žinių. Visi pedagogai regioniniu principu buvo padalinti į kelias grupes, kiekvieną grupę konsultavo ir vertino paskirtas konsultantas. Norėdami sėkmingai baigti kursus mokytojai turėjo išlaikyti testą bei parengti pateiktis. Į testo klausimus sėkmingai atsake 84%, pateiktis parengė 93% dalyvių. Testo rezultatų analizė leido daryti išvadą, kad edukacinę dalį gerai suprato visų specialybių pedagogai – vidutiniškai atsakyta apie 26,5 klausimo iš 30 pateiktų (teigiamas įvertinimas nuo 24). Šių kursų pabaigoje buvo pataisytos mokymo medžiagoje likusios smulkios klaidos, patikslinti reikalavimai pateikties ruošimui. Planuojama apmokyti apie 5000 Lietuvos mokytojų.