REALISATION OF POST-GRADUATE TRAINING FOR TEACHERS OF INFORMATICS OF RURAL SECONDARY SCHOOLS VIA INTERNET

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ABSTRACT

The Curriculum combining both traditional classrooms and Internet-based activities for regular post-graduate training for the teachers in informatics is developed, approved by the Ministry of Education and Science and implemented in Latvian Republic. The Curriculum is anticipated for teachers from rural schools, excludes embarrassing overnight staying on training site, improves teacher's professional skills and helps to create county-wide network of partnership. Teachers on Informatics are in indirect way involved as experts of eLearning arrangement.

Keywords: Computer-based teaching, Classical teaching, continuing education, approvers

INTRODUCTION

Usually virtual collaborations (e-meetings, e-conferences etc.) is promoted mainly to technologically advanced high and medium level management with the profitable aim to save up time and money for journeys. We have discovered that Internet-base collaboration could be in great benefit for ordinary inhabitants of rural areas also. Further follows description of particular campaign curried out in Latvia by Riga Technical University (RTU). Working on main task of teachers' post-graduate training the possibility to make research on eLearning methodology is appeared. Teachers being IT-experts acquiring arranged course made sense of eLearning processes features and therefore are ready to accept for approbation not completely worked through methodology.

NECESSITY OF TEACHERS' POST GRADUATE TRAINING IN UNIVERSITIES

Evolution of Informatics course in secondary school

Historically Informatics course appeared as the result of development and implementation of computers. To the classical curriculum was brought academic notion of new computing environment empowering, logical and physical principles of working. Informatics course has adopted also several parts of classical logics and math courses of secondary school. Informatics discipline was introduced in curriculum of all Baltic States. For pupils it was great interest on new medium, its design and opportunities. Therefore Informatics disciplines were popular in pupils midst, although it looks only at theoretical level of computers usage and mainly teach for logical thinking and basics of algorithms.

Exactly fundamentals of algorithms became the basis for background of secondary schools pupils to familiarize high schools disciplines related to Information Technology. Due to evolution of computer facilities computers appeared at schools also. Both teachers and pupils had chance to use computers practically, moreover often for unlimited time. New technical facilities made essential influence to Informatics discipline. Thus in Latvian Republic sequentially was implemented a couple of different curricula standards. New approach for teaching of Informatics at secondary schools converts the course of Informatics from explicitly academic to explicitly pragmatic where the certain aim is to prepare pupils for everyday computer usage. New approach resolves several problems related to application of computers in learning process. Pragmatic approach allows also right now for secondary schools graduates to take a job, especially in regions.

New trend of Informatics at secondary schools and learning in high schools

Despite of positive aspects of new approach for Informatics learning at secondary schools from our point of view it brought highly profound problems. For instance, it is generally accepted that vocational pragmatic education follows after academic education and is based on academic theoretical cognition. Presently to high schools come students with pragmatic skills that do not ground on theoretical knowledge (Grundspenkis et. al, 2006-1). As a result a couple of problems rise:

- schools' graduates did not familiarize themselves with algorithmization and are not ready for solving of logical tasks;
- schools' graduates consider themselves as qualified computer users whom theoretical knowledge of computer application not needed as they already are practical experts;
- a lot of schools' graduates whose enter Information Technology specialty of high schools have supreme wrong concept of their future job.

To improve the situation of learning at high schools not broken results of new approach to Informatics learning at secondary schools a set of special measures is needed.

Preconditions of post-graduation

The first precondition is that according to Latvian rule each teacher of school (both secondary and primary) must once a 3 year to improve his/her professional skills through special training courses. Duration of such courses have to be not less than 36 contact hours. In most cases such courses are provided in Riga - the capital of Latvia and their duration is 5-6 days. It means that teachers form rural schools are forced to spend around the week out of home (the distance from Riga to frontier areas is up to 300 km). For many of rural inhabitants it is very uncomfortable due to their style of life and daily duties.

The second precondition is that conventionally there are many graduates of rural secondary schools between students of the Faculty of Computer Science and Information Technology of RTU. To a certain extent it is due to regular 1-day seminars for the teachers of informatics hold by Department of Informatics and Programming of RTU. Department provides the fundamentals of software for all year 1 students of university as well as set of courses for the whole faculty.

Mentioned seminars have two basic aims. From one hand it is the part of annual stump (presentation of University, Faculty etc.), from other hand – a good chance to talk over problems and weakness in readiness of future University's students to study informatics in high school. So the main part of seminars was focused on methodology and methods of studying of informatics in secondary school.

There were much more subjects for conversation than is possible to discuss during one day, but attempts to increase duration of event shorten immediately number of participants from regions as it requires from them to spend a night out of home.

As a result of mentioned above two preconditions has born an idea to organize official (recognized and approved by the Ministry of Education and Science (MES) of Latvian Republic) training course over the Internet. The idea has got support by MES and the Syllabus "E-course for practical computer using in teaching of programming and adopting of application programs" was developed. The Syllabus was certified by the MES as legal post-graduate training for teachers of informatics (Lavendels et. al, 2005; Grundspenkis et al, 2006-2).

INTERNET-BASED TRAINING

The rest of the article is devoted to our experience in creating of study group, its face-to-face instruction, "rolling-on' Internet-base sessions, behaviors of "virtual participants", a bit of statistic, explanation of collateral effect, conclusions and plans of further development.
The Syllabus consists of 1-day introductory seminar in Riga, set of Internet-based sessions and final 1-day seminar. The platform for Internet-based collaboration is Blackboard (http://www.blackboard. com), tool for presentation development - ScreenFlash (http://unflash.com/).

AVERALL PROBLEMS OF E-LEARNING ORGANISATION

Classical teaching

The following two basic teaching forms are developed: using text-book and intramural lessons in class-rooms.

Properties of the classical teaching are as follows. Textbook is the repository of knowledge. The learner works usually with textbook individually therefore manage this process by him/herself. Lessons in class-rooms nowadays envisage the teaching of the group of learners under the conduct of a teacher. Both mentioned forms of teaching were progressing over centuries and stroked the society including psychological-emotional comfort and perceptivity of learners during the lessons. Both form of teaching complement each others i.e. reading of textbooks together with taking lectures, classroom's consultations after studying of correspondence courses.

Despite of a long coexistence, processes of classical teaching do not have the tendency to join together because the first teaching process is a sole, but the integral part of the second one is a group of learners with the properties typical exactly for a group. Classical teaching methods usually are seen as the achievements of pedagogy and are analyzing particularly from that point of view.

In contradistinction to mention above we are looking to the process of teaching as to interaction of intellectual systems with highly complex structure (Figure 1). Direct teaching materials is only one of influences that particular learner has get during the lesson. For effective teaching not less important than previous one are also another influences that come from lecturer and from the auditorium: intensity of presentation of teaching materials - the lecturer has determine the proper intensity exactly during the lesson, behaviors of another learners and their actions (disturbance, questions etc.), interest of the learner himself and others learners on examined subject, discussion on the subject.

During the lesson and during the whole learning process learners are influencing the teaching staff as well. It could be in direct and indirect manner and such influences come both from particular learners and from the group of learners at whole.

Teaching staff during the lesson is adopting to influences form particular learners and from auditorium at whole. It is “quick” feedback. The influences are expressed as: feedback from the whole auditorium (interest, attention, manners as well), feedback from particular listener whose background differs from average background of auditorium (interest, attention, manners as well), questions during the lecture and after it, discussion if teaching staff allows it.

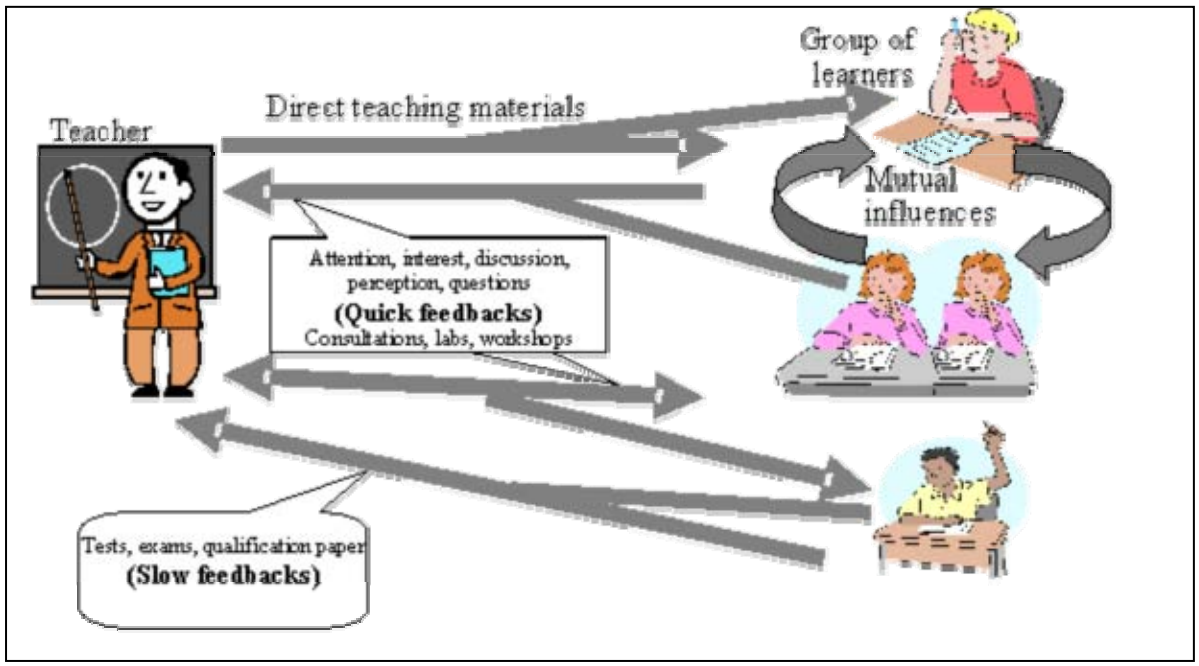

Figure 1: Data flows and feedbacks in classical teaching.

During the whole process of learning is working “slow” feedbacks that have an effect on activities related to inspection of the familiarization of teaching materials: consultations, test works, workshops, tests, exams.

As the teaching is carrying out usually by the person who is an expert in particular studying (subject) area that mentioned above feedbacks are not separated and analyzed preparing particular course of instruction. They (feedbacks) are bearing in mind only by the light of nature on the basis of lecturer’s (author’s) pedagogical background and experience.

Conclusions about the classical teaching

- Classical teaching process due to it’s developed by centuries structure is adaptive both from teacher and learners sides. Therefore it is effective and emotionally comfortable both for lecturer and listeners;
- The model of classical teaching process is multi-elements self-controlling system. This model includes the range of mutual influences which provide both the adaptation of system’s elements to the current situation and optimization of the system’s work within the long time;
- In classical teaching could be recognized “quick” and “slow” feedbacks which provide mutual adaptation for the teaching process participants and give the ability to teaching staff to optimize the process;
- Deviation from classical teaching scheme usually do not allow to mentioned feedbacks to work either completely or partially. As a result the teaching system could not adopt to the current conditions as well as to optimize its work within long time slot therefore brings to the learners and teacher discomfort and essentially decrease the quality of teaching process.

Computer-based teaching

Computer-based teaching (CBT) is a result of attempts to apply new technological tools for storing the information and further its representing to the learners. Computer as the data repository completely could replace the textbook, but the learner who is guided to classical mechanisms of knowledge adoption, not always is emotionally and psychologically ready to replace the book with the computer. The further research was address to assignment of the properties of a teacher to the

computer. Of cause there were attempts to assign appropriate properties only to teaching materials – to prepare the information in specific manner i.e. using of keywords for quick searching, collecting the information about the most frequently asked questions and the most frequently met mistakes etc. Nevertheless even such approaches were brought about discomfort to the learner. Studying individually the learner is managing the process by him/herself, but in computer-based teaching the process of sole learning is controlled by the computer (Леонтьев et. al, 1987; Новицкий 1990).

Properties of computer-based teaching

CBT systems very often were developed by particular knowledge area's experts whom are not deep knowledge in pedagogy and deep experience in teaching process. The main focus in such teaching usually was devoted to the content of reviewed subject – to precision of essential details, but less attention was made to the organization of teaching process and its appropriateness to learners. In CBT each learner is working individually (solely) and therefore do not exist such entity as the group of learners that is an integral and historically accustomed part of the teaching process. Absence of a group creates discomfort to teacher during preparation of teaching materials in computer-based form as it is not the ability reactively to adapt to the particular current conditions during the teaching process like in classrooms.

CBT usually do not envisage quick reaction and adaptation to the actions of listeners, but envisage only more less fixed teaching scenario that to a certain extent can be customized to learners asking additional questions or giving additional quant of information etc. Attempts to replace physical learner with overall generalized model of a learner and therefore to simulate quick feedbacks usually do not give the desired results because the development of precise learner model is more complicated task than the teaching process by itself (Леонтьев et. al, 1987; Растригин et. al, 1998). Computer-based teaching system even if it fully accomplishes nowadays achievements of artificial intelligence cannot provide genuine adoptive discussion with the learner.

Thereby CBT from organizational point of view cannot fully provide properties of classroom's lessons because existing technological tools cannot provide genuine adoptive discussion with the learner, it cannot provide quick feedbacks and could provide only slow feedbacks.

Exactly by the lack of that feedbacks are illuminated the following problems of CBT: it is difficult to authors to provide necessary level of detail, speed of presentation, the learner cannot enter into the spirit of a lesson because there is not physical auditorium around him (there are not interested listeners whose keep discussion with a lector).

Conclusions about computer-based teaching

- CBT has a lot of weaknesses that will not be overcome in the immediate future because CBT does not have formal semantic equivalent to brainwork of the teacher and therefore it has not an effective algorithm of teaching;
- To resolve problems of CBT is necessary to apply achievements of the other knowledge areas – artificial intelligence, theory of algorithms, theory of systems etc.;
- Despite of the problems of CBT it is necessary today to develop teaching tools for the Web because it is necessary to teach learners who for a variety reasons cannot attend classroom's lessons. For instance, they are teachers from rural schools.

Teachers on Informatics as approvers of new approaches

The analyze shows that computer-based teaching by its organization, data flows and main management rules differs from classical forms of teaching. It is unlikely that in nearest future computer-based teaching from learners' point of view could come closer to classical teaching. Despite of just mentioned computer-based teaching is needed for nowadays information society. But this form of teaching must evolve as self-dependent without trying to copy classical teaching both in classroom's version and as independent work with book.
Teachers on Informatics as against from many others users of eLearning courses are able evaluate both strengths and impartial weaknesses of e-course. Therefore teachers on Informatics in particular are the most appropriate audience for approbation of eLearning methods. For that reason implementing continuing education of teachers we simultaneously settle both further education and evaluation of eLearning issues.

SELECTION OF PRESENTATION TOOL

It was decided from very beginning that presentation materials have to be "as alive as possible" that means not only showing the face of presenter, but mainly to provide:

- the voice of presenter, accompanying by moving pictures;
- pictures similar to written by hand;
- showing the execution of program, moreover with additional comments over the image of the screen;
- ability to watch presentations without any specific client-side software.

So the first task was to select presentation tools allowing lecture recording. The decision was made to find not the best from provided, but to use the fist found that corresponds to mentioned above requirements. Search has been stopped on ScreenFlash (http://unflash.com/). Recorded movie could by played by simple browser.

KICK-OFF MEETING

First face-to-face meeting is necessary not only to go through the formalities (application form, signature etc.) but also to understand local conditions in what participants will act. Those are:

- internet facilities (type of connection, broadband capacity, used e-mail client and browser),
- rights of participants to install additional software (in institutional equipment as usually any new installation could be done only by System Administrator),
- ability of access to Internet not only from schools, but from home also (for working at out-of-office time),
- previous experience of "chatting" and participation in forum.

Evaluation of participant's conditions has discovered that many of them have mail-boxes from public-wide e-mail providers (local equivalent of "hotmail" and similar) with the limitation to the size of attachment. To a certain extent it predefines preparation of presentation.

The last and main task of meeting is to explain to participants how the further work will be done.

PREPARATION OF PRESENTATION

The main issue was not so as to record a lecture, as to determine the optimal duration of one movie. To have an ability to send presentations by e-mail, initially limitation of file size was set up to 5 MB (it is the maximum size of attachment allowed by many of e-mail servers). In records made by ScreenFlash it gives about 15-minutes movies with sound accompaniment.

Later when we proceed only to downloading from our server and such kind of limitation was declined, it became clear that 15-minutes quant of recording is the most convenient to the lecturer also. So theoretical part of course consists of 15-minutes movies consolidated in blocks.

COLLABORATION PLATFORM AND SOME STATISTICS

We do not select appropriate collaboration platform, but simply utilize solution which RTU had at that moment – it was Blackboard.

We started with short movie explaining how to use Blackboard and had sent it by e-mail to all our participants together with request to confirm delivery, watching and understanding the contents.

19% of our respondents did not respond on first message at all (despite of obvious interest expressed on kick-off meeting from one hand and several telephone calls, e-mails and SMSs with reminders from other hand). Obviously it is simple probabilistic dropout that could be ignored on evaluation of result's strengths and weaknesses.

The rest of participants had entered the Blackboard following given in movie instruction and made a note in e-forum that they are ready for training. In further e-forum was the main point for information exchange.

13% from participants who started e-course had broken it or postponed training to some future. The reasons were or the lack of time or complexity of considered issues, but no one case due to inconvenience of distance learning.

Therefore 70% of kick-off meeting's participants successfully completed the course.

LECTURES AND PRACTICAL EXERCISES

Initially the idea was to provide artificially some king of synchronous actions. Each participant was instructed to mark the state of downloading and further mastering of training materials in especially opened e-forum. New training materials were set up for downloading only after mastering of previous content by the majority of participants. It seems to us that in such manner we could expect the most dynamic debates in e-forum on familiarized issues. However later due to numerous requests from the doing well participants we had decline from artificial holding of progress and the rest of course went purely in asynchronous mode. That by the way didn't decrease activity in e-forum. Designations of performance, questions to lecturer and internal discussions between participants gave to moderator full control over an event.

Besides of pure informational materials – presentations and explanations, the course includes a set of tasks for practical execution also. Executed tasks in this case for the reason for more confidentiality were sent to evaluator via e-mails. That simple solution was convenient and secures enough. Primary idea was to carry out the course partly in offline mode and partly arranging real-time sessions. The first one was realized fully - Blackboard's features like e-mails, repository on learning materials, forum etc. works perfectly. However establishing of life interactive session has failed as even the most advanced of our participants couldn't install Blackboard's client part necessary for online mode.

FINAL MEETING

The main aims of final meeting sequentially are:

- to introduce participants with each other - after virtual interactions some images of participants were formed and it was interesting to them to communicate now "in alive";
- to bring to the end training by itself – to realize troubles and mistakes in practical exercises (hereto to verify authorship of the work);
- to issue the certificate;
- to evaluate SWOTs of content, used platform and applied methods.

The evaluation shows that realized distance learning Syllabus is very attractive for participants and graduates of the course gave very high appreciations for the approach. By the way for many of them it was first experience of cyberspace collaboration.

COLLATERAL CONSEQUENCE

Besides the primary aim – improvement of teacher's professional skills, realization of training over the Internet gave very generous additional effect – desire of participants to continue e-collaboration. People being far from advanced technological and scientific centers could actively participate in joint efforts and fill their involvement in outstanding problems solution.This wish of e-collaboration gave us unique infrastructure of partnership that allows us to plan country-wide experiments and implementations. This infrastructure will be used in a couple of future projects. We are intended to use created human-technique structure not only for education, but for different kind of informational events and research also.

CONCLUSIONS

First of all the primary aim is achieved - rural teacher's post-graduate training in the way most convenient for them.

Additional result of undertaken activity is formation of the certain country-wide e-community. Members of this community feel like absolutely equal in rights partners and equally participating in work irrespective of their site. Actually they originate a set of supporting points capable to perform various activities.

This network of partners could expand at least in two dimensions:

- on first level by new graduates of Syllabus;
- on second level the network could be expanded by the teachers in informatics from schools nearby to supporting points of the first level. In this case first-level partners will act as moderators.

By such network is possible to cover up almost the whole county and use it not only for education, but for different kind of evaluations and informational events.

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