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INTERNET AND COMPUTER SUPPORTED LEARNING IN RURAL SCHOOLS

(IMPROVING TEACHERS' CLASSROOM TECHNIQUES
WITH ICT TECHNOLOGY INTEGRATION)

Summary of the PhD thesis

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Contents

1. Introduction

I have more than 15 years of practice in in-service training and teacher training. In recent years I attended a lot of conferences, research projects and other events regarding the use of ICT in Education. My broad experiences inspired me to seek and research the educational practice of infomation and communication technologies. Both my study trips abroad and studying the literature of the profession convinced me that research on the hidden possibilities of this issue can support underprivileged pupils to catch up with their peers. This can be done indirectly, through the enhancement of teachers' professional development.

Since the launch of the Sulinet programme in 1996 a great number of articles have addressed the issue of teachers' changing role (e.g., Fehér, 1999; Komenczi, 2000, 2001; Nagy, 2001), but the concrete gains of teacher in-service training courses in everyday practice have not been reported. My personal experience in teacher retraining programmes also encouraged me to start researching the possibilities for making teacher development courses more efficient. Some research results point to the fact that distant learning and e-learning are not efficient enough to reach the aims set, and this also played a role in my choice of research aims.

2. Aims of the research

The key aim of my research was to find adequate tools and methods improving teachers' classroom techniques with ICT technology integration. For this reason it was important to understand the facts and figures and identify factors determining the use of ICT in the clasrooms. After the first phase of the research I tried to implement an action-research related to the proven methods with ICT mentoring teachers.

The aims of the different phases of research were the following:

- The qualitative analysis of internet access and ICT-tools of rural schools, and ICT-usage of teachers.
- The qualitative and qualitative analysis of ICT methods of teachers.
- To examine of the implementation of the „mentorated innovation" in an action reasearch and development new collaboration methods between teachers.
- To examine of technology integration possibilities of different subject teaching.
- To examine the barriers of technology integration and ICT competencies among rural primary school teachers.

3. Methods of research

The dissertation consist of 3 different research elements, which are combined into one comprehensive whole. These were the following stages:

> **1. Effects of ICT on the practice of schools – 2003-2004.**
> **2. An innovated mentoring in OECD ROIP project - 2003-2005.**
> **3. The barriers of development of ICT-competencies of teachers, 2006-2007.**

I will present the aims and tools separately in the next sections, however, in spite of their complexity it is easy to follow their common roots and close connections with each other.

The first research project was supported by the Research Grant of the Ministry of Education and the Hungarian Academy of Sciences, the second one was supported by the Hungarian Ministry of Education and the OECD.

3.1. Effects of ICT on the practice of schools – 2003-2004.

The aims of the first phase of research were the following:

- How much ICT-tools are in rural schools (number of PC's, internet access, etc.)?
- How often use teachers different teaching methods in their classrooms? Which methods do they prefer?
- How much technology tools and access does the school provide teachers supporting the implementation of ICT for them?
- Is there enough good learning content available via ICT?
- Are there different learning places and enviroments (school library, computer lab, virtual learning environments, etc.) implemented in everyday practice of schools?

I planned following methods: questionnares for teachers and head-teachers, interviews with a selected teachers and making case-studies in schools, presented best practice. (The research paper of Éva Tót, which has been communicated in different sources (for example *Tót*, 1999), provides a good source for analysis of similar findings). I use also the results of my earlier research (*Fehér* 2001, 2002, 2003c.), and the data published regarding similar studies by much bigger sample (*Tót*, 2001a, 2001b, 2001c, 2002, *Gallup Intézet,* 2002)

The members of my research group (*Gajdus Istvánné, Kucsanda Ibolya és Pércsich Richárd)* involved in designing research questionnaires. Both schools in the sample got three questionnaires: one for head-teachers, one for teachers and one about general factual information about school.

The questionnaires contains following topics:

  - The ICT background of schools (13 factual questions)
  - Questions about ICT usage of teachers (13 questions)

The general questionnaire contains questions related to statistical data (number of pupils, number of teachers, usage of ICT-labs and library, etc.) The validation of the questionnaire was tested by experts of the Pedagogical Institute and the correction was made.

To strenghten data validation and investigating more background and personal information we planned az interview in 30 choosen schools. This sample contains about 21% of schools of Baranya County, but we chose schools better than average regarding ICT usage. The selection of schools was based on the results of questionnaires and their earlier activity in this subject (known by us). An important aspect of selection was to represent every region of Baranya.

The case studies were based on selection of best schools, because we wanted to find and present a best practice case for others. We introduce two of these works (Bicsérd, Nagyharsány) in details in the dissertation. The example of these schools illustrate well, how an effective workplace for teachers can be organised, and how ICT tools can be integrated in everyday collaborative work of innovative teachers with supporting school management.

3.2 An innovated mentoration in OECD ROIP project - 2003-2005.

The OECD started a new research initiave in October 2002 regarding „ICT and Policies Of Inclusiveness and Equity". The Hungarian Ministry of Education joined this initiative and comissioned Eötvös University, UNESCO Centre for ICT in Education to launch the national research project in cooperation with OECD in January (*Kárpáti*, 2006) The coordinator of this research project was Prof. Andrea Kárpáti. The project started with an international seminar held in Budapest in June 2003. There were 54 participants from 19 countries presenting lectures on „*Promoting Equity Through ICT in Education"*. They summarized how ICT in Education for the handicapped, low-achieving or disadvanteged students in different countries of the world could be supported.

In the framework of this project the Hungarian research group planned an action-research. We created an ICT-enriched, constructivist like learning environment in 10 primary schools of Borsod County in North-Eastern Hungary. The researchers developed a teacher training programme for different groups of subject teachers to support their works with handicapped Hungarian Romani children.

I worked in this project as an ICT consultant between June 2003 and June 2004. We have succesfully implemented a new method called „innovated mentoring" and

combined „blendid learning" with face-to-face teaching and distance learning. I have collaborated with 8 teachers of different schools from Borsod county, supported and evaluated their work smoothly. During research collaboration they made different developments (webpages, presentations, school journals, etc.) in their own schools evaluated within collaborative work.

3.3 The barriers of development of ICT-competencies of teachers, 2006-2007.

In the framework of HEFOP 3.1.3 and HEFOP 3.1.4, from the autumn of 2006, many thousands of teachers had the opportunity to learn about the methods of skills-based (competence-based) education. Besides skills-based courses, a strong emphasis was put on ICT-courses to support teachers in classroom work. I started the third phase of the research project in October 2006.

Recent research findings show that although more teachers understand the benefits technology can bring to learning and teaching, not all opportunities are being fully exploited. In this research I wanted to collect information about reasons why ICT methods are so rare in teachers' classroom practice. My hypothesis is that teachers lack ICT-skills, and they are avoiding engagement with technology. As a first step of the longer research I tried to reveal the roles of first- and second order barriers (regarding *Ertmer*, 1997) of technology change. Which one is more significant between Hungarian teachers? The first results have been presented in EARLI Conference paper (European Association of Learning and Instruction) Budapest, 2007 (*Fehér,* 2007).

My sample consists of those teachers, who have got at least 30 hours of ICT training background, and proved anyway their commitment to ICT-based methods. The validation of this criteria has proven by attendance in SDT-courses *(Using the Framework and database of Hungarian Schoolnet in teaching/learning process in the classroom - A Sulinet digitális tudásbázis keretrendszerének, adatbázisának felhasználása a tanítás-tanulás folyamatában)*

A questionnaire was designed to collect evidence from teachers about their ICT experiences, expertise and use in teaching, their attitudes to the value of ICT for teaching and learning, the training they had received.
I asked teachers to fill in the questionnaires voluntarily after completion of courses or later, and they sent them back by e-mail or regular letter. I chose mostly primary school teachers, excluding ICT-teachers. (There were 9 preschool teachers out of 97 teachers of the sample.) I tried to filter out those, who attended the courses only by external pressure not being interested in ICT (there were only 2-3 such persons).

Most of the teachers in the sample (more than 87%, N=77) work in rural schools, therefore I did not examine rural-urban relationships. There was a ratio of females to males 88,6% - 11,4% in the whole sample, and 87,4% - 12,6% is between school

teachers only, the same as in the whole country. (*Jelentés a magyar közoktatásról,* 2006)

4. The layout of dissertation

In my doctoral paper I have summarized the results of three research projects and all of my experiences of a 10 years long teaching and research work.

The dissertation consists of seven chapters preceded by a table of contents, a list of figures and tables.

In chapter one I discuss the chosing of research topic and shortly introduce the importance of promoting equity through ICT in education.

Chapter two introduces all the details of the my research projects (aims, hypotheses, choosing samples and research methods. I present questionnaries and interviews used in this project.

In chapter three I analyzed existing studies from the mid 90's to 2006 that reported empirical research findings and practices of different countries. In this chapter I first deal with the theoretical framework of ICT usage focuses on constructivist theory and pratice. After that I have analysed an ICT usage of educational settings on an international context and the practice of teacher training experiences of some EU countries. Finally I summarize the history of Hungarian initiations and projects regarding ICT in education between 1993-2007, from the Public Education Development Plan of Soros Foundation to EU E-Twinning Program. (The author took part actively in some projects, too.)

Chapter four summarizes the results of the project „ICT and teachers of rural schools". I give a detailed overview of results of questionnaires, teachers' interviews, and present two case-studies about practice of successful implementation of ICT in rural schools. After discussions I give a recommendations for different kind of school developments. The details of a widely accepted theoretical model „Internet-pedagogue" is also described in this chapter.

In chapter five I presented an research project, which had implemented by mentorated innovation through OECD ROIP framework. This chapter focused on practical approach, and introduce an applied methods, tools, and briefly analyse of practical works of teachers (school webpages, presentations, schools journals).

Chapter six introduces the most important data concerning the barriers of ICT usage of teachers: After the discussion of sampling and questionnaires, I present the statistical analyses of questionnaire.

Finally in chapter seven goes through the hypotheses set up in the second chapter, proves (or disprove) them and outlines the results. After that section I summarize new results of the my work give some recommendations for further research.

5. Theses and results of work

In the dissertation I have taken a glance the best methods and practices of using ICT in Education, based on published national and international experiences and analyses. After this survey I tried to summarize results of my own research and present a comprehensive view of the current situation of rural schools. I explored the relevant details of technical backgrounds and human resources of educational institutions, then proved by practice that a „mentorated innovation" method (suggested by A. Kárpáti) for improvement of teachers ICT-literacy and competencies meet the requirements very well. This model is also suitable for ICT improvement of rural schools taking into account local characteristics. Finally, I revealed several aspects of development of teacher's ICT competencies. The results of my research could support decision and policy makers to improve the planning and developing technology integration in Hungarian schools.

5.1 Evaluation of research hypotheses:

In my dissertation I discussed following hypotheses:

1. ICT tools, access to the internet and resources, and providing teaching materials are not enough for a wide spread of technology integration in Hungarian schools. However, there is a minium and optimum level of access to technology having an effect on the results of education.

Any kind of method of didactical innovation requires a lot of work and more erudition by teachers. It is especially true when trying to use computer supported methods, because in this case the methdological improvement is combined with a very special knowledge and practice (ie. use of computer and using the internet.) My research shows that basic computer courses are not efficient for adapting new ICT.supported teaching methods into classroom practice. The minimal level of knowledge recommended is the EPICT course which is specifically designed for teachers. Another benefit of EPICT is the pedagogical add-on values. After successful course completion teachers are able to develop pedagogic scenarios and use ICT in their teaching process. The team collaboration during EPICT assisted them to develop their knowledge on the pedagogic use of ICT and develop a positive attitude towards collaborative learning approaches.

The optimal level of knowledge recommended is an „oktatási informatikus", which provides teachers with high-level skills not only for using, but adapting or developing new materials.

2. *Freshly graduated teachers could help rapid change technology integration in public education, because they are better trained in ICT education in primary, secondary and higher education (teacher training).*

Surprisingly, this hypothesis was proven wrong. The results of research identify the most effective ICT users among teachers between ages 35-39, who are able to combine their experiences of subject teaching with high level ICT profficiency. It emphasizes that information and communication technology can enhance teachers' learning and their professional developments by giving opportunities to initiate new ideas through their classroom experience.

Results also indicate that the curriculum of teaching of ICT supported learning needs more emphasis in teacher training. Otherwise, a lot of ICT training on its own is not enough to be a good subject teacher, it requires years of subject teaching experience, too. The above hypothesis also implies that the missing ICT skills of new teachers requires in-service training courses for them to increase the level of ICT knowledge.

3. *One of the most effective models of technology integration is the „mentorated innovation", which integrates in-service training and blended learning with acquiring knowledge through the use of new tools and methods among teachers.*

The successful collaboration between teachers and researchers in OECD-ROIP project proved clearly this hypotheses. The professional development programs for teachers should be more than a range of training workshops, meetings, and in-service days. It should be a process of learning how to put their new knowledge into practice. I found that the level of teachers' practical work is more usable, than traditional course lessons. With the support of well trained ICT-mentors the teaching materials and new methods are easily accessible for teachers and they can build personal relationships among colleagues with the same subject. It is helping to increase the motivation of teachers in collaboration, too. The main barrier of the application of this method is the large demand of human and financial resources. However, its efficiency may prove the usefulness of the investment. Implementing an ICT mentoring system for schools requires thoughtful planning, but it supports very efficiently technology integration in Hungarian public education. The theoretical questions of the „mentorated innovation" are detailed in chapter 5.

4. The handicap of teachers of rural schools can be significantly decreased by providing access to ICT-tools and teaching best-practice methods. It is also necessary and important to give them mentoring and support which help to develop the pedagogical effectivness of teaching practice.

The third phase of my research shows that the technical background of schools and teachers increased significally in 2006-2007. We can conclude also that ICT-knowledge, motivation and activity of teachers increased as well. Teachers gained much better results, the areas of ICT-usage among teachers is widened and became more profound. As other sources indicate, I can also substansiate a claim that the best teachers of rural schools and the „main body of the army" (ie. 75-80% of ICT literate) is not left behind their urban colleagues. To exactly clarify this further qualitative research is required.

5.2 New findings of my research

The new findings of my research are:

- Based on the model of „internet-pedagogue" (*Fehér,* 1998), which has been referenced a lot in recent literature, my research found that teachers around 40, with at least 15 years teaching practice produce the best practice regarding ICT in the classroom. (*Fehér,* 2003b).
- On the basis of the theoretical model of „mentorated innovation" (*Kárpáti-Molnár*, 2004b, *Kárpáti-Molnár*, 2004c, *Kárpáti-Molnár*, 2005.) I have successfully implemented the model into practical work in OECD-ROIP Project, and we proved its usability in teachers collaboration.
- I have described the ICT features and technical backgrounds of rural schools and clearly identified the difficulties and barriers of ICT usage of teachers. Our research findings are very similar to those of the entire Hungarian population. Some results of research have proven based on statistical methods (khi-square, ANOVA).
- We have found some results of self-generated process regarding self-education of teachers. Teachers who attended the most trainig courses were the most actively working on their informal self-impovement. The following research will prove which fact indicates other ones.

5.3 Recommendations for further research

Based on the analyis of related research we now discuss several related problems and provide recommendations for further research. The rapid change of ICT technology is hard to follow by teachers. It would be helpful to support teachers by

ICT-mentors, who would be up-to-date for continuous development of schools and teachers. There is also a need for research to develop and implement the training program for ICT-mentors (Fehér, 2008b).

Here I suggest some more research areas and problems:

„Being up-to-date in the teaching profession"

One noteworthy result of the research is that a significant amount of teachers do not follow with attention nor the news and information, nor the methodical improvements of their own professional field. This, however, would be desirable at all costs, because of the challenges of modern educational needs. Otherwise internet-based resources (webpages, mailing lists, forums, blogs) provide fast and easy access to such information. The question therefore is twofold: What is the cause of being so much uninterested? How can we change teachers' attitudes, and increase their interest in novelties? It is also important to examine, how to motivate more teachers to using possibilities of electronic communications (internet, web2 tools, blogs, etc.) in their practice.

Efficiency

Efficiency is one of the key components of education in Hungary and worldwide also. The huge amount of financial resources wasted on computers rapidly becoming obsolete indicates a lot of debate among researchers, too. That implies many questions regarding the importance of effective use of ICT resources.

 Some actual questions of these are the following:

- Which is the most effective use of ICT tools in the classroom? How does the new learning environments effect classroom-based learning methods?
- Are electronic teaching materials more useful than paper-based materials?
- What are the most effective methods of teacher training/in-service training? How can the new research findings be implemented into widely published „best practice" and the classroom activities of teachers?
- What will be the long term impact of the introduction of these technologies into the classroom?
- How can teachers' activity be increased in the internet-based projects?

Sustainability

The most crucial question of innovative work of schools is sustainability. Further research should be conducted to examine in greater depth the strategies and implementation methods of technology integration in everyday classrooms – after the end of the continuous financial support (ie. external motivation).

Differentiation

ICT in education provides more inspiring, resourceful and easy-to-use tools which support teachers' planning, and creating completely personal development and personal learning environments for students. I believe that the role of teachers is changing and increasing as a mentor of collaborative learning. They need to support the learning of students of very different personal abilities, and providing help for students choosing the most effective learning environment. What to do, how to help or support dyslexic pupils? How to handle gender differences in computer attitudes between boys and girls (and teachers also). How to use ICT to support gifted and talented children?

We can see, there are a lot of questions arising from such an analysis of the subject, and I am aware that the research of any topic is very important to gain new experiences and results of using ICT technology in the classroom.

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