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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) IN TEACHER TRAINING

Doctoral (PhD.) the theses of a treatise

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1. Introduction, preamble

Owing to the boom of ICT in the 90s we are in an age when the developing computer technology and electronics are everyday parts of our life. Informatics is far more than just data processing on computers. Industrial usage has grown into everyday work and entertainment. The usage of the computer as one of the most ordinary thing in our life shows a diverse picture. It can be found in the entertaining industry, education and business. Lecturers no longer enter the audition halls with chalks in their hands but with laptops.

Education is a stage for development. Technology provides for new opportunities in the field of education. Computer technology has paramount importance in this process.

The age of technology that has long been open for a lot of human activities is now opening for education, too. Computer can no longer be only the object of the teaching-learning process but also the tool of it.

Computers and ICT itself have revolutionised life as such and has brought a lot of changes about in the field of education as well. It has changed the character of work and the features of teaching making methodology richer. It really is high time to scrutinize these changes in education with the future teachers and the students. The group of the future teachers is a group of teacher training students while the group of students is a group of vocational school students.

The chosen topic is at the edge of the border science merging education and technologies. This science highlights the specific topics of technological education from the general pedagogical approach.

2. The aim of the research

Beyond collecting the specific things of teacher training in Hungary I will survey and measure its relations to ICT. The surroundings and the forms of learning that are in relation with these are also among the aims and finally, by analysing the results possible developments in the field of education technology are to be drawn up. Besides, it has been a concrete aim to cast some light on the levels of e-receptivity, that is, digital receptivity within teacher training.

The time period measured stretched from 2001 to 2007. This period was undoubtedly essential in the field of both digital technology and mobile communication.

3. The object of the research

The function of the research was to reveal the digital receptivity of the sampling population and also to survey some of its features that can be connected to its changing in time. The results clearly reflect the idiosyncrasy of technical teachers. The representativeness of the survey was out of question as the whole range of the students taking part in technical education today was subject to it. As teachers within the society bear a special level of qualification on the labour market the survey is not representative in the sense of the whole

society thus the conclusions cannot be applied to the whole range of our present day society. Because of this reaching a representativeness of this level was clearly not among our aims.

There were two big target groups to the survey. One was the technical teachers of the Budapest University of Technology and Economics, The College of Dunaújváros, The University of Western Hungary and the College of Kecskemét while the other group was the students of the demonstration school of the Faculty of Technology and Pedagogy of the Budapest University of Technology and Economics.

The samples surveyed have special features. The teachers participating in this survey are the ones who teach in technical secondary schools; that is they are dealing with the problems of the age group between 14 and 19 mainly. They are trained to teach the theory and practice of technical sciences. We interpret it as the current listeners of the foresaid teacher-training college's institutions, who are educators practising at the same time, on the other hand in one.

4. The problems of the research

Our research is firstly of refining, specifying nature. This is mainly an exploration to find more specific information. In this sense the research can be considered open, as it is not that existing hypotheses are to be checked but open questions are to be answered. Besides, there have also been research conducted to follow hypotheses, which means that we have a certain knowledge of the field on the grounds of which relevant hypotheses can be set up.

We have the following open questions:

1. *Which are the most commonly applied methods in education? Do teachers take computers for a means of methodology?*

2. *How do teachers evaluate the opportunities provided by ICT with a view to educational methodology?*

3. *How much is ICT present in education in the period surveyed?*

4. *How could ICT take traditional methods out?*

5. *Should traditional and ICT based methods be separated, or not?*

6. *How is the relation of ICT and teaching methods seen by those participating in engineering-teacher training?*

7. *Which fields of ICT are applied in teaching compared to those required by the students? Is there a significant difference between the two?*

8. *What expectations, difficulties, methods did the teachers encounter during learning informatics? Were there any that helped to further develop their competencies?*

9. *Is there any kind of correlation between the surroundings where teachers live and learn?*

10. *How do teachers relate to the different approaches of e-receptivity?*

11. What kinds of ICT usage habits have developed among the teachers?

The hypotheses which are connected to the research are the followings:

1. *The follow up of the development of the ICT is required by the educators, but the qualification of these educators does not react to the actual requirements as quickly and as elasticly as it would be necessary regarding to trainings and also the postgraduation.*

2. *The educators show the same natures from the most points of view regarding to the acceptance of ICT, without respect to age, sex, specialization, geographic location. A strong „ICT homogeneity" is typical for educators.*

3. *The main fields of the usage of the computer –which is considered as the most general tool of ICT- are basically around a few preferential junctions, which are not changing as the time passes.*

4. *The future professors and students react elastically for the usage of ICT tools and the connected challenges of the methodological culture and the environment.*

5. Methods of research

We have done our researches with the following discovery methods:

- document analysis to find out theoretical background information,

- monitoring,

- verbal questioning with structured interviews,

- written questioning, with the help of questionnaires in written and electrical form. We have done the biggest part of our researches with these tools. The questionnaires contained mostly closed questions and the target audiences filled out them anonymously.

After the excavation of the data we used the following processing methods:

- statistical methods,

- quality analysis.

We processed the collected data from our researches easier with the methods of descriptive statistics, and we excavated and evaluated the deeper connections with the help of variable analysis methods. We used the SPSS social science research program.

6. Implications based on the survey and the results

Statements based on the results of the survey are now being disclosed in detail, with charts to have a better understanding.

> *1.Statement: It has been concluded that teachers express a need for following the advance of ICT, but the education of teachers shows little success in following these needs concerning both teaching and professional teaching.*

Using the tools of ICT is not wide-spread enough in education. One of the reasons for this comes from the speciality of this area, namely it is changing and developing so fast that not everyone is able or wants to keep track with it.

Workplaces need to embrace the development of ICT competence. The concept of appropriate environment is broadened in a sense that the competence and interest in information technology of other teachers' takes part in it.

This is why workplaces should provide - besides the appropriate technical equipment - chance for the working community, in our case the teachers, to take part in continuing professional education. The thorough knowledge of a subject and the educational abilities are necessary for a teacher's work, but not enough. Research shows that the emotional state of the teacher is in direct relation with the studying process of the students. So beside the basic cognitive and educational competencies teachers also need emotional competency. Emotional competency is an ability that is based on emotional intelligence, and results in outstanding performance. One example taken from the education process: to get the students react in the intended way. The basic elements of this competence are two capabilities: empathy, which means recognising others' feelings and social skills, which means how one handles emotions. Teachers have to know the personal and social competences of themselves and their students also, because while using ICT influences may occur which could have a negative or positive effect on their affective system. Such an influence can be fallback at digital knowledge, the fear of lagging behind, teaching based on inconsistent knowledge of information technology, unskillfulness in using or handling information found on the internet or the unstable knowledge of the teacher compared to students. These influences contain the risk of falling behind.

The concern of the needed information technology competence for teachers is being mentioned more and more with the incredible pace of development in the ICT field. Information technology competence of the teacher means both the use of information technology equipment and using the ICT equipments in education.

If we compare what kind of ICT knowledge and skills teachers needed a few years ago and today, we can definitely experience the fast development of information technology and other technological fields. Keeping track of the development of information technology should be given priority for every teacher. This is emphasized by a 2004 statement of the European Commission, saying that teachers should be helped to achive skills necessary to fulfill the needs of the knowledge society and to their lifelong role as a student and teacher at

the same time. This is especially so concerning the use of ICT devices in education. This should be ensured by appropriate continuing education. In the world of LLL (lifelong learning) teachers should of course work out their own method of independent and continuous learning to enable successful education.

The education systems of today and the past show a different course of finding the right way in education. Information technology studies and continuous education have resulted in a kind of limited usage and applications. This process lead to a fast result, but only with limited usage. Today the emphasis should be put on the understanding of the workings and structure of the whole system. The current education systems, controlled from the top, achieve results faster, but can only be maintained with continuous progress, since without knowing the basics, correcting errors and suggesting unknown parts is not possible.

Various solutions arose in the countries of Europe answering the challenge in professional education. These solutions reflect the different political, economical and historical properties of the given country. These differences also show in the professional education of teachers, so it can be concluded that the education of specialized teachers does not have a unified model in the European Union, and unified standards do not exist either. What is even more, there are also differences within a country. The two basic models of professional education, the parallel and the following model - although with different methods - provide professional and human knowledge. There are also examples of someone getting the necessary education knowledge with the support of a tutor without completing the formal degree.

It is a universal opinion that the education of professional educators has to have top priority because the quality of professional education and the skills of the teachers have an obviously close relationship.
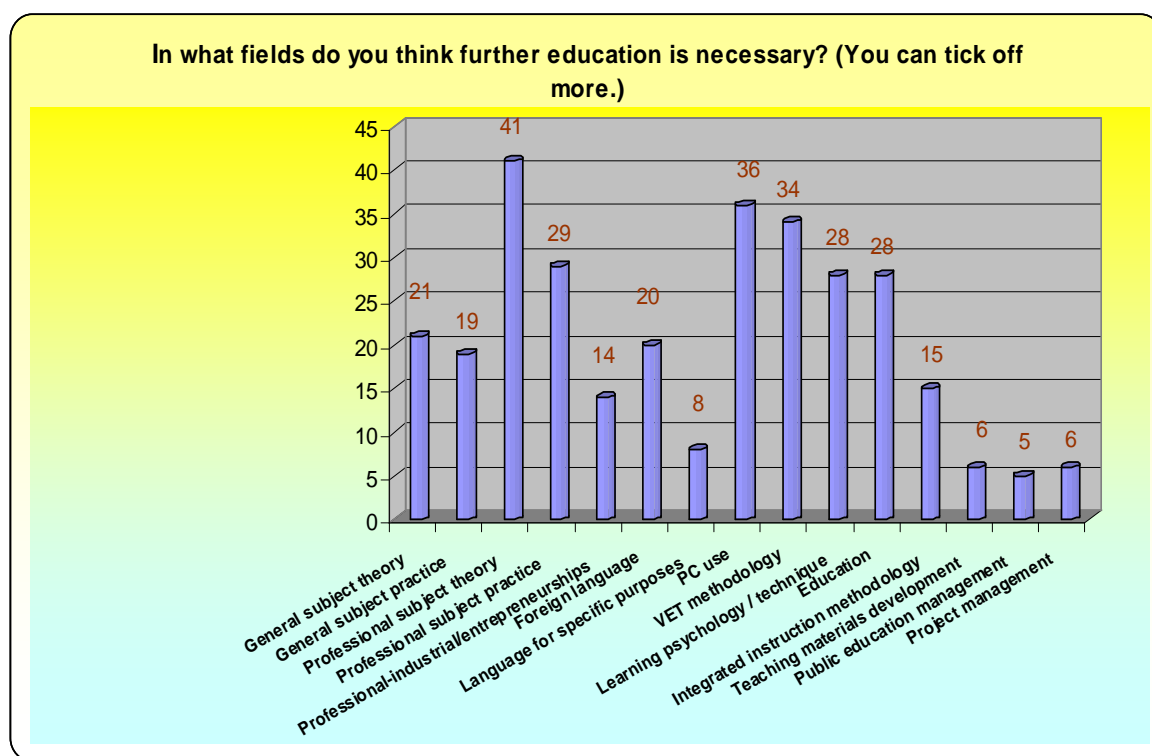

Figure 1. Source: self-created

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The survey conducted in the autumn of 2006 show that beside the usual continuous education, new forms are also much needed. These new kinds of education provide possibility for teachers to get ready for their new, unusual task and to achieve the necessary competences, especially in the ICT field.

The thesis is proven true by the results of a December 2002. survey, since information technology knowledge is already a general knowledge, and such would enable combining different education methods. This would be used to get information, demonstrate and to inspire students to work self-sufficiently. Thanks to all of this a much more efficient and better motivated studying process would be created. The better studying process needs the appropriate infrastructure and continuous education with up-to-date content and form.

These statements are supported by the findings of the Strategic Committee Nr. 2 dealing with the education of teachers between 2005 and 2007. These results show that the education of teachers does not meet the requirements in their current form, that is why it is of utmost importance to prepare the already edifying teachers to use new methods and devices.

> *2.Statement: Professional educators show a similar attitude to accepting ICT regardless of age, gender, profession or location. They show a great „ICT homogeneity", meaning that they have a similar opinion about using ICT in education. This homogeneity entails the obvious possibility to organize joint courses for them, helping to develop their ICT competence.*

A 2002 interview of students also stands as proof for the above statement. Students were looking forward to develop their ICT competence with completing tasks and using portfolios provided by their education in the first place. They felt this the most efficient method, since milieu plays determining role in the given education. This milieu includes the ICT competence of other teachers.

Proof to this is given by the results of a 2007 survey, where multi-variable analysis showed the homogeneity and consistency of the participants.

The comparative analysis of the cross-tables shows that female and male participants gave a different answer concerning Internet and auxiliary education material usage and the changing of workplace. Despite this, their need of electronic education materials, new generation methods and the new forms of getting information shows a uniform result.

Considering the above mentioned, it is safe to declare that the people taking part in the survey have a similar opinion about ICT, which means similar thinking, but it also shows that the education method should be different with boys and girls.

The research done after the cluster analysis resulting in 14 and 24 factors showed that the answers are homogeneous concerning the taking in of ICT. Because of overlaps, some factors can be unified, which means that the take-in ability concerning ICT can be grouped around the nodes shown on the scree plot figure.

Certain other educational considerations and earlier surveys show that the results are grouped around the following four factors:

- The role of information technology in education

- Place and method of using Internet services in the education process

- Needs of the labour market and their connection with ICT

- Relation of workplace and ICT education areas

The 205 responders define 24 factors, which, similarly to the analysis of the questions, shows that the surveyed population cannot be classified firmly, so they can be regarded homogenous from a practical point of view. This is also supported by the scree plot figure (see below).
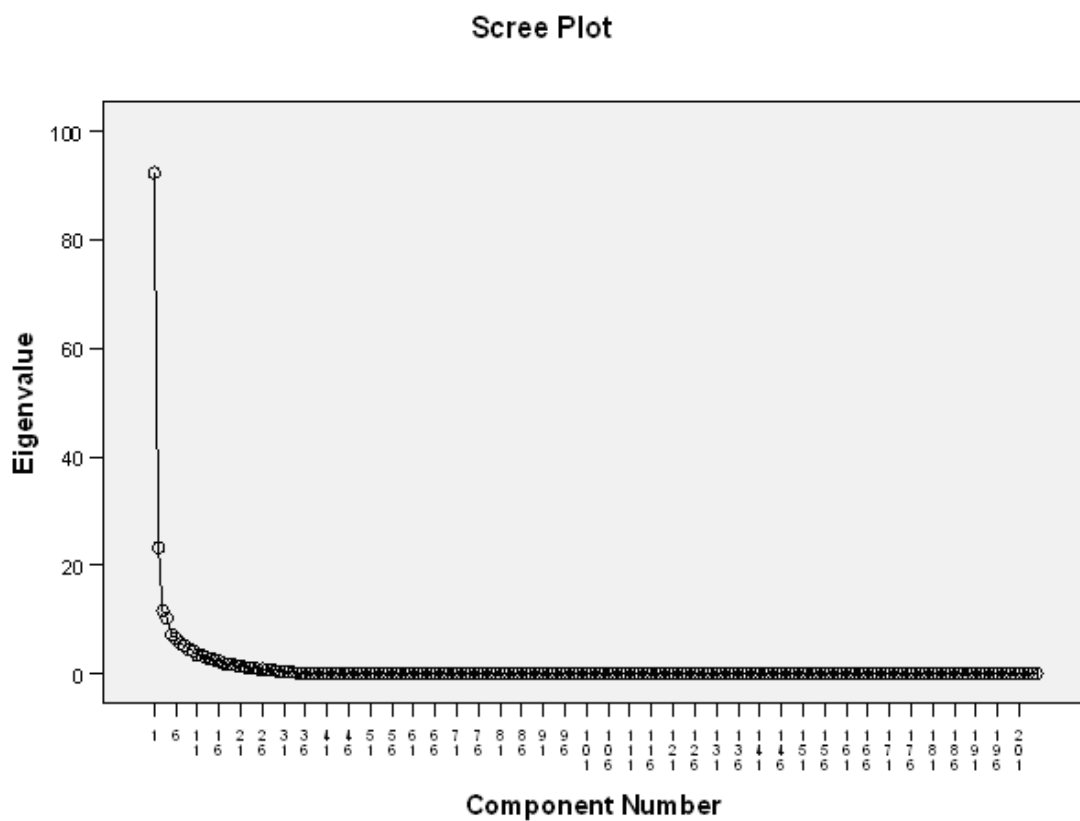
Figure 2., Source: Own
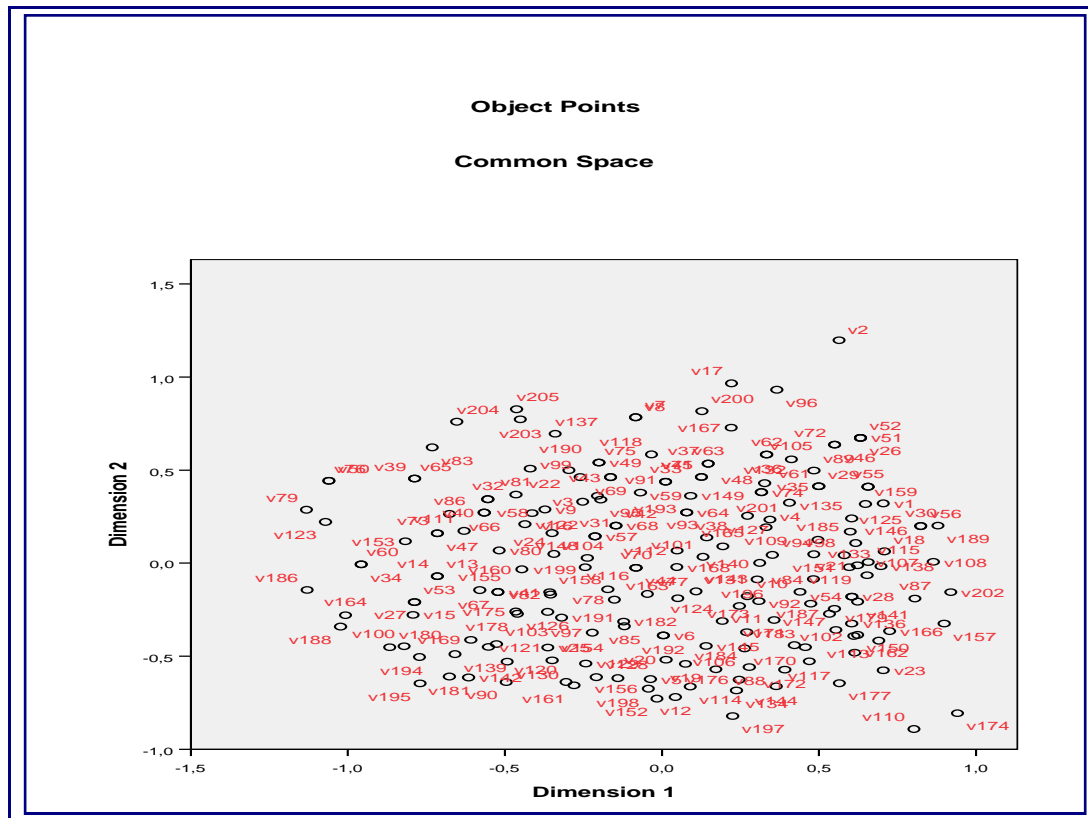
Figure 3. Source : Own

The factor analysis also proved this unity and synchrony, since the dendogram shows that it is not possible to separate outstanding clusters. This is so, because much noise appears at the analysis levels, and the responders are homogeneous. Because of all the noise elements and the high level presence of the components (the dendogram is one magnitude larger horizontally) unambiguous consistence exists between them.

The same result is produced by the multi-dimension scaling (see Figure 3.), where we have shown the distance and distribution of the responders supporting the homogeneity and consistency.

All of the conducted multi-variable surveys show the same result of 'ICT homogeneity'.

3.Statement: During the last 7 years we can separate 5 segments in using the most prevalent device of ICT, the computer. The ratios of the 5 segments continuously react to outside factors. These segments should be the main concern of teacher training.

These main nodal parts are the following:
- Getting information
- Administration
- Tools of education
- Subject of education
- Other (development being the most important)

This composition is supported by the figures of the results below:
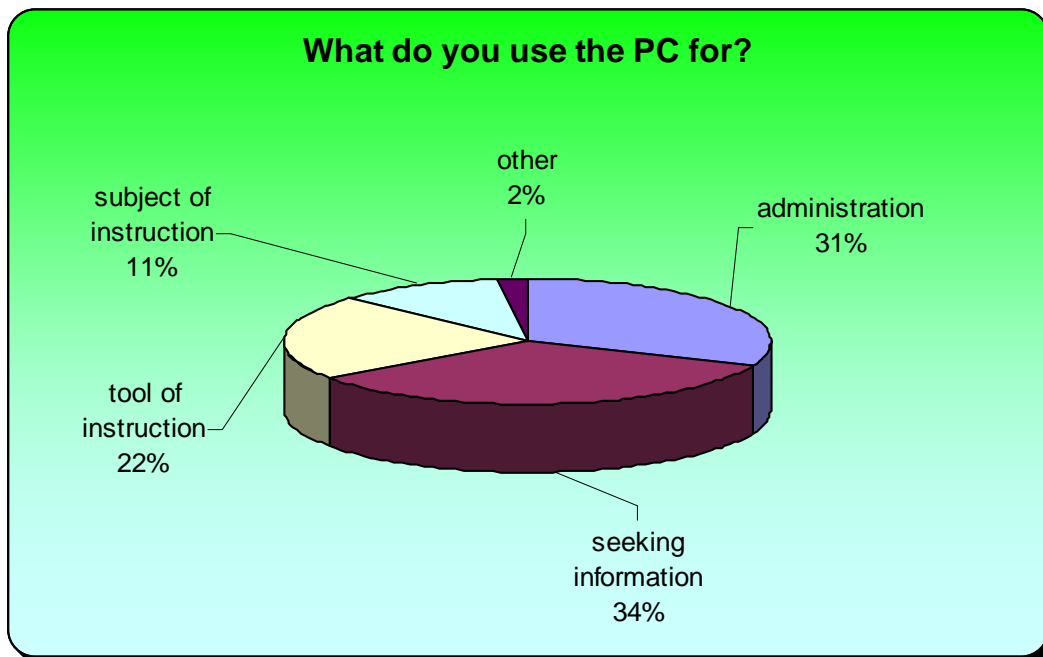
Figure 4. Source: Own

Results of the survey conducted during the spring of 2002 show that subjects use the computer to get information in the first place (34%), the second and third being administration (31%) and as an educational device. Rather high number of responders said computer was the subject of education.
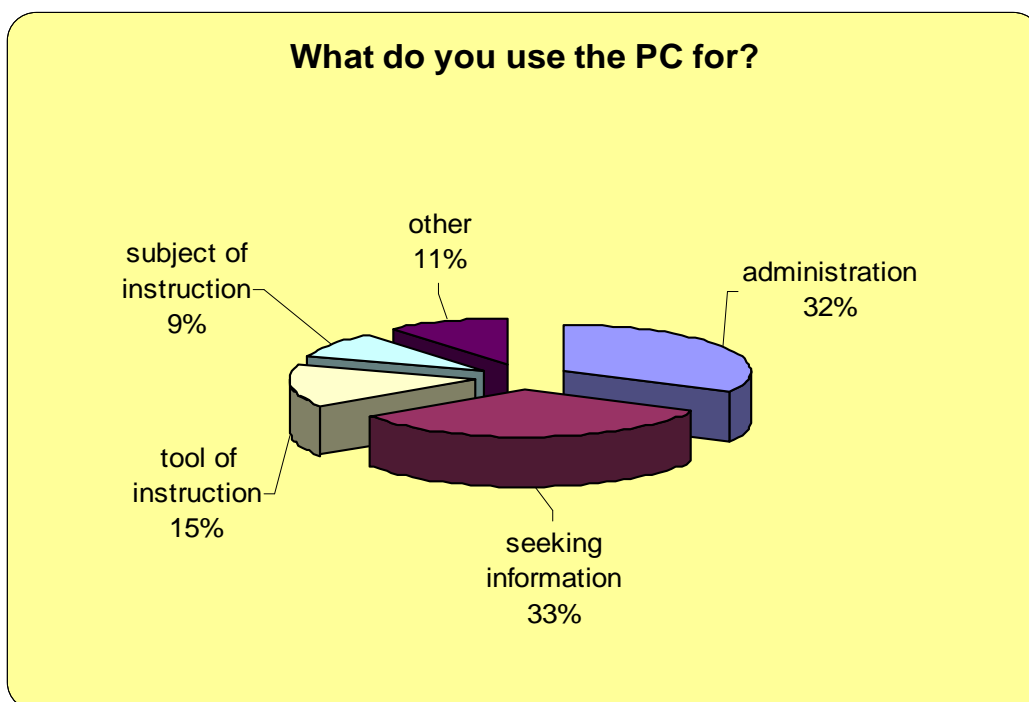

Figure 5. Source: Own

A survey of 2002 December shows that the computer is still used as the source of information primarily (33%). This is followed by the almost as high percentage of administration usage (32%) and with lesser importance as an educational device (15%) and as a studying device. These results show that the ratio has not changed much in a year (see figures 4. and 5.)
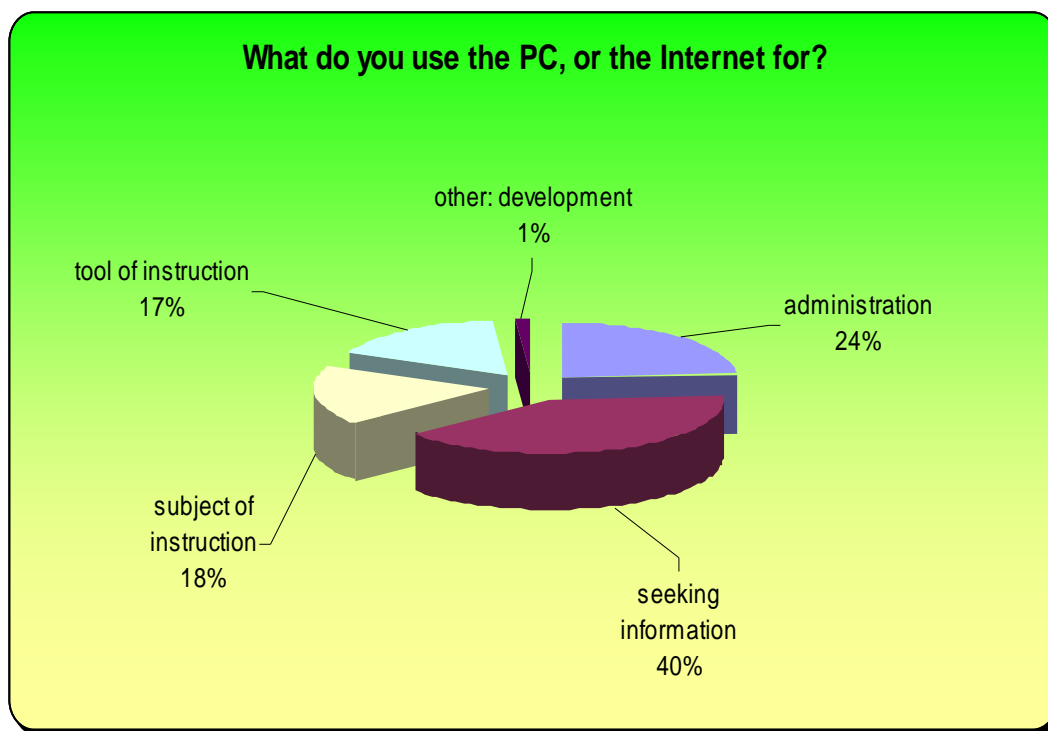
Figure 6. Source: Own

According to the survey of 2006, 24% of the respondents use their computers for administrative aims, 40% of them for collecting information, with 18% of them their computers are the objects of education, while with 17% the means of education. The remaining 1% uses it additionally for product development.

The computerized information acquisition can be tightly correlated to the Internet access, so it is clear why it has been put to the first place. The emerging extent of the administration is due to the quality assurance systems introduced recently, as well as to the precisely performed documenting in the process of education. Its use as a means of education in the fourth place is slightly surprising, because more and more subjects are becoming taught in the scope of computer aided education. (E.g.: Power Point presentation, TINA, DEGEM, TANGO etc.). As object of education we find it mostly with certain specialized trainings, e.g. with specialization in informatics, this nevertheless appears as third rated reason in the list. Here the particular areas already show significant offset of their main focus, regarding the prior tendencies – the role of administration diminishes significantly, while as object of education they slightly move forward.

4. Thesis: The task of the vocational teacher training currently and in the near future, besides providing widespread user-level information necessary to ICT, is creating dispositions for autonomous acting and creating confidence in acting. Much smaller is its significance in immediate expertise in coding-level tasks. The generations entering the teacher training process after 10-15 years in the future will grow up in a much more advanced ICT environment than the generations entering it right at the moment or being currently in it. They will be able to build easily onto the knowledge which nowadays can be attained merely within the frameworks of teacher training. The generations mentioned, presently evolve their influence as "prefigurative" components onto the educational processes, in scope of which the relation teacher – student in the field of new knowledge can be inverted any time. This is, however, just an easy-to-diagnose mark of a transient state, since the harmony re-establishes after the next coming leap of development.

The surveys of our researches show that today's teacher training institutions don't perform education of ICT, but, instead of it, they focus on a narrower, first of all Windows-platform and PC-based solutions. Since this contributes to establishing expertise merely within a limited area, unfortunately in the world of the work, on the market of proprietary in-house software of multitude of companies, gives often only little routine, because users seek for the designations and functions of the often single software taught. In the former, DOS-based world vocational trainings provided a store of knowledge that shed light onto the content and consequences of the individual commands, too. The knowledge of systems is more and more missing in today's educational institutions' portfolios, thus in many cases learning of different systems at the beginning degenerate into a series of "graphical pushing trials". Conscious seeking for logical ties in software using would mostly bring, to the contrary of this, a feeling of success and effective work in short time.

For retaining jobs in our days, presence of computer science or ICT competences do not mean any significant advantage to the employee, however it is rather a huge disadvantageif someone lacks the knowledge and skills peculiar to his particular trade. Changes in the character of the work also point toward the direction that in the world of work experts first of all need widespread user skills and presence of key qualifications. Thus also trainers have to focus on these areas.
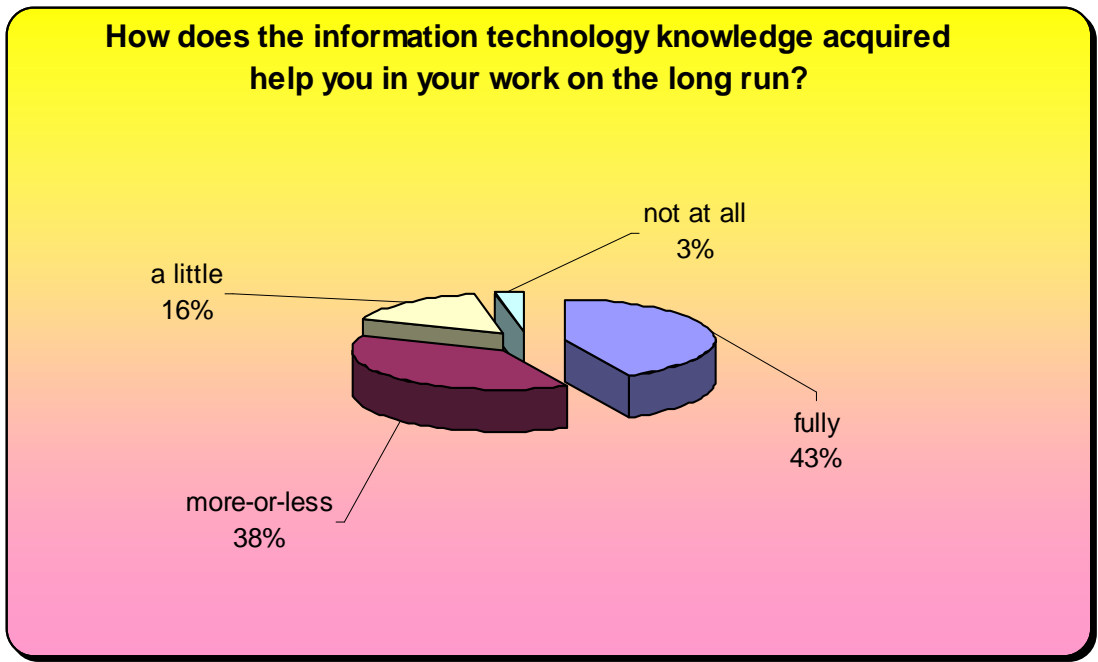
How does the information technology knowledge acquired help you in your work on the long run?

not at all
3%

a little
16%

fully
43%

more-or-less
38%

Figure 7. Source: self-created

According to the survey of 2007, for most of the respondents their informatics knowledge attained in the course of the training insure fully (43%) or more-or-less (38%) the long-term sustainability of their jobs (see the diagram above). It is evident from the diagram, that the store of knowledge provided by the training guarantees merely to less than a half of the respondents holding and sustaining of the firm job. This justifies the statement brought up by the thesis, that providing of widespread user knowledge is necessary.

Which tasks can you perform autonomously by means of your computer?

number of answers

file download	181
software download	147
installing programs/his removal	146
audio or image file sending	161
a chatterer sending on substance attached through programs	125
configuring of computer	103
the installation of an operating system	113
other	54
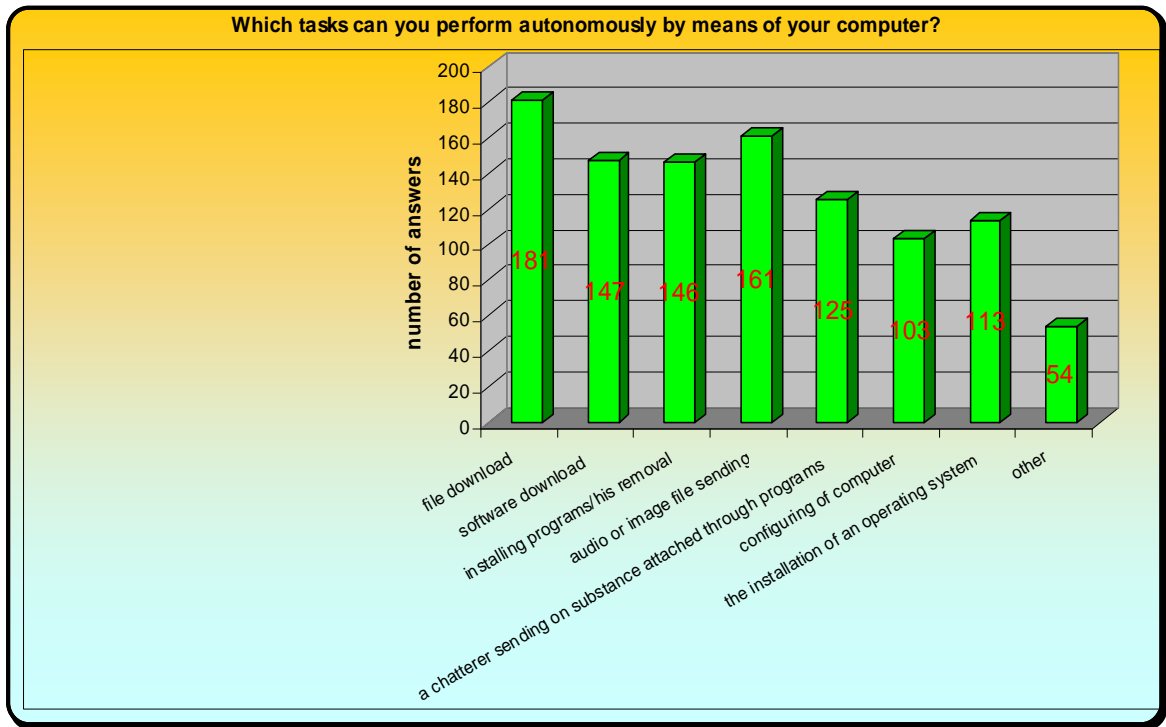
Figure 8. Source: self-created

As it is obvious from the diagram above, the respondents own very dissimilar competence levels, but most of them are able to download files and software, install and remove programs,

send audio and video contents, which abilities are covered by a relatively narrow user-level knowledge.

We can state that the first stage of development of the ICT competences has already been mastered, which stage has had for its objective teaching computers and basic applications related to them. Vocational teacher training should, in its second stage, be built onto a wider interpretation of the attained user-level knowledge. This means that one must not stick at a certain level in this field, else both communication between teachers and communication between teachers and students could be impeded.

These statements are justified by the experiences and recommendations of the Strategic Committee Nr. 2 dealing with the education of teachers between 2005 and 2007, according to which the pedagogical application of ICT, network information sources and methodological culture is in part or on the whole unsolved in the current training of vocational teachers.

In the course of our examinations the two following statements have been interpreted as research tasks:

1. The use of languages in the field of ICT shows an interesting history, since with the Internet becoming more and more spread and playing a more and more important role; almost every nation can reach the desired surface in its own mother tongue. Because of this – to the contrary of the past decades' expectations – the command of languages is more and more losing its importance, which is of impact onto the kind and quantity of the ICT devices used in the process of education. The initial marks of this have been measured during our research, the results of which have confirmed this tendency.

2. According to technological prognoses the coming decades will not bring such a rapid development in the field of ICT as it was peculiar to the years 90s. This period will rather witness a level-related and qualitative refinement of existing technologies, for example intensive spread of mobile Internet access and network development, as well as changeover to completely digital systems.

Our open questions have got their answers as following statements, according to the results of our investigations and experiences accumulated during the years of research:

The fast-paced changes driven by the technological development have generated a continuous race of technologies and trainings. As a result of this, the training of vocational educators has to provide innovation in two areas: The appropriate up-to-date infrastructure on the one hand, and the pedagogical utilization of ICT - s, which can be accomplished only by a continuous developmental work. In result of these, the opportunity of "learning by doing" must be established, which is highlighted by the convergence of working and learning environment. All these make us able to contribute, besides providing new means, to the development of the methodological culture. This is confirmed also by the surveys which yield that the appropriate level of the ICT infrastructure and internet access of the educators targeted by the inquiry are in most cases available, but the patterns, curricula and trainings which would help them merging into the pedagogical activity, still are missing.

7. Application of results in practice

ICT aided learning enables knowledge to be conveyed in a safer and more extensive way; in addition, the immediate feedback makes it more successful to get the education material studied and to improve problem solving abilities and thinking. This, however, calls for an ICT system that fulfils educational requirements, as well as the necessary willingness of professional educators to utilize such a system. If both of these conditions are met, which nowadays happens just about everywhere, then absolute efficiency can be achieved by an educational approach that largely exploits the ICT possibilities, and by samples that reveal this potential. Education using digital devices has set out on its conquest; the only open question is when it will become an everyday tool for all educationalists. Everyone can find whatever suits them most among the host of available ICT tools, hence the device that enables innovation and a change of approach. Studying aided by ICT tools may become even more efficient by involving cooperative learning methods, since grouped learning overshadows teacher-oriented schooling in order to bring about student-oriented education.

The last survey of the period under study shows the future performance of ICT enabled learning environments, suggesting a convergence of typical and atypical learning forms as well as the connection of their space and time dimensions. On the other hand, the rapidly developing state of the art technology will always be present as the foundation of the virtual environment.

8. Limitations

As final statements of this investigation it must be highlighted that it drew consequences based on data from a single source due to its uniqueness, which certainly requires additional verification and confirmation or possibly criticism.

Therefore, these data do not allow detection of trends and tendencies of strategic importance. As a result, it would only be possible to find out the engineering-teacher population's mind-set, ICT situation, and their relation to their schooling and to their profession by fulfilling the recommendation of repeating the investigation with due frequency and extension of the sample of respondents.

9. Further research

The questions and theories suggested throughout this study, the investigation questionnaire developed and the results received all make an appropriate foundation for further research and analysis, which focus on additional ICT related elements of the schooling of vocational educators. Progress requires raising further questions and defining new areas of study. The continuous advance of technology also necessitates the continuation of the ongoing research.

As a sequel to this study, a further longitudinal investigation could form adequate groundwork, requiring the establishment of a precise data and information management

system in order to enable us to extend the examination over the widest possible group of qualified vocational educationalists. The instruments of the study can be improved based on the survey results; an upgraded questionnaire, interview or observation would facilitate obtainment of new records.

The research may be extended by other means of revealing, such as contacting employers of qualified engineering-teachers, as well as involving entrants and graduates of the new, multi-cycle education. Another approach for further developing this study may entail the examination of teacher training students in regular intervals to better understand educators' relation to schooling.

10. The candidate's publications in the subject of the PhD research:

Articles, studies, conference volumes:

    📖   György Molnár: The importance of Information and Communication Technologies in educators. – BUTE TDK 14 November 2001

    📖   György Molnár: The importance of Information and Communication Technologies in the training of vocational educators. – Vocational training - Pedagogic doctor's school Students Conference #7 4 July 2002

    📖   György Molnár: The importance of Information and Communication Technologies in the training of engineering-teachers – BUTE TDK 12 November 2002

    📖   György Molnár: The importance of Information and Communication Technologies in the training of engineering-teachers and technology educator students - ITTK research report No 20-21, May 2003

    📖   György Molnár: Subjects affected by the restructuring of the modular system of German higher education – Third National Conference on Educational Science 9-11 October 2003

    📖   György Molnár: The importance of Information and Communication Technologies in the training of engineering-teachers and in vocational education – The Day of Hungarian Science 2003 Conference at the College of Dunaújváros, 5 November 2003

    📖   György Molnár: The importance of Information and Communication Technologies in the training of engineering-teachers and in vocational education – BUTE TDK 11 November 2003

    📖   György Molnár: Influence of the technological development on the education of engineering teacher as well as on the vocational training. microCAD 2004 International Scientific Conference University of Miskolc, 18-19 March 2004

    📖   György Molnár: Multimedia presence in the education of engineering-teachers as well as in the vocational training – Conference on Multimedia in Education Szeged, 27-29 May 2004

    📖   György Molnár: The importance of Information and Communication Technologies in the training of educators Renewing vocational training extracts from diploma theses 2005 BUTE MPT 73-93

    📖   György Molnár: Appearance of motivations and teacher models in the education of engineering-teachers as well as in vocational training with special focus on the education of informatics – Conference on "Applied educational and social sciences in the schooling of the 21st century technology intellectuals" Sopron, 11 November 2005

    📖   György Molnár: Methods of technology education in informatics from the perspective of adult education – "Week of Hungarian Science on the College of Dunaújváros" Proceedings of the Conference in Dunaújváros, 25 November 2005

    📖   György Molnár: Why is mathematics difficult? The importance of previous knowledge, learning abilities and consultations. Analysis and opportunities for improvement of ICT usage and Internet attitude. In: Andrásné Balogh dr. (ed.):

Methodology of vocational training from the perspective of adult education, Budapest December 2005

📖 György Molnár Judit Vidékiné Reményi: The current practice of the training of vocational teachers in Hungary. Study, National Institute for Vocational Education, Budapest, 2006

📖 György Molnár: The importance of Information and Communication Technologies in the training of vocational educators. – "New Trends in Teacher Training" Proceedings of the Conference, Budapest, 18 November 2006

📖 György Molnár Judit Vidékiné Reményi: Survey on the demand for postgraduate education of vocational trainers and analysis of results. Study, National Institute for Vocational Education, Budapest, 2006

📖 György Molnár: The demand for postgraduate education of vocational trainers, with emphasis on information and communication technologies. – "Environmental education by scientific means" Proceedings of the Conference, Sopron, 2007

📖 György Molnár: Is there a threat of falling standards? Experience of final exams based on presidential reports. Study, National Institute for Vocational and Adult Education, Budapest, 2007.

📖 György Molnár: The importance of information and communication technologies (ICT) in the professional training of educationalists. In: Dr. Benedek András (ed.): New Trends in Teacher Training, ISBN 978-963-420-919-5, BUTE Institute of Applied Pedagogy and Psychology, Budapest, 2007. pp.135-142

📖 György Molnár: The role of information and communication technologies (ICT) in vocational education and training (VET) teacher training. In: Dr. András Benedek (editor): New Trends in Teacher Training (Proceedings of the Conference Budapest, 18th November 2006) ISBN 978-963-420-921-8 BUTE Institute of Applied Pedagogy and Psychology, 2007. pp. 43-47

📖 György Molnár: The importance of information and communication technologies (ICT) in the education of vocational trainers. In: Vocational Training Bulletin ISSN 0237-2347, 2007., pp.181

📖 György Molnár: Explanation of the information and communication technologies (ICT) enabled IT environment for learning in the education of engineering-teachers. In: Dr. László Kadocsa (ed.): Publications of the College of Dunaújváros XXIX/2., ISSN 1586-8567, College of Dunaújváros Publisher's Office, Dunaújváros, November 2007 pp.173 -183

📖 György Molnár–János Horváth Cz.: New learning environments in the educational system of the knowledge based society in Hungary. – "Innovations of electronic distance education" Proceedings of the Conference, ISBN 978-963-7154-70-6, Budapest Tech Polytechnical Institution, Budapest, 20 March 2008

Educational aids:

📖 György Molnár: The most frequently used pedagogical terms. In: Dr. András Benedek (ed.): The fundamental problems of vocational pedagogy. – Univerity textbook Budapest December 2005

📖   György Molnár: ICT tools. In: Dr. András Benedek (ed.) Curriculum plan on the development of distance education and e-learning, National Institute for Vocational Education, Budapest, 2006., pp. 33-49

📖   György Molnár: Voice editor programs. In: Dr. András Benedek (ed.) Curriculum plan on the development of distance education and e-learning, National Institute for Vocational Education, 2006., pp. 61-68

📖   György Molnár: The requirements and development areas of the ICT aided learning environment. In: Dr. András Benedek (ed.): Digital pedagogy – University text-book Budapest 2008. (Under publication)