

ICT Education Should Be Started in Time

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1 Introduction

(1/2)

- Contemporary teaching of ICT is characterized by more mutually incompatible approaches at Czech basic schools.
- Each basic school has its own School Educational Programme (SEP), which is based on the Framework Educational Programme (FEP) formulated by the Ministry of Education, Youth and Sport.
- The management of each basic school and its available human factor fully determine the quality of the SEP and the ability to successfully implement it with the aim of achieving the expected outcomes in the field of ICT.

1 Introduction

(2/2)

- The importance of basic schools for a successful educational system of the state, not only in the field of ICT, seems to be sometimes underestimated by higher-level schools and professional public.
- The Czech basic schools do not have enough competent teachers of ICT.
- Knowledge and skills achieved by students at various Czech basic (and also secondary) schools differ in ICT radically.

2 Theoretical background (1/4)

Fields (thematic areas) of information technology

$$\mathbf{FoIT} = \{\mathbf{F}_1, \mathbf{F}_2, \dots, \mathbf{F}_n\}, \quad (1)$$

where

\mathbf{F}_i , $i = 1, 2, \dots, n$ are specific thematic areas such as databases, computer networks, word processors, spreadsheets, computer graphics, programming, etc.

2 Theoretical background

(2/4)

Let r_i , $i = 1, 2, \dots, n$ is an integer from the interval $\langle 0, 100 \rangle$, which expresses the level of knowledge of the relevant thematic field F_i .

This value can be understood as a percentage assessment of mastering the subject area according to the set of educational goals.

2 Theoretical background

(3/4)

The informatics profile is a data structure

$$\text{ITP} = [F_1, r_1], [F_2, r_2], \dots, [F_n, r_n] \quad (2)$$

where each thematic field F_i from the FoIT can be expressed

$$F_i = \left\{ T_x; \left[\left\{ t_y \right\}_{y=1}^{x1} \cup \left\{ s_z \right\}_{z=1}^{x2} \right] \right\}_{x=1}^{p_i} \quad (3)$$

- $T_x, x = 1, 2, \dots, p_i$ are topics, into which a given thematic area F_i is divided,
- $t_y, y = 1, 2, \dots, x1$ are selected technical terms belonging to T_x ,
- $s_z, z = 1, 2, \dots, x2$ are selected skills belonging to T_x . 7

2 Theoretical background

(4/4)

- Each thematic area (e.g. databases, programming, etc.) is divided into the appropriate number of specific topics. Within each topic, the students are required to handle the selected appropriate terminology and they acquire special selected skills. The number of lessons on individual topics is generally different.
- Teaching each topic should be primarily based on the understanding of selected technical terminology. The teaching process should lead to the point where the relationship between selected terms is entirely clear. Selected skills are specific practical tasks and activities that the student is capable to self-manage. They should be especially focused on using computers, computer networks and IT supported communication.

3 Selected basic school and its goals in ICT education (1/5)

- The 31st Basic School in Pilsen, Czech Republic is a Czech basic school with a capacity of 750 pupils.
- The school disposes of three classrooms which are equipped for teaching Informatics. The total number of computers is 43 (15, 14 and 14). An interactive touch board is available in two classrooms. Complete ICT services for the school are provided by the statutory city of Pilsen, which is the school founder.

3 Selected basic school and its goals in ICT education

(2/5)

- School Educational Programme includes Informatics (educational field ICT) in the fifth and sixth forms. The number of hours for Informatics is one hour per week. The subject is compulsory for all pupils.
- It enables pupils to achieve a basic level of information literacy. Students will gain basic skills in computers usage and they will be able to orient themselves in the world of information.

3 Selected basic school and its goals in ICT education

(3/5)

- From the seventh form the pupils are educated within the mandatory optional subject Informatics. The time devoted to the subject is three hours weekly. The subject is chosen from a wide range of optional subjects. Only one study group of a maximum number of fifteen pupils in the same year of study is formed.
- The optional subject enables pupils to achieve higher level of information literacy in connection with their previous knowledge.

3 Selected basic school and its goals in ICT education

(4/5)

The optional subject Informatics covers the following topics:

- Safety and ergonomics at work with PC and multimedia;
- History of computing;
- Hardware and software;
- Operation system;
- Text processor;
- Typography;
- Vector graphics, animation;
- Raster graphics, digital photograph;
- DTP printing technology, the principle of recording equipments;

3 Selected basic school and its goals in ICT education

(5/5)

- Digital image recording;
- Spreadsheet;
- Internet;
- Multimedia;
- Computer network;
- Copyright Act;
- Basics of programming languages;
- Computer based teaching programmes;
- Computer viruses.

4 Implementation of feedback

(1/4)

- As a research sample, the sample of former pupils who finished their basic education in the academic year 2006/2007 was chosen. In the academic year 2010/2011 they finished their secondary education. These days they should be competent to evaluate the teaching of ICT at their basic school and their informatics profile achieved there.
- The pupils included in the research sample attended the optional subject Informatics from the seventh to ninth forms with a time allotment of 2 hours a week. The subject areas covered were the same as in subject Informatics, mentioned above. The teaching process was led by the same teacher.

4 Implementation of feedback

(2/4)

- The questionnaire survey deals with the achieved informatics profile of pupils. The questions in the questionnaire are focused on four basic areas:
 - student's personal relationship to the subject
 - evaluation of educational content and teaching methods used, and the technical quality of the school computers.
 - relationship between the level of achieved education and the way of teaching Informatics.
 - some issues of human factors aspect (teacher personality) in connection with teaching.
- The research survey involved 15 respondents. The first contact and further follow-up communication with respondents was held electronically. Respondents filled in a questionnaire in a text editor and returned it back electronically to researchers.

4 Implementation of feedback

(3/4)

The questionnaire contained questions as follows:

- Were you satisfied with your choice of Informatics, or did you want to exchange it during your training for another optional subject offered by your basic school?
- How would you assess the educational content of the subject Informatics?
- What is your opinion on the usage of the methods which are stated in the following table?
- What hardware and software was used in teaching Informatics?
- Was the choice of your secondary school influenced by the optional subject Informatics?
- What secondary school have you finished, or are you still studying at?

4 Implementation of feedback

(4/4)

- Have you used your knowledge and skills acquired in Informatics in your secondary school, or in another period of your life?
- At what school are you studying now, or what is your current job?
- Was the organization of teaching suitable (time schedule, learning pace, hygienic aspects of teaching)?
- Can you recall some interesting moments from Informatics classes?
- Did the way of communication with your teacher in Informatics suit you?
- Was the assessment in Informatics in accordance with your knowledge and skills?
- Did you participate in any activity outside of school within the scope of Informatics? To what extent was this activity beneficial?

5 Two examples of the evaluation of the students' responses

5.1a The educational content assessment – table

5.1b The educational content assessment
– conclusions

5.2a The opinions on the usage of the selected
methods – table

5.2b The opinions on the usage of the selected
methods – conclusions

5.1a The educational content assessment – table

	Teaching unchanged	Teaching in more detail	Teaching in less detail	Stop the teaching
Safety and ergonomics at work with PC and multimedia	7		8	
History of computing	9	2	4	
Hardware and software	6	8	1	
Operation systems	7	5	3	
Text processor	15			
Typography	11	2	2	
Vector graphics, animation	4	11		
Raster graphics, digital photograph	4	11		
DTP printing technology, the principle of recording equipments	8	4	5	
Spreadsheet	14	1		
Internet	7	8		
Multimedia	10	5		
Computer networks	7	6	1	
Copyright Act	7	2	6	
Computer viruses	4	6	5	
Computer based teaching programmes	5	5	5	
Basics of programming languages	3	5	2	5

5.1b The educational content assessment – conclusions

- The teaching of the most useful software such as a text processor and a spreadsheet is well done.
- The pupils are very interested in computer graphics; they would like to go deeper inside this topic.
- The teaching of programming is the most difficult part and pupils' responses differ radically.

5.2a The opinions on the usage of the selected methods – table

	The usage of this method should be unchanged	The usage of this method should be started (this method should be used more frequently)	This method should be used less frequently	The usage of this method should be stopped
Verbal method	11	4		
Dialogic teaching method with students	12	3		
An illustrative demonstration of procedures	7	8		
Practical work with computers	11	4		
Working with text on a PC (electronic material, internet, etc.)	14	1		
Projects	5	5	5	
Group work	3	10	2	
Individual tasks as homework and their evaluations at school	7	3	5	
Competitions	2	7	6	
Individual presentation of your work in front of the class with the multimedia usage (PC, interactive whiteboard)	2	10	3	
Individual creation of electronic materials (photos, video)	3	7	5	

5.2b The opinions on the usage of the selected methods – conclusions

- The respondents are satisfied with the classical methods (verbal method, demonstration of procedures, and practical usage of PCs).
- The modern methods are assessed according to the respondents' temperament. The extroverts prefer competitions, project, etc. The introverts do not like these methods.

6 Conclusion

(1/3)

Based on the authors' contemporary knowledge in the field in focus:

- The approach of the Pilsen basic school which was described above can serve as a starting point for other schools in terms of content and teaching methods.
- Teaching Informatics should be always dealt with in relation to other subjects. The teachers of other subjects should require the skills acquired by pupils in Informatics.

6 Conclusion

(2/3)

- The personality of the teacher significantly affects the pupil's perspective. He/she is responsible for the attractiveness of the subject for pupils and can aim the pupils' focus on education.
- Good quality of information technology equipment and competent teachers of Informatics at basic schools are important indicators for achieving required outcomes.

6 Conclusion

(3/3)

- The authors assume that the suitable time for starting teaching Informatics is approximately the age of twelve.

(This statement is based on the results of the questionnaire survey and consultations with several ICT teachers. It is not suitable to start the ICT education earlier due its demands on pupils. On the other hand, computers can be used successfully as a complement tool in other subjects before the ICT education is started.)

**Thank you for your
attention.**

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