

Some Aspects of ICT in Education in Slovakia and China

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ICT as a Tool for more Effective Teaching

- Significant development of information and communication technologies brings new possibilities in education at all levels of the educational process and in every school subject.
- Information technology has provided new innovations to sustain constructing an artificial educational environment by means of computers.
- Computer simulations in education often go into virtual reality applications. The virtual reality is distinguished by unique sorts of interaction, that responds to users' behaviours and actions. It is considered to be a new model of computer-based learning that provides the individual learner with a wider range of scientific vision.
- In informatics education it is important to represent and visualize various concepts of different notions, relationships and practices, respectively algorithms. Visualization is usually implemented through different models. The model may take the form of real device, but may also be implemented in a suitable virtual software environment. Virtual modelling has particular importance in the stages of cognitive processes in STEM education.
- A suitable tool for virtual modelling is virtual laboratory.



Implementation of ICT in Education with respect to Computer and Information Literacy - CIL

- ▶ If we implement Information and Communication Technologies (ICT) in Education, then for their effective use by pupils and students they need to have a certain level of computer and information literacy (Computer and Information Literacy - CIL). This problem has already been dealt with many countries around the world on different continents within the international comparative research ICILS - International Computer and Information Literacy Study and other international studies.
- ▶ Information and Communication Technology (ICT) is often associated with the most sophisticated and expensive computer-based technologies. While definitions of ICT are varied, it might be useful to accept the definition provided by United Nations Development Program: "ICTs are basically information-handling tools- a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information"

Concept of ICT in education and curriculum

- However, the special concept of ICT in education field refers to the new technology based on computer, communication, and network. Besides, IT is acronym of Information Technology and its mean is nearly the same as ICT (Information Communication Technology) or Information and Communication Technologies (ICTs), most of us are accustomed to call it as IT but not ICT/ICTs in China.
- We use in Slovakia we use both terms ICT and IT. ICT is more general and IT will be used in State educational program ISCED 3 for subject informatics.
- The goal of the school subject Informatics is to lead students to understanding basic notions, algorithms and techniques. Important aspect is to build informastics culture, that means – educate to effektive using of tools of the information society with respect of the law and ethical rules by the using of different ICT tools.



Simulations in education

An important aspect of ICT aided education is the visualization. It can bring forward the following points:


- ▶ An effective approach while looking for the results, solving the problems and discovering the very structure of the model.
- ▶ A visualization of relations in the model allows to infer new results in other areas and fields of different subjects
- ▶ Support of basic competences in science and technology; digital competences.
- ▶ The mission of computer science is to help students understand the basic concepts, procedures and techniques used to work with data and the flow of information in computer systems. It builds an informational culture, educates the efficient use of information civilization resources while respecting the legal and ethical principles of the use of information technologies and products. This mission is to be achieved through the joint action of computer science and the application of information technologies in the teaching of other subjects, interdisciplinary projects, all-school programs and school management (see also different studies by Turčáni, Magdin).

Simulations, animations and virtual laboratories (VL)

- ▶ Animations provide a schematic understanding of the concepts of the experiment in a better way that is not easily communicated by textual or passive illustrations. The visualization techniques used in virtual laboratories allow the student to experience the virtual world. In a traditional lab, users may encounter certain problems, such as limited access to laboratory equipment, lack of equipment, inadequate technical support. We want to focus on the use of virtual lab as a pedagogical method to support the acquisition of practical experience of students.
- ▶ In addition to animation and simulation for each virtual experiment, the theoretical part explains the theoretical background of the experiment, a procedure details and step by step leads the student. The method sheet is also provided with a set of questions to which the user could respond as part of a laboratory exercise. The electronic system allows users to send their feedback and receive feedback. It is an element that helps us improve the quality of workouts with virtual laboratories.
- ▶ VL opens up new challenges, such as separation of imperfections in learning technologies and methodologies and developing strategies for the assessment, providing reliable feedback on the students' abilities.
- ▶ Feedback from students and professionals brings many constructive comments and suggestions. VL can also be updated to include video guidelines for adjusting. The video should include instructions on how to connect the optical circuit devices used in laboratories, and instructions for measurement.



THE PROFILE ON ICT SUBJECT IN CHINA



As a stand-alone compulsory subject ICT, there has not restrict uniform policy on curriculum standards from government, neither definite regulation about the IT subject, in China. Furthermore, the different provinces, autonomous regions, and municipalities have some autonomies in the main content, the aim, and the amount of the course of IT subject. There are more than thirty provinces in China, and the difference of different province is very great. So, I give the example—Sichuan province—to discuss the general profile of the IT subject in schools.



ICT SUBJECT IN PRIMARY EDUCATION

- ▶ In primary education, the subject of IT will start at the grade three, in which the age of the pupil is eight or nine. The pupil will learn the subject in four years, with one course per week. The total course will reach 150 proximate during the stage of primary education. The IT teachers can select textbooks for pupils comply with their specific circumstance.
- ▶ There are two modules in the IT subject in primary school, the basic module and the expand module.
- ▶ The basic IT module includes three special contents, namely, hardware & system management, information processing & information presentation, and network & communication. The basic module will be learnt in the grade three and grade four, and divided into 36 units each of which will be taught in each course.
- ▶ The expand module includes two special contents, that is to say, induction algorithm & program design, and beginner of studying robot. The expand module will be studied in the grade five and grade six, and the amount of course is the same as the first module.

ICT SUBJECT IN LOWER SECONDARY EDUCATION

- From grade seven to grade nine, there are approximate 72 courses totally in the IT subject to students with the age of from thirteen to fifteen years old.
- These courses are arranged usually at the grade seven and grade eight once a week.
- The structure or the frame of the content is the same as the primary's, while with deeper content than that of primary education. Taking the module of algorithm & program design as example, it focuses on direct experience and object teaching in primary education, on the other hand, the IT teachers will pay attention to advanced program and encourage students to try to design or understand the basic structure of program (CAET, 2012).
- There is not any exam of IT subject in primary education, while a unified examination will be holden at the grade nine in some big city such as Chengdu (the capital of Sichuan province), which has nothing to do with the leaving examination or eleven-plus.





ICT SUBJECT IN UPPER-SECONDARY EDUCATION

- ▶ The content and the modules are the same as the primary and lower secondary education, but more abstract and more difficult.
- ▶ The difference is the arrangement of the IT subject which will be taught only at the grade ten with twice a week, approximate 80 courses, totally.
- ▶ There is a qualifying examination at the grade eleven, which requires all students reach the same basic level (generally, it is easy). The examination of IT isn't related to the college entrance examination in Sichuan province. On the contrary, the score of the IT exam in some province, such as Zhejiang, Jiangshu province, and Shanghai will be accumulated into the college entrance examination (see Zheng (2017)).



CONCLUSION

- ▶ There were in Slovakia many national projects for implementing of ICT in education not only in the subject Informatics, but also in other subjects, e.g. Infovek, Planéta vedomostí (Planet of knowledge, see Infovek(2017), Planéta vedomostí (2017)). Initiative and projects of this type are important because physical and virtual didactic means play a very important role in today's information society. Their role in the teaching process is based on the fact that in the more diverse ways a person learns, he learns better, faster and remember it for a longer time. While one student only needs a teacher's interpretation to master the lesson, for the other it will not be enough.

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- ▶ The Information Communication Technology (ICT) in Chinese conditions is one kind of subject, the same as mathematics, Chinese, English, etc. Generally, ICT, being regarded as a stand-alone compulsory subject. The main content in the subject is a bit of similarity, such as the basic skills of operating computer, the application of the Internet, the communication via network, and some simple software (see Koreňová (2016)). However, the grade of difficulty of the contents is different, and more and more difficult with the increasing of the students' grade.



➤ **Thank you for your attention.**