Supporting the development of digital competences of pupils and teachers

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***Abstract*—The author of this article dealing with issues of developing digital skills of students in primary and secondary schools. In addition to devote his attention now processing the results of testing students in various grades of the Slovak Republic and Czech Republic. Testing was conducted at several pre-selected objects and to analyze the results allow a comprehensive analysis of the cognitive level of students participating countries. In the project participated in three different institutions: University of Trnava in Trnava, the University of Ostrava and Methodology and Evaluation Center, ops in Ostrava. The obtained results of the project, as well as the objectives, specific focus are outlined below.**

I. INTRODUCTION

Internet has long been not only a medium allowing the sharing of information in text or graphic form or medium providing "chat" and e-mail based on a text. Today, in connection with the Internet constantly increasing development of technical means, such as parameters and data networks offers a wider range of options developed interactive communication [1].

Information and communication technologies (ICTs) bring with them a wide range of possibilities for their application in the teaching process. In terms of stages of the learning process are the application of IT from the motivational phase, exposure and fixing phase after finishing the diagnostic phase. The international project ERDF titled "Diagnostics of knowledge and skills of pupils in CR – Slovakia border region, focusing on their development," we implemented the use of IT in order to develop students' digital skills on the one hand, as well as development of teachers on the other. In addition, it is one of the diagnostic phases of at least used to the application of IT compared to other phases of the learning process.

In addition to the results of international comparative studies, PISA and PIRLS shows that the quality of education in Slovakia has a long-term downward trend. It shows that the content, but mostly learning how not to meet the requirements of the current labour market [2]. As the Sotáková: "There may be more, we will mention only the most important: passive reception of information at the expense of their usefulness in life, individualism at the expense of teamwork, with easy access to information, lack of internalisation and the like. In Slovakia there is a long-term development concept of the education system" [3].

In Slovakia there is a long-term development concept of an educational system aimed at stopping the above-mentioned adverse trends and innovation and modernization of curricula and teaching methods and the increasing competence of teachers in the education process [4]. Among other things, to improve the quality of the curriculum can be a vital and participate in national or international projects (ESF, ERDF…). These can often be a pragmatic contribution to the intended target groups to develop specific competencies. One of the following oriented projects is a project that was implemented over three years to develop digital competence through opportunities to test their students and then determine their cognitive level. In the next section characterize a particular course of project implementation.

II. PROJECT DESCRIPTION, OBJECTIVES AND SUPPORT INFORMATION LITERACY

Improving the quality of education in that country is also reflected in the growth of national economy. If the leaders of the country preferred need to build quality education system (i.e., building cutting-edge content of study programs, quality teacher training, availability of sufficient and high quality material and technical equipment of schools, as well as lifelong upgrading of skills and supporting the acquisition of key competences as the body and learning object) then the support of educational and regional projects is one of the possible solutions to contribute to this goal. One project, which was, inter alia, its content also aims to increase digital skills of the ERDF project was titled: "Diagnostics of knowledge and skills of pupils in CR – Slovakia border region focusing on their development."

The project was approved in 2008. Implementation of the project was in a period from September 2008 – August 2011. Project leaders were: Ostrava University in Ostrava (principal investigator), Trnava University in Trnava (the main cross-border partner) and Methodology and Evaluation Center in Ostrava. The project was funded 85% from the European Union ERDF (European Regional Development Fund). Fund designated for economic and social development of the European Union (its member states) aimed at reducing disparities between disadvantaged regions to supporting economic growth, increasing competitiveness in the employment…

Project involved more than 200 primary and secondary schools (including grammar), of which 155 schools from the Czech Republic and 45 schools in the Slovak Republic. A total of 6,231 students tested. Testing could only attend school (primary and secondary) in the border region SR (School of Trenčín, Trnava and Žilina) and the

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CR border (Moravian, Zlín, South Moravia). Other schools from other regions were not included in the project. The project was divided into two stages of testing: testing input (year 2010) and testing output (year 2011). Obtained and statistically processed the results presented below.

The aims of the project were:

- intervene in the situation in education on both sides of the border,
- identify the causes of the educational deficiencies of elementary and secondary schools,
- develop core competencies students,
- enhance the quality of schools,
- enhance the educational potential teachers,
- strengthen the competitiveness of the region through human resource development and education,
- enhance cooperation between all stakeholders in the educational process.

The specific objectives of the project were:

- verification of knowledge of pupils 3, 5 and 7 school year and 1 and 3 year of high school courses: mathematics, mother tongue (or Slovak. Czech language), foreign language (English or. German), science foundation (biology, chemistry, physics),
- identification of problem points in education,
- specification and design changes in the approach to teaching,
- implementation of teacher training (eLearning) – 800 teachers,
- organize three international conferences for teachers – introductory and two comparative,
- strengthen contacts between the actors and the mutual sharing of experiences,
- comparison of test results between schools,
- implementation of teaching approaches in the educational process of evaluating the relative increase in knowledge,
- improve the quality of education,
- promote and develop human resources in accordance with the requirements of the knowledge economy.

III. Project Realization:

Overall, the project has been categorized into several separate phases of implementation. In the first phase of the project were prepared tests and testing technical support (server, database, web interface testing). Have been designated (selected) vocational didactics, methodology, who had the task on the basis of educational standards and performance standards to propose specific tasks that could be used in individual tests for individual subjects (i.e., the Slovak language, mathematics, foreign language – English or German language, physics, biology and chemistry).

Prepared on the basis of the following tasks have been developed pilot tests, these were then tested on a sample of students and checked again the methodology to prevent the use of suspected problems (suspected activity – more than 80% success rate, less than 20% of the success of the models) in the tests. It was also checked by formal, but also stylistic page of all the tests. Followed by another phase, this was the initial testing (first test). The first phase of testing was conducted in 2010, the time of testing was determined for four months (February–May). After implementation of the testing was obtained from the testing results are processed and subsequently evaluated. Based on these data, the results obtained were analysed for levels of competence (skills), and then made specific recommendations in the form of methodological shortcomings such as exercise, if possible as much as possible to reduce or eliminate. Methodological guide for teachers on the recommended methodology used in universities throughout the school year.

In the next stage, after 12 months was again made the second round of testing – test output. This was realized on the same sample of schools, but was offered the opportunity of involvement and new schools. The difference between schools that were included in the first round of testing and those that were included in the second round of testing was that the schools integrated in the second round of testing has not been evaluated relative increase in students.

As mentioned above, after passing exit test, the relative increase was observed that students achieve course with the assumption that their cognitive level of the course will be higher. These results were processed in the form of "Test reports." These systems were automatically generated and divided into three groups:

Report to the Director – contains a summary of all tested students, and recommendations that the director should be taken into account in the further education of their students. Of course, the report also contained data on which the school knew what the level of the object of which compared to other schools.

Report to class teacher – % contained recommendations on how many students in which subject and which specific responsibility or not the problem.

Report to the pupil – containing specific recommendations on the level of individual competence.

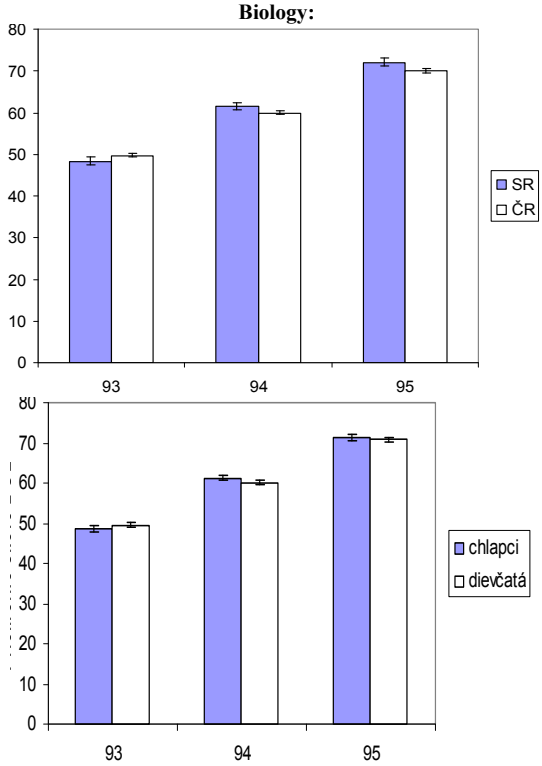
IV. Analysis of the Results Obtained in Testing

As already mentioned above, the second round of testing was conducted in early 2010. After passing the test was carried out comprehensive analysis and evaluation of admission testing of pupils and students of schools involved in the project. Test results were analysed by multivariate statistical test (ANCOVA, MANCOVA) correlations (Pearson). According to the analysis that the project carried out by Paul Prokop. Differences in test results between the SR and CR, as well as differences between the sexes overall results were not significant [3]. In some subjects, however, significant differences were noted. E.g. differences in the results of physics at secondary schools were quite clear – the boys consistently achieve higher average scores than girls.

Activity of innovative teaching aids directly followed up by testing the input of knowledge and skills students 3, 5 and 7 grade of primary school and first grade grammar schools and secondary schools. In these teaching materials of the tested objects are now ready to print, are offered some feedback and advice to teachers to help improve the skills of students. It places them in a particular emphasis

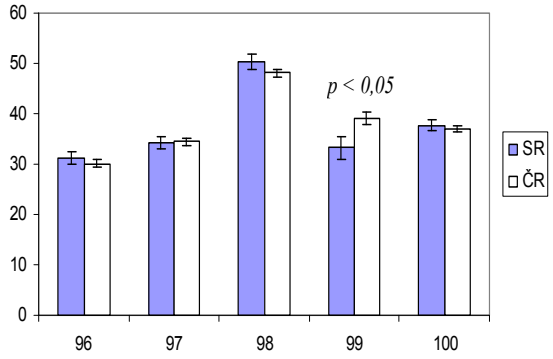
on those aspects of education, such as problem solving, group work, problem solving and project below. Awarded the role to contribute to the development of creativity of pupils, the thinking, the courage to grasp the problem and find a way to self, to experience the exciting action if the joy of finding their own solutions to problems. The authors of these teaching materials are trying to equip pupils and students the necessary knowledge and skills they will need for their future application in personal, professional and civic life. Below is a graphical representation of test results from the seventh grade:

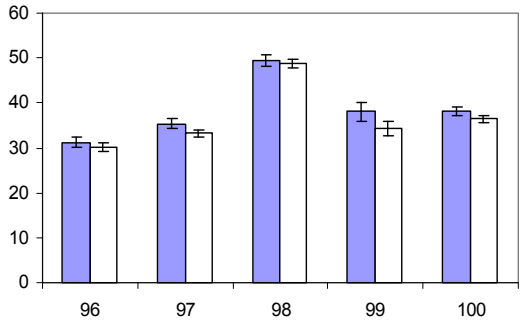
Biology:



Skill 93 – Perceptions of the broader context
Skill 94 – Graphic art
Skill 95 – Orientation and work with technical terms
Level of education: 7

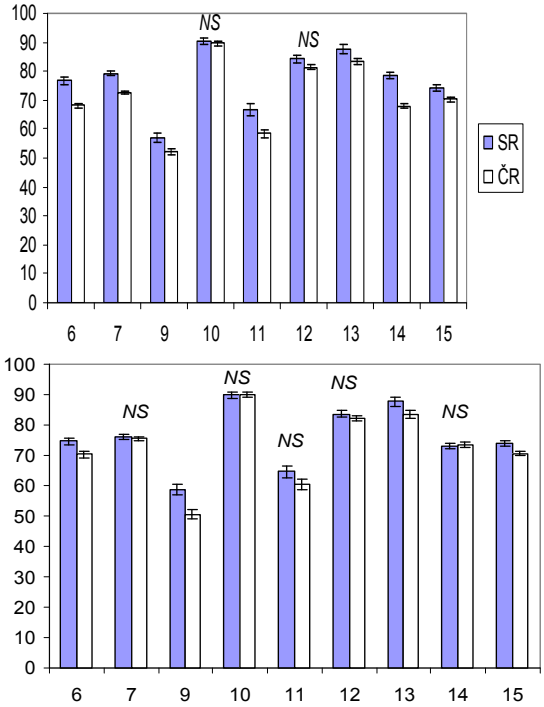
Physics





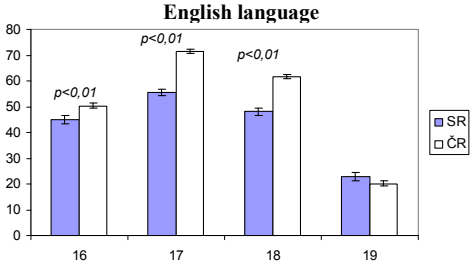
Skill 96 – Identify and correct use of terms
Skill 97 – Qualitative and quantitative description…
Skill 98 – Explaining and predicting phenomena
Skill 99 – Graphical perception, creation…
Skill 100 – Application of knowledge, use…
Skill 101 – Observation, experimental measurement
Level of education: 7

Mathematics

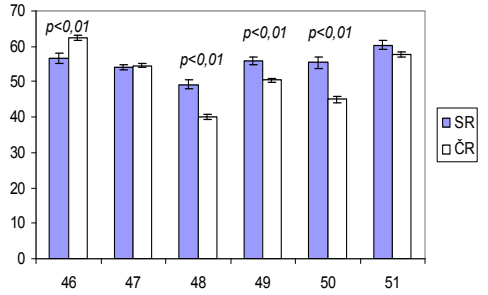


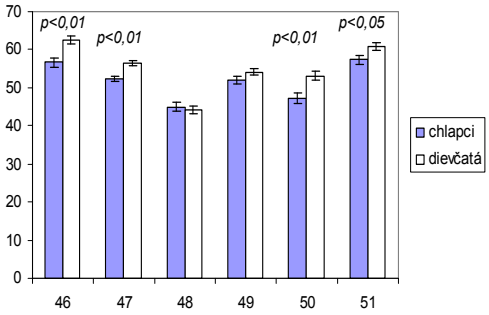
Skill 6 – Understanding the concept of numbers as…
Skill 7 – Numerical skills
Skill 8 – (data not provided)
Skill 9 – Orientation and work with the table
Skill 10 – Graphical perception
Skill 11 – Working with graphs
Skill 12 – Knowledge and work…
Skill 13 – Spatial imagination
Skill 14 – Function as a relationship between variables
Skill 15 – Logical correctness account
Level of education: 7

English language



Skill 16 – Know rhymes
Skill 17 – Vocabulary
Skill 18 – Construction of the English sentence
Skill 19 – Working with prepositions
Level of education: 7





Skill 46 – Know rhymes
Skill 47 – Construction of the English sentence
Skill 48 – Working with prepositions
Skill 49 – Working with opytovacími
Skill 50 – Responses to the simple
Skill 51 – Reading a shorter
Level of education: 5

Differences between Slovakia and Czech Republic have been inconsistent. The girls were in some cases higher scores than boys.

CONCLUSION

The aim of this contribution was to analyse the current status of that project and analysis of the achievements. Our attention, we tried to address not only the characteristics of individual stages of the project, but also the processing of statistical results and recommendations. They emerged from the experience we gained during the project, i.e. the findings of a deficit in the education of students and school students involved in the project followed the work of teaching materials and formed in early 2011 (March–May) final testing took place. When evaluating gain knowledge and skills of pupils and students will show whether the proposed methods and the curriculum effectively. Lifelong learning should be an essential part of every job seeker. This aspect is also supported by the project, which was presented in this article and which will contribute to better prepared graduates for success in the labour market.

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