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International research of technical curriculum

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Abstract

The article's main topic is the research of primary school technical education in the Czech Republic, in the Federal Republic of Germany and in Slovakia. Modern society cannot do without technical development, information technologies and seeking new sources of energy while maintaining ecological balance. This trend requires essential changes in the system of education. Technical literacy must become an important part of education as early as on the elementary school level. Monitoring and analysis of various approaches to technical education in the countries listed above is one of the key outputs of an international project named World of Work (WOW), which has got the registration number 2015-1-SK01-KA201-008942.

Key words: international project, technical education curriculum, status analysis, SWOT analysis.

Introduction

Both the Czech and Slovak school systems have been undergoing a curricular reform since the beginning of the 1990s. The output document in the Czech Republic is called Frame Educational Program – FEP, resp. FEP EE for Elementary Education level. In Slovakia, the situation is the same. State education program for junior secondary education has the abbreviation SEP (School Education Program). Technical education has been weakened continually in both school systems. In the Czech Republic, technical education is mainly represented by the educational field called Man and the World of Work. This field is divided into eight topics: Working with Technical Materials, Design and Construction, Plant Growing and Animal Breeding, Household Operation and Maintenance, Cooking, Working with Laboratory Equipment, Use of Digital Technology and World of Work. For complete meeting the requirements in this field it is enough for the school to put into practice the instruction of the obligatory topic World of Work in Grade 9 plus one more of the topics listed above [Ministry of Education 2013]. Through alterations of the FEP for elementary schools, the number of technical education classes per week has been lowered. Out of the original four classes only three have remained for four elementary school upper grades. The situation in Slovakia has been even worse. During the school year 2011/2012 the

subject called Technology only had the allotment of one class per week and moreover, only in one of the elementary school upper grades [ŠPÚ 2016]. In Germany, the situation is different. Education is controlled by particular land governments, so the conditions and school programs vary in particular lands. The central (federal) regulation is limited to regulation and coordination of professional training and research. Technical education (WOW) is part of the curriculum of Werkrealschule, Hauptschule and Realschule. In lesser measure WOW is part of curriculum of natural science oriented high schools [NICM 2014].

Research Methodology

Main research goals

Analysis of technical education status quo and its possible further development was the main research goal.

Research tools

With regard to the research goal, questionnaires were chosen as the tool. A questionnaire containing both closed and open items was designed. The inquiry thus had both quantitative and qualitative character. The main topics featured in the questionnaire were: Position of WOW within the FEP; Class Allotment in Particular Grades (5 through 9); SEP and WOW; Topics, Teaching Matter; Organization of Classes; Conditions of Instruction (room, material, aids, tools, textbooks – existence and availability, workbooks, manuals, and other sources; Methodology of Instruction; Cooperation with Partners and Sponsors; Gaining Teacher Qualification; Professional Profile; Qualification and Professional Growth. The text of all items was designed in order to be clear and understandable in German, Slovak and English. There were 24 items in the questionnaire. Its validity was proved at an elementary school in Pilsen.

Respondents

Representative institutions that are well informed and oriented in this field were selected in all countries involved in the research. These institutions are also co-investigators in WOW project. In Germany, the research was carried out by Stuttgart University (SU) and MiNe-MINT (MM) – a methodology center. In Slovakia, it was Dr. J. Raabe (RAABE) Publishing House and Udice (a private secondary art school). In the Czech Republic the survey was carried out by West Bohemia University, Faculty of Education, and 7th Elementary School in Pilsen.

Evaluation Methodology

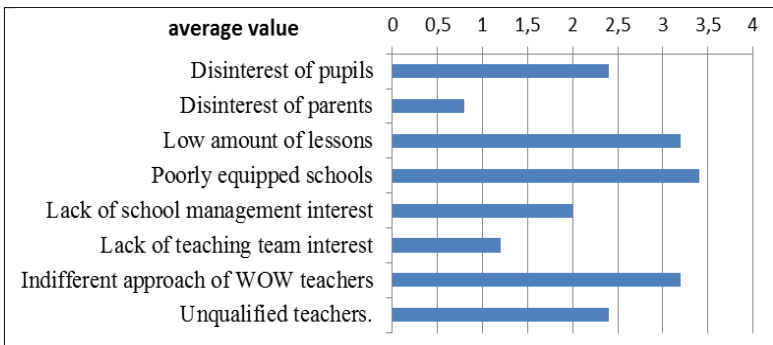
Quantitative results of the questionnaire research were processed using basic statistic methods – charts and graphic summary. Semantic analysis and elements of semiotic analysis were used for evaluating the quantitative items. Final interpretations of results were processed using SWOT analysis [Mach, Simbartl, Krotký 2015].

Constituent research results

Position of WOW within the education programs

WOW is usually taught as a compulsory subject, sometimes as a compulsorily optional subject. It is also contained in hobby clubs. Average number of classes varies from 1 to 1.5. In Germany, they are likely to have 2–3.5 classes in upper grades. This time allotment usually applies to all grades instructed. Differences occur in case technical education is taught as an obligatorily optional subject or organized as a school hobby club. Here the number of classes rises considerably, up to 3–6 classes a week. Remarkable differences are also seen between a normal elementary and a special (practical) elementary school where the latter has more classes per week. Grammar schools have fewer technical education classes or do not teach this subject at all. About 40% of respondents view the number of classes as satisfactory. 55% of respondents consider it unsatisfactory. Generally, it is proper to increase the number of classes.

Negative influence on the status of WOW in education



Graph. 1. Negative influence on the status of WOW in education

Respondents state that unsatisfactory school equipment, low number of classes and certain lack of teachers' interest have the most negative impacts on WOW instruction.

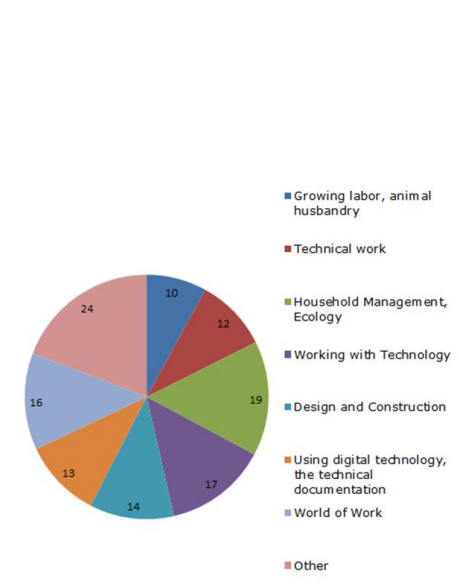
WOW – position as a subject in education program preferences

Table 1. WOW Instruction Preference

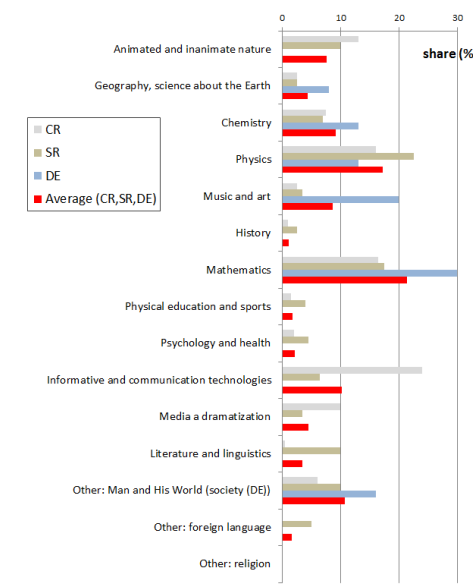
	ZUP	7ZSP	SSUD	RAABE	US+MM
In each grade 1 compulsory subject.		X		X	
In each grade 1 compulsory subject and an optional subject.			X		X
A compulsory subject in any grades according to school possibilities.					
Integration of subjects and a project character of teaching.	X				X

The most important WOW topics

The WOW topics are very differentiated by their names. That's why they have been categorized and based on the filled-in questionnaires also rated in order to determine priorities. The results are visualized in the graph. The category "other" contains: Cooking, Working with Laboratory Equipment, Energy, Creative Work, Handiwork, Transport and Traffic. The categories mentioned above had very low rating, so the most important categories are: Household Operation and Maintenance, Ecology, Working with Technical Materials or World of Work.



Graph 2. Priorities of topics in the educational program



Graph 3. Priorities share of other areas in the educational content of WOW considering the type of school (primary school and Realschule)

Cooperation of other subjects in WOW instruction

Following subject have the biggest share in WOW teaching matter: Math, Second Language, ICT, Physics, Art, Music. Interconnecting and/or linking of these subjects with WOW are very likely. For comparison, this item was divided according to comparable specializations of the schools.

Conclusion

Important conclusions following from SWOT analysis.

WOW position within the education programs frame

Strong points: current social support of technical education, active approach and creativity of teachers.

Weak points: low number of classes, low qualification of teachers, unsatisfactory equipment of workshops and special classrooms.

Opportunities: launching new optional subjects; subject is suitable for students with special educational needs and/or having different social and cultural background; chance of starting various projects out of range of the regular classes.

Threats: WOW supporting activities may lack systematic approach; students may not be interested in technical subjects.

Summary:

WOW is integrated into all types of schools providing general elementary education. Low number of technical education classes presents the biggest problem in all three countries.

Conditions of WOW instruction

Strong points: relatively good material conditions for teaching the topic of Working with Materials. Enthusiasm and active approach of teachers.

Weak points: not completely satisfactory equipment for teaching other WOW topics. Not enough classes.

Opportunities: the chance of teaching WOW outside of school is not used as often as it could be (social partners, science centers). There are suitable conditions for project instruction.

Threats: insufficient financial and material sources. Frustrated teachers.

Summary: WOW and related subject suffer from a long-term lack of financial, material and space sources, especially in the Czech Republic and in Slovakia.

Methodology materials

Strong points: teachers' own activity (making worksheets, etc.)

Weak points: unsystematic publishing of textbooks, manuals and worksheets

Opportunities: cooperation of publishing houses with colleges, science and education centers and teacher associations for publishing teaching materials.

Threats: the published materials will not cover all WOW topics. Published materials will lack systematic character. Materials may soon get outdated.

WOW teachers training

Strong points: the major idea is that WOW teachers' training is satisfactory.

Weak points: the majority of pedagogy students are not interested in technical subjects and natural science; WOW topics are wide-spread (from nutrition and cooking to ICT) which means a complicated and complex training; at high schools, WOW is usually taught by teachers who primarily teach other subjects.

Opportunities: chance of getting the teacher's qualification not only at the faculty of education, but also at other faculties (natural science, technology).

Threats: low percentage of qualified WOW teachers.

Summary: Training teachers for all WOW topics is practically impossible. Lack of WOW teachers at grammar schools and small elementary schools is a big problem.

The conclusions following from the survey will serve as initial assumptions for phase two of the project dealing with designing WOW methodological materials. The worst situation concerning technical education is in Slovakia. Created collections of materials will help teachers in Slovakia increase the level of WOW instruction.

Literature

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