



Activity 1 Research

Questionnaire survey evaluation

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Evaluation

The number of survey respondents was five. Three respondents (ZUP, RAABE, US) in their questionnaires could take into account a broader overview of examined problems (because of their professional background). Questionnaires of US and MM in all entries coincide. During the analysis, it was taken into account as one output.

Methodology of evaluation

The quantitative results of the survey were processed with basic statistical methods - tabular and graphical reports. For qualitative evaluation items was used semantic analysis and elements of semiotic analysis. Final interpretation of the results are compiled by using SWOT analysis.

Respondents:

RAABE - Dr. Josef Raabe Slovensko, SR

SSUD - Súkromná stredná umelecká škola dizajnu, SR (Private Secondary Art School of Design)

ZUP – Západočeska univerzita v Plzni, CR (University of West Bohemia in Pilsen)

7ZSP – 7. základní škola a mateřská škola Plzeň, CR (7th elementary school and kindergarten)

US – Universtität Stuttgart, DE (University of Stuttgart)

MM – MiNe-MINT e.V., DE

Item 1

Teaching WOW is most often taught in elementary schools and their similar types of schools for children aged 7 to 15 years.

ZUP	7ZSP	SSUD	RAABE	US+MM
Primary school, Practical and special primary school, Gymnasium	Primary school, Practical and special primary school,	Primary school, Gymnasium	Primary school,	„Working Elementary School“ – Werkrealschule Secondary General School – Hauptschule, Intermediate Secondary School - Realschule,

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low level				Gymnasium
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Item 2

WOW subject is usually taught as a compulsory, sometimes compulsory optional. It is also included in leisure activities. The average time allocation for the compulsory teaching is between 1 and 1,5 hour (in Germany, in the higher grades they have greater time allocation – 2 – 3,5 hours). They are usually covered all taught classes. Differences occur in the event that it is a compulsory optional subject, or as an object of interest (hobby group) at school. Here, the number of hours markedly increases to 3-6 hours per week. A marked differences are also often among the elementary school and special (practical) primary school. There is also a higher number of hours per week compared to, for example, the gymnasium, where the number of hours has decreased significantly (sometimes it is even not taught). At approximately 50% the time allocation is satisfactory. From an overall perspective it is useful to increase the time allocation. Larger projects then can be solved only outside of main teaching because of the lack of time.

Legend: (sa) satisfactory, (un) unsatisfactory, (+) optional subject

Practical and special primary school (CR) „Working Elementary School“ – Werkrealschule (DE) Secondary General School – Hauptschule (DE)	ZUP	7ZSP	SSUD	RAABE	US+MM
5 th grade	4 (sa)	4 (sa)			1.5 (un)
6 th grade	4 (sa)	5 (sa)			1.5 (un)
7 th grade	5 (sa)	5 (sa)			1.5 (un)
8 th grade	5 (sa)	6 (5) (sa)			3.5 (sa+)
9 th grade	6 (sa)	6 (5) (sa)			3.5 (sa+)
10 th grade	6 (sa)				3.5 (sa+)

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Primary school (CR) Primary school (SR) Intermediate Secondary School – Realschule (DE)	ZUP	7ZSP	SSUD	RAABE	US+MM
5 th grade	1 (sa)	1 (sa)	1 (sa)	1 (sa)	1 (un)
6 th grade	0 (un)	1 (sa)	1 (sa)	1 (sa)	1 (un)
7 th grade	1 (sa)	1 (sa)	1 (sa)	1 (sa)	3 (sa+)
8 th grade	1 (un)	1 (sa)	1 (un)	1 (sa)	3 (sa+)
9 th grade	1 (un)	1 (sa)	1 (un)	1 (sa)	3 (sa+)
10 th grade					3 (sa+)

Gymnasium – low level (CR) Gymnasium – 8 years (SR) Gymnasium – language emphasis (DE) Gymnasium – science emphasis (DE)	ZUP	7ZSP	SSUD	RAABE	US+MM	
					Language emp.	Science emp.
5 th grade			0 (un)		0.2 (un)	0.2 (un)
6 th grade	1 (sa)		0 (un)		0.2 (un)	0.2 (un)
7 th grade	0 (1) (un)		0 (un)		0.2 (un)	0.2 (un)
8 th grade	1 (sa)		0 (sa)		0.5 (un)	2 (sa)
9 th grade	0 (0,5) (sa+)		0 (sa)		0.5 (un)	2 (sa)
10 th grade					0.5 (un)	2 (sa)

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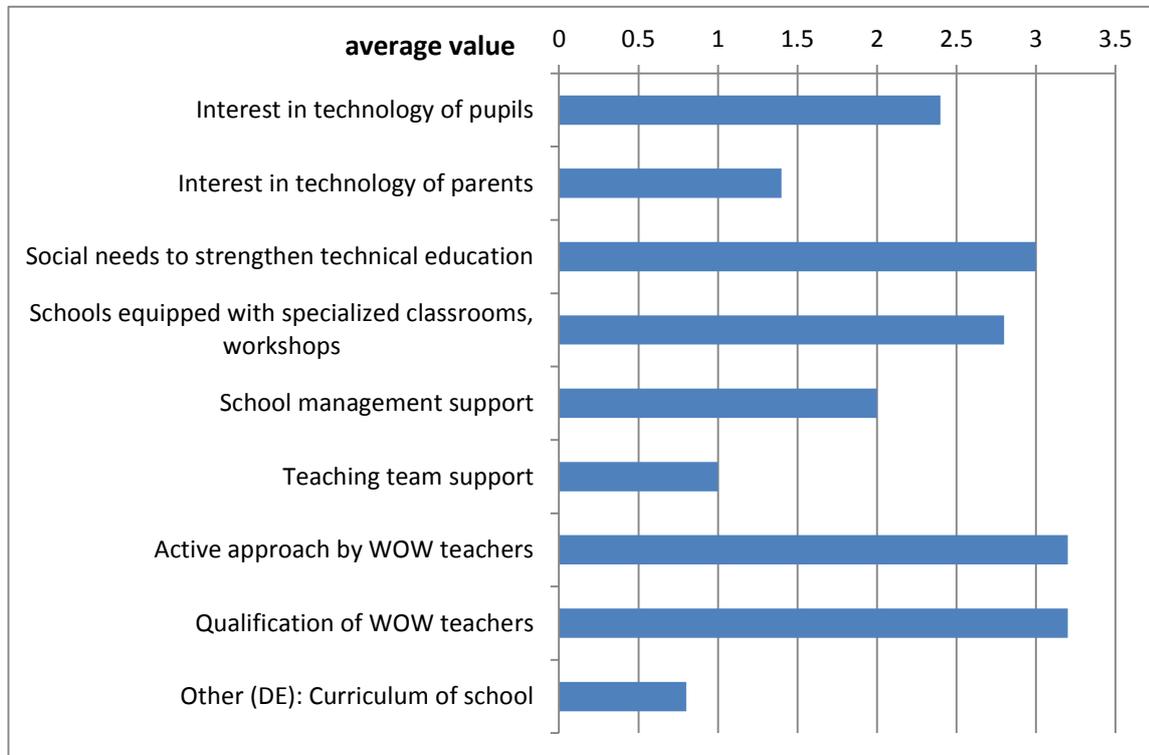
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Item 3

The most positive impact on the status of WOW education is:

- The social need of technical education.
- Equipment of school with classrooms, workshops.
- Active approach WOW teachers.
- Qualifications of WOW teachers.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Interest in technology of pupils.	3	2	3	2	2
Interest in technology of parents.	2	0	3	0	2
Social needs to strengthen technical education.	3	3	4	3	2
Schools equipped with specialized classrooms, workshops.	4	3	2	4	1
School management support.	3	2	2	2	1
Teaching team support.	1	0	2	1	1
Active approach by WOW teachers.	4	3	3	3	3
Qualification of WOW teachers.	3	3	3	3	4
Other: Curriculum of school					4

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Graf 1 Positive influence on the status of WOW in education


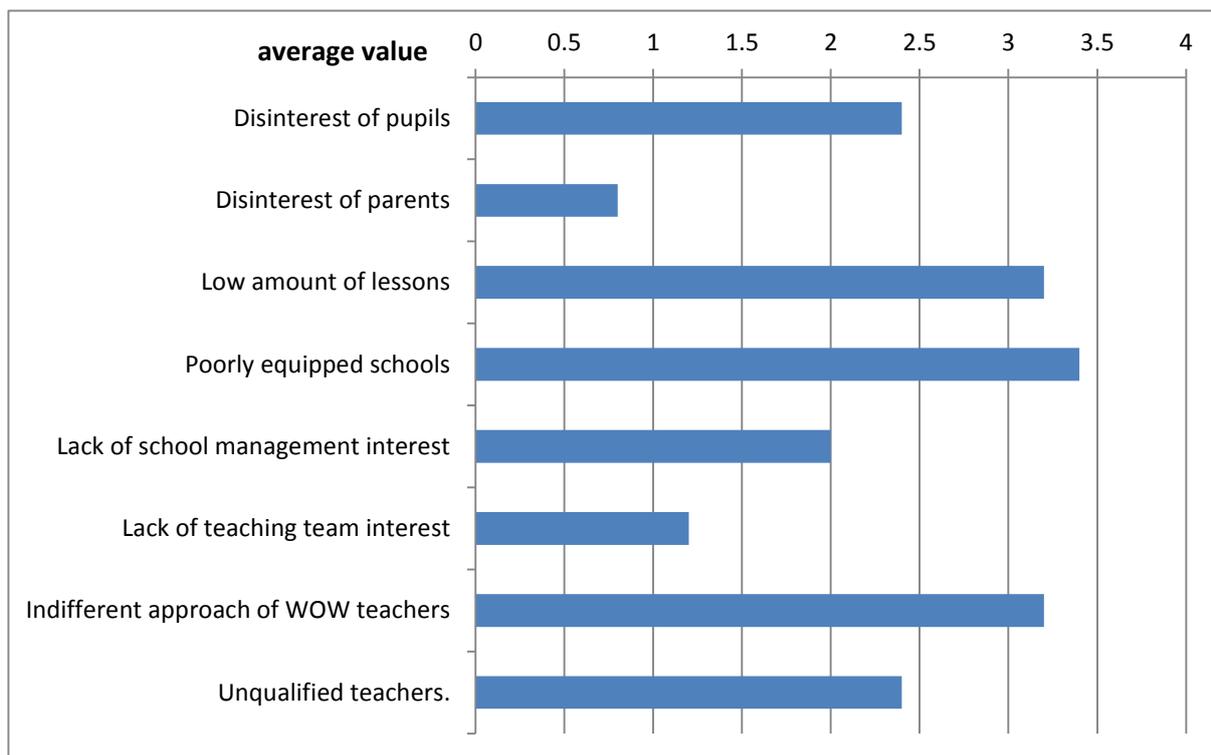
Item 4

Negative impact on the status WOW affects mainly "low time allocation" and lack of school equipment, it means items that have practically the greatest frequency. Respondents also come to the conclusion that the position of WOW is also affected by the proactive approach teachers of WOW, as expected.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Disinterest of pupils.	4	2	2	2	2
Disinterest of parents.	1	0	2	0	1
Low amount of lessons.	4	2	3	3	4
Poorly equipped schools.	3	4	3	4	3
Lack of school management interest.	4	1	2	2	1
Lack of teaching team interest.	2	0	2	2	0

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Indifferent approach of WOW teachers.	4	3	2	3	4
Unqualified teachers.	2	2	2	2	4

Graf 2 Negative influence on the status of WOW in education


Item 5

Curricula for elementary schools allow to respect the specificities of pupils or groups. Elimination of social and health disadvantages of pupils solves a system of special and practical schools. Working with the exceptionally talented students is mostly solved by Gymnasium systems or leisure activities and elective subjects in primary schools.

	ZUP	7ZSP	SSUD	RAABE	US+MM
With social disadvantages.	X	X	X	X	
With disabilities.	X	X	X	X	
With different cultures and religion.		X		X	

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With extraordinary talent.	X	X	X	X	
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Item 6

Respondents prefer teaching WOW mainly as a compulsory subject, including compulsory optional in each year. However, there are possibilities in the form of integration into other subjects. This option has a positive effect on the development of the pupil but is not preferred because it brings organizational and administrative problems for schools.

	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

ZUP: The current trend of integration is the current trend in the educational process. Allows to obtain for the educational area higher time subsidy than is specified by framework curriculum.

7ZSP: This is partly because the framework curriculum for basic education, which is mandatory for all primary schools in the country. Furthermore, the decision of the school management.

SSUD: It is required compulsory subject, because it takes account of needs of pupils associated with their further education, respectively with their entering to the labor market. Optional subject is related to the increased interest of individual pupils on the subject and student orientation to the needs of the region.

RAABE: It's the framework curriculum. There is also the possibility of disposable hours, but they are more used to other objects.

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Item 7

The content of optional subjects according to analysis could be:

- products supporting the creativity and skills,
- Products with longstanding (project) character from design to finish,
- use of modern technologies (eg. Robotics).

ZUP	<i>Mechatronics, working with natural and waste materials, the design process and how to solve problems on a project basis (eg. The creation of a product) .Učivo supporting manual skills and creativity, ideally interdisciplinary implemented.</i>
7ZSP	<i>Work with wood, electronics, robotics.</i>
SSUD	<i>Working with various materials - creative work from paper, textiles, wood, natural materials.</i>
RAABE	<i>Constructing, programming, modeling.</i>
US+MM	<i>Same topics as in the compulsory subjects but with more details and depth. Advanced topics that are not part of the education plan.</i>

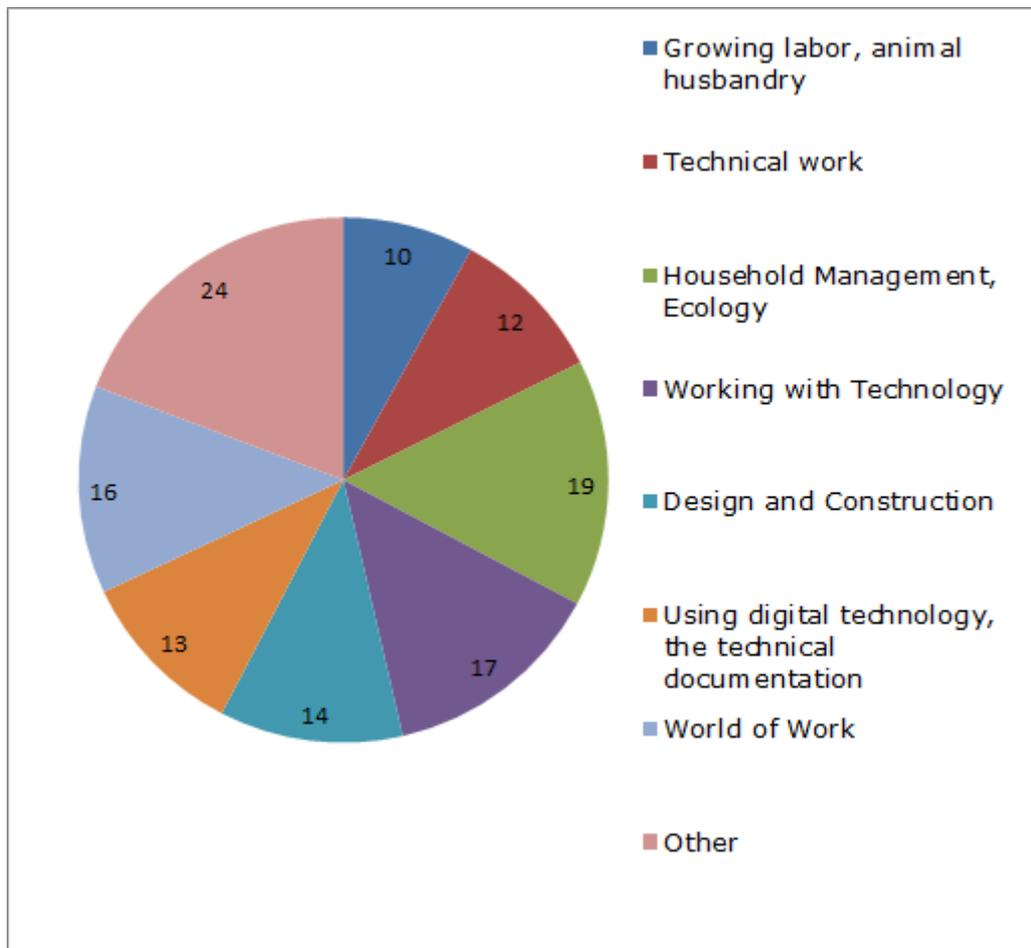
Item 8

Thematic areas of WOW have branched names. These areas were categorized and with the help of point evaluation from the questionnaire can be prioritized. Everything shown in the graph. "Other" category includes: teaching of cooking, working with laboratory equipment, energy, creative activities, handicrafts, transport and transportation. The mentioned categories have little scoring or was a low occurrence. The most significant part are so: household management, ecology, working with technology and the world of work.

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Graf 3 Priorities of topics in the educational program



Item 9

From all collected data, the subject matter is largely defined by educational program - STEM fields.

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Item 10

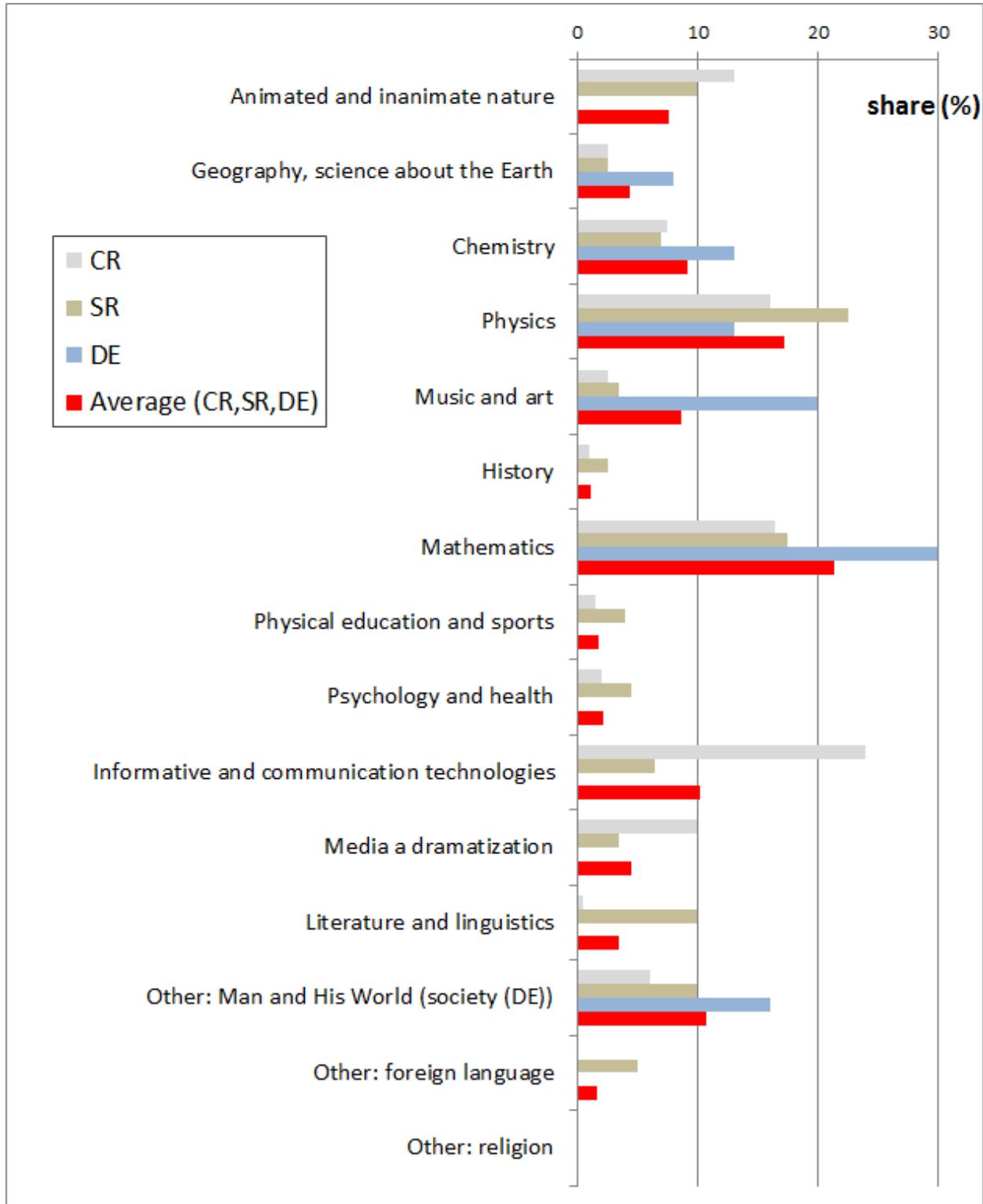
The largest share of the educational content of WOW have the following fields: mathematics, foreign language, informative and communication technologies, physics and artistically oriented subjects. It is more probable the possibility of linking these subjects in teaching and WOW. For comparison, the item was divided according to generally comparable focus of schools.

Type of School:	ZUP	7ZSP	SSUD	RAABE	US+MM
Primary school (CR, SR)					
Intermediate Secondary School (Realschule (DE))					
Animated and inanimate nature	16	10	5	15	0
Geography, science about the Earth	5	0	5	0	8
Chemistry	5	10	4	10	13
Physics	12	20	5	40	13
Music and art	5	0	7	0	20
History	2	0	5	0	0
Mathematics	13	20	20	15	30
Physical education and sports	3	0	8	0	0
Psychology and health	4	0	4	5	0
Informative and communication technologies	18	30	3	10	0
Media a dramatization	10	10	2	5	0
Literature and linguistics	1	0	20	0	0
Other: Man and His World (society(DE))	6		10		16
Other: foreign language			5		0
Other: religion					

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Graf 4 Priorities share of other areas in the educational content of WOW considering the type of school (primary school and Realschule)



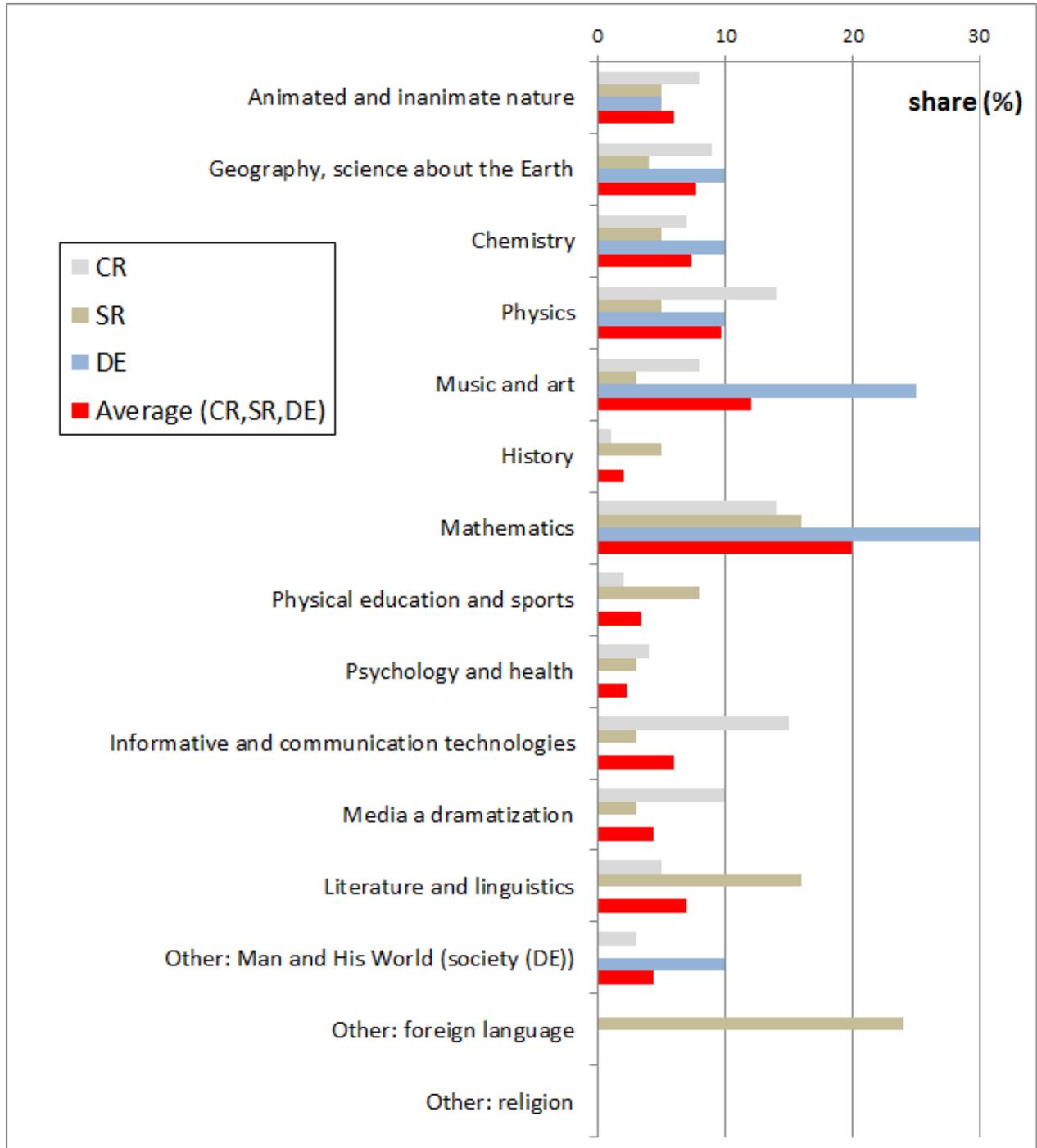
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Type of School:	ZUP	7ZSP	SSUD	RAABE	US+MM
Gymnasium (CR, SR, DE)					
Animated and inanimate nature	8		5		5
Geography, science about the Earth	9		4		10
Chemistry	7		5		10
Physics	14		5		10
Music and art	8		3		25
History	1		5		0
Mathematics	14		16		30
Physical education and sports	2		8		0
Psychology and health	4		3		0
Informative and communication technologies	15		3		0
Media a dramatization	10		3		0
Literature and linguistics	5		16		0
Other: Man and His World (society(DE))	3		0		10
Other: foreign language			24		0
Other: religion					0

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Graf 5 Priorities share of other areas in the educational content of WOW considering the type of school (Gymnasium)



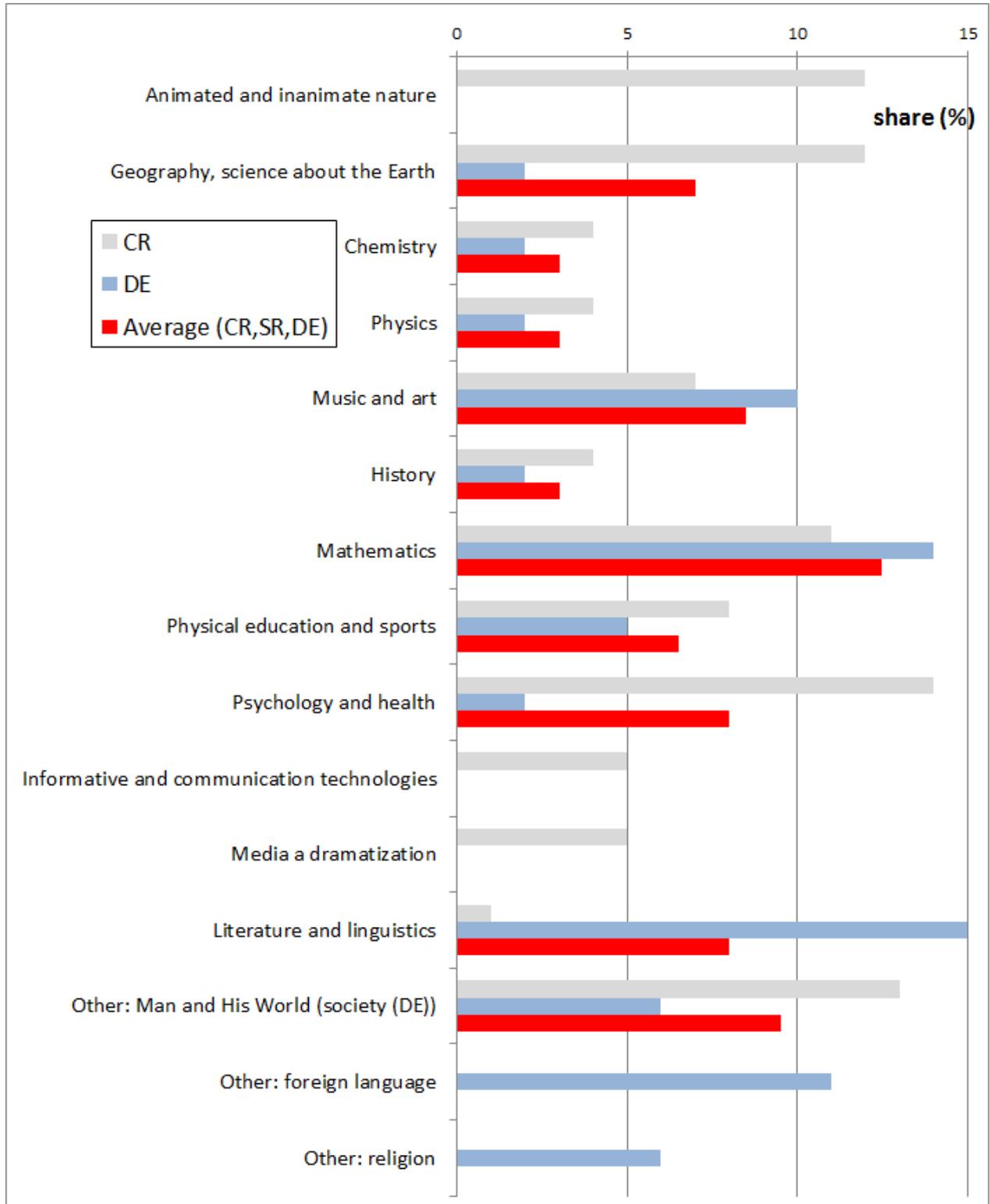
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Type of School:	ZUP	7ZSP	SSUD	RAABE	US+MM
Practical and special school (CR) „Working Elementary School“ – Werkrealschule (DE) Secondary General School – Hauptschule (DE)					
Animated and inanimate nature	12				0
Geography, science about the Earth	12				2
Chemistry	4				2
Physics	4				2
Music and art	7				10
History	4				2
Mathematics	11				14
Physical education and sports	8				5
Psychology and health	14				2
Informative and communication technologies	5				0
Media a dramatization	5				0
Literature and linguistics	1				15
Other: Man and His World (society(DE))	13				6
Other: foreign language					11
Other: religion					6

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Graf 6 Priorities share of other areas in the educational content of WOW considering the type of school (Practical and special school (CR), Werkrealschule und Hauptschule DE)



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Item 11

WOW teaching is often taught regularly in one lesson a week or is taught by larger teaching units. Teaching could be linked to larger units in order to save preparing time for lessons and classroom activities (cleaning, preparation work on the product).

Item 12

Teaching WOW is most often realized only in the school. They are used both indoors (both common and specialized classrooms) and outside school grounds. Aspect of use of outdoor space is a given by school location.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Common classrooms	X	X	X	X	
Specialized classrooms	X	X	X	X	X
Workshops	X	X	X	X	
Outdoor areas	X	X	X	X	X
Areas of other institutions	X				
Other:					

ZUP: *Techmania Science center, shared workshops with other schools or other educational institutions*

Item 13

Equipment of schools depends primarily on project activity, of school management and engagement of the teaching staff. Schools are mostly equipped with computer and presentation technology. Experimentally they work with new technologies, but their spread is slow and not very systematic. Recording devices for pupils work are represented in greater numbers rather exceptionally.

A classroom for working with digital technologies	ZUP	7ZSP	SSUD	RAABE	US+MM
10 and more computers	X	X	X	X	X
3 and more digital cameras					

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2 and more digital video-cameras					
High-speed connection to internet	X		X		X
SW for 3D models		X			
Other:	X	X		X	

ZUP: *tablets, one camera, interactive board.*

RAABE: *tablets, videorecorder, camera.*

7ZSP: *videorecorder, camera, 30 tablets.*

Schools are equipped for the WOW area especially with hand machine tools for metal and wood. Using electric machine tools is problematic and therefore exceptional.

A classroom for working with technical materials	ZUP	7ZSP	SSUD	RAABE	US+MM
Working desk shared by maximal two pupils	X	X	X	X	X
Vice on a working desk	X	X	X	X	X
Tools for woodworking (saws, files, rasps)	X	X	X	X	X
Tools for metalworking (shears for metal sheets, files)	X	X	X	X	X
Drill per group of pupils		X			X
Band, radial, chop saw for teachers to prepare materials		X			X
Other:					

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Primary schools in the Czech Republic are often equipped for work with ceramics. It's mainly because of the use of facilities for leisure activities organized by schools to improve their financial situation.

A classroom for working with ceramics	ZUP	7ZSP	SSUD	RAABE	US+MM
Potter´s wheel	X	X	-	-	X
Kiln	X	X	-	-	X
Other:			-	-	

School grounds allows the realization of cultivation activities in the furrows. Caring for houseplants in the classroom is also often realized.

Areas for practicing plant growing lessons	ZUP	7ZSP	SSUD	RAABE	US+MM
Several garden beds for lessons	X	X	X	X	X
Greenhouse		X			X
Fruit trees					
Rock garden					
Flower boxes and flower pots for pupils to take care of it	X	X	X	X	
Other:					

Equipment of this kind is not much available in schools.

Areas for practicing household maintenance lessons	ZUP	7ZSP	SSUD	RAABE	US+MM
Domestic appliances	X	-	-	-	X
Plumbing		-	-	-	
Wiring	X	-	-	-	
Other:					

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Spaces for full teaching of cooking at schools are often available.

Areas for practicing cooking lessons	ZUP	7ZSP	SSUD	RAABE	US+MM
Kitchen per group of pupils equipped with basic dishes and a cooker	X	X	X	X	X
Place for cold meals preparation			X		
Other:					

Item 14

Schools are often equipped with tools such as construction kits. Schools have different kinds of kits and use didactic models to support the clarity of teaching.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Construction box	X	X	X	-	X
Electrical construction box	X	X		-	X
Electronic construction box	X	X	X	-	X
Didactic models.	X	X	X	-	X
Other:	X				

ZUP: educational presentations, training videos, demonstrations of products and solutions, posters with the procedures.

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Item 15

Survey shows that at schools there is a lack of textbooks and methodological materials in print and electronic form. This lack Schools solve by creating your own worksheets for pupils.

	CR ZČU	CR 7. ZŠ	SK SSUD	SK RAABE	DE MiNe+Stut.
Textbooks for individual thematic scopes.		X			X
Complex textbooks for the WOW area.			X		
Workbooks for pupils for individual thematic scopes.			X		
Methodical manuals for teachers.	X	X			
Own teaching texts.					
Own worksheets.	X	X		X	
Standardized electronic teaching materials.			X		
Own electronic teaching materials.			X		
Other:	X				

ZUP: *textbooks of selected areas (particularly career choice), older worksheets, drawings.*

Item 16

Optimal structure of methodical materials should generally correspond to the division:

- methodological manual for teachers,
- worksheets with the theoretical part and practical tasks and procedures for students.

Item 17

The questionnaires revealed a structure composed of 22% of the theory, forming skills while working with materials and tools 42%, developing creativity and project lessons 32%. The structure corresponds approximately to the global structure according WOW ITEA. (International Technology Education Association).

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	ZUP	7ZSP	SSUD	RAABE	US+MM	Průměrné hodnoty
Theory	20%	20%	20%	20%	30%	22%
Forming skills while working with materials and tools.	30%	60%	20%	60%	40%	42%
Developing creativity and project lessons.	40%	20%	50%	20%	30%	32%
Other:	10%		10%			10%

SSUD: *presentation of work, evaluation.*

ZUP: *planning, presentation of solutions.*

Item 18

The survey showed that most finances schools receive from projects and sponsors. Cover the cost of school budget appears as insufficient. Teaching or more attractive projects must subsidize, in some cases pupils' parents.

	ZUP	7ZSP	SSUD	RAABE	US+MM
School budget	X		X		X
Social school partner	X				X
Sponsors	X	X	X	X	
Parents	X	X	X		
Projects	X	X	X	X	X
Other					

Item 19

The survey shows that the training of teachers for WOW is realized mainly at public universities.

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Item 20

Respondents consider the current state of teacher training in the area of WOW as sufficient.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Yes		X	X	X	X
No	X				X

RAABE: *but... there is little interest in studying technology as an object, so this object is mainly taught by unqualified teachers.*

ZUP: *approbation which is compatible with WOW is seen as a complement to the "main branch". This is usually caused by a low time grants for elementary and general awareness about the style of education under the previous regime. In those days education in this area accounted for mainly manual work in the workshop or on land. Not only because this directors and teachers have rather superficial relationship to this educational area, which is transmitted to the students. Opening of specialization: mathematics and engineering, physics-engineering, computer science-technology.*

US+MM: *yes, for Werkrealschule, Hauptschule and Realschule, No, for Gymnasium (most teachers in Gym were not trained in technology.*

Item 21

Given the diversity of the topics, teacher training is complicated and not for all educational circles sufficiently secured.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Sufficient in all thematic areas.					X
Sufficient in some topics.		X	X	X	
Insufficient in the following topics, write down which:	X				X

ZUP: *cultivation and breeding work, partly for Design and Construction. In particular, this is connected with facilities faculty / department.*

US+MM: *for non-Gymnasium teachers the training is insufficient in all areas.*

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Item 22

The survey shows that there is a lack of systematic postgraduate education of teachers of WOW.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Yes, systematically					
Yes, occasionally	X		X		X
No, give a reason		X		X	

7ZSP: *no institutions offer further education (except working with digital technology).*

RAABE: *they are not offered education / training for this area; possible only in the context of solved projects and it is not for all pedagogues.*

ZUP: *further education is offered almost exclusively as accredited courses within the currently solved ESF projects. Thus, it is available for a limited time. Mainly concerns the digital technology, and activities directed to the creativity and working with small material.*

Item 23

Further educating of teachers should be focused primarily on Development of creativity, obtaining specific ideas for products, activities, experiments and related proper use of methodic materials.

	ZUP	7ZSP	SSUD	RAABE	US+MM
General education, didactics and psychology.					X
Alternative methods and teaching styles.	X		X		
Technical didactics.				X	X
Development of creativity, experimental teaching.	X	X	X	X	X
Gathering specific topics, products and teaching materials.	X	X	X	X	X

SSUD: *pupils must be motivated and interested in finding and using unusual, interesting and creative forms and methods of work.*

ZUP: *it needs to change entrenched standard concept of WOW in the form of subjects Technology or Technical education. Teaching should be more focused on student*

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competency development and to integrate the curriculum into other subjects and maximize the use of different organizational forms. There are also a number of electronic educational materials (multimedia), but teachers do not know about them.

US+MM: give a reason for your stand.....Technology instruction should allow students to develop not only a knowledge of technological processes but also allow them to experiment with the possibilities that technological tools and other materials allow.

Item 24

Respondents put the least emphasis on theoretical knowledge of students in their evaluation.

	ZUP	7ZSP	SSUD	RAABE	US+MM
Manual skills, working with tools.	X	X		X	X
Creativity, ability to create and implement own ideas.	X	X	X	X	X
Theoretical knowledge	X				X
Communication skills and presentation skills.	X		X		X

7ZSP, RAABE: in this area it is important to combine the theory and practice. Without a theory, students can not cope with practical training. Therefore, we primarily focus on the practical part, we support students in the realization of our, or their own ideas and a teacher is there only in an advisory role.

SSUD: if the student is creative and able to realize his idea, prove by this his manual skills and ability to use the knowledge gained too. It is also very important for the student to be able to present their work and be able to defend their project - it is very important for the labor market.

ZUP: the evaluation should also combine stuffs above with the character and type of student. Excellent can receive student who fails to think of solutions, but can understand how to proceed, eg. He can perfectly prepared the product. On the other hand mastermind of genius idea or solution may not be very skilled manually. Together, these two students will form an excellent team to link theory and physical implementation and presentation.

US+MM: all of these factors contribute to successful performance as a creative and productive designer.

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Activity 1 Market research

Questionnaire survey evaluation

1. WOW position within educational programmes

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

Weak points: small amount of lessons; poor qualification of teachers; insufficient equipment in workshops and specialized classrooms.

Opportunities: possibility to open optional subjects; the subject is suitable for pupils with specific educational needs, coming from different social or cultural environment; possibility to create project activities in addition to the given amount of lessons.

Threats: partial non-systematic support of technical education; possible lack of interest in technical subjects at pupils

Summary:

WOW is integrated in all types of schools providing basic general education. All of the three countries face the biggest problem of small amount of WOW lessons.

2. WOW content

Strong points: relative consensus of WOW topics in all the states (DE, SK, CZ)

Weak points: too much of liberalization of framework and school educational programmes in SK and CZ; insufficient content and extent of WOW at secondary grammar schools

Opportunities: potential integration with other natural scientific subjects: ICT, Mathematics, Physics, Chemistry

Threats: topics preferences, where schools have got already created material conditions (workshops, specialized classrooms) ; suppression of topics requesting new investments into equipment – this stands especially for CZ and SK.

Summary:

Schools have got the possibility to implement all essential topics into their educational programme. However, their selection is limited mainly by material conditions. There is significant consensus of topics in the participating countries.

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3. WOW teachers preparation

Strong points: there prevails opinion that WOW teachers are satisfactory prepared

Weak points: poor interest of students at faculties of education in technical and natural scientific fields; large multi-field focus of WOW (from nutrition and meal preparation to computer technology) and therefore complicated all-embracing preparation of teachers; WOW lessons are at most secondary grammar schools taught by teachers with different specialization.

Opportunities: possibility to gain WOW qualifications not merely at faculties of education but also at faculties of technical engineering or natural sciences

Threats: small percentage of WOW teachers with appropriate qualifications

Summary: teachers preparation for all WOW topics is in reality impossible. Lack of WOW qualified teachers poses a problem especially at secondary grammar schools or small primary schools.

4. Conditions for WOW lessons

Strong points: relatively good conditions for teaching topics of work with material. Enthusiasm and active approach of teachers.

Weak points: not quite suitable equipment for other WOW topics. Insufficient amount of lessons.

Opportunities: the possibility of outdoor lesson realisation is used poorly at schools (at social partners, in science centres), appropriate conditions for project lessons.

Threats: insufficient financial and material provisions of lessons. Frustration of teachers.

Summary: subjects reflecting WOW subject matter suffer from long-term insufficient financial, spatial and material provisions, particularly in CZ and SK.

5. External cooperation

Strong points: project announcements in the WOW area (ESF, regional projects). Financial support by sponsors.

Weak points: low cooperation with social and external partners. (Science centres, museums, vocational schools)

Opportunities: there is possibility to carry out lessons out of school area (at social partners, in science centres).

Threats: lessons carried out of school area will not fully correspond with educational programmes and will miss the proper methodical conduction.

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The cooperation between schools and external partners is not used very often for WOW, it may bring advantages especially for schools in the future.

6. Teaching materials

Strong points: own activity of teachers regarding creation of study materials (worksheets for pupils).

Weak points: missing systematic publication of study materials (text books, manuals, worksheets).

Opportunities: cooperation with publishing houses and faculties of education, centres of education or teachers' associations for creating and publishing teaching materials (text books, manuals, worksheets).

Threats: created materials cannot cover all WOW topics and areas. The published materials will not have long-term systematic character. Material obsolescence may become a problem too.

Summary:

Requesting teaching materials shall be characteristic especially with suggestions for activities, products and experiments with accompanying methodical comments. The theoretical part shall be formed by basic text books dedicated to the most important areas: work with materials, household and maintenance, technical works, meal preparation, financial literacy, plant growing and breeding.

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