The European Social Fund,

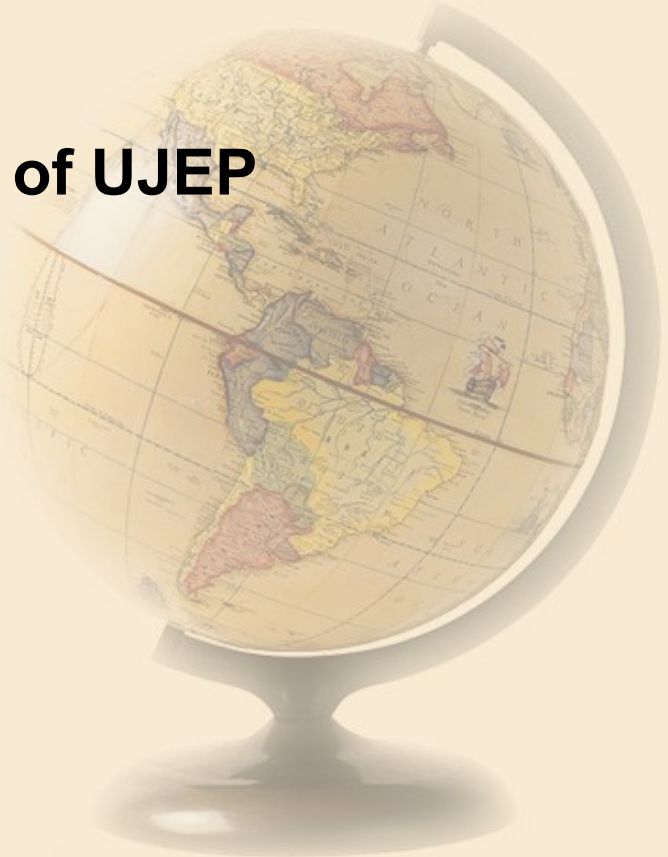
the Czech Republic State Budget,

the UJEP Faculty of Natural Sciences

and

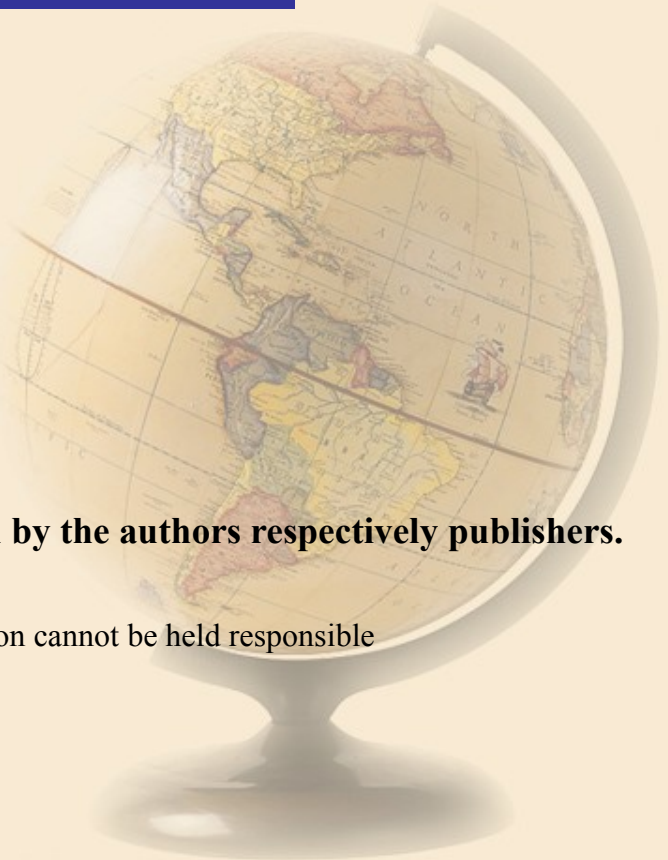
the Pedagogical Faculty of UJEP

present



GD Bildung und Kultur

LLP/AT-230/22/08



This project has been funded with support from the European Commission.
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předškolní vzdělávání

základní vzdělávání

gymnaziální vzdělávání

speciální vzdělávání

Man and Nature at General Educational Programmes in the Czech Republic

School Educational Programmes

QUO VADIS?

PhDr. Jiří Škoda, Ph.D.[1]

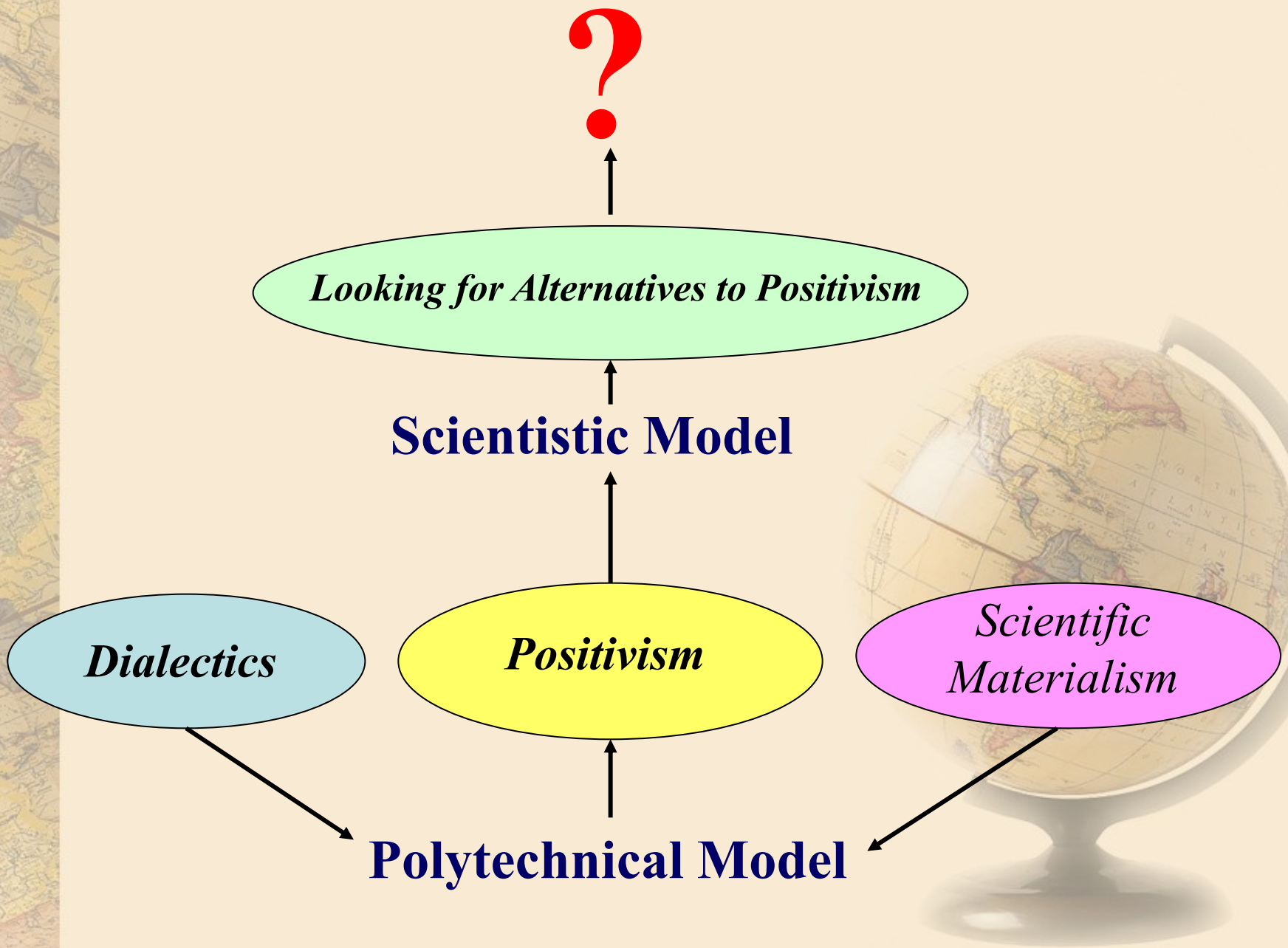
Vice-Dean for Science and Foreign Relations of PF UJEP

EFEU Project: PhDr.Vladislava Heřmanová, Ph.D.[2]

PF UJEP Department of Pedagogy[1]

PF UJEP Department of Psychology[2]

Paradigms of Natural Science Education



Generalization

Abstraction

Scientistic Model

Atomisation

Matematisation

Scientistic Model

-Strictly Rigid Curricula

-Mass Teaching

-Transmissive and Instructive Educational Procedures

-Cognitive Goals

-Utilitarian Teaching Strategy

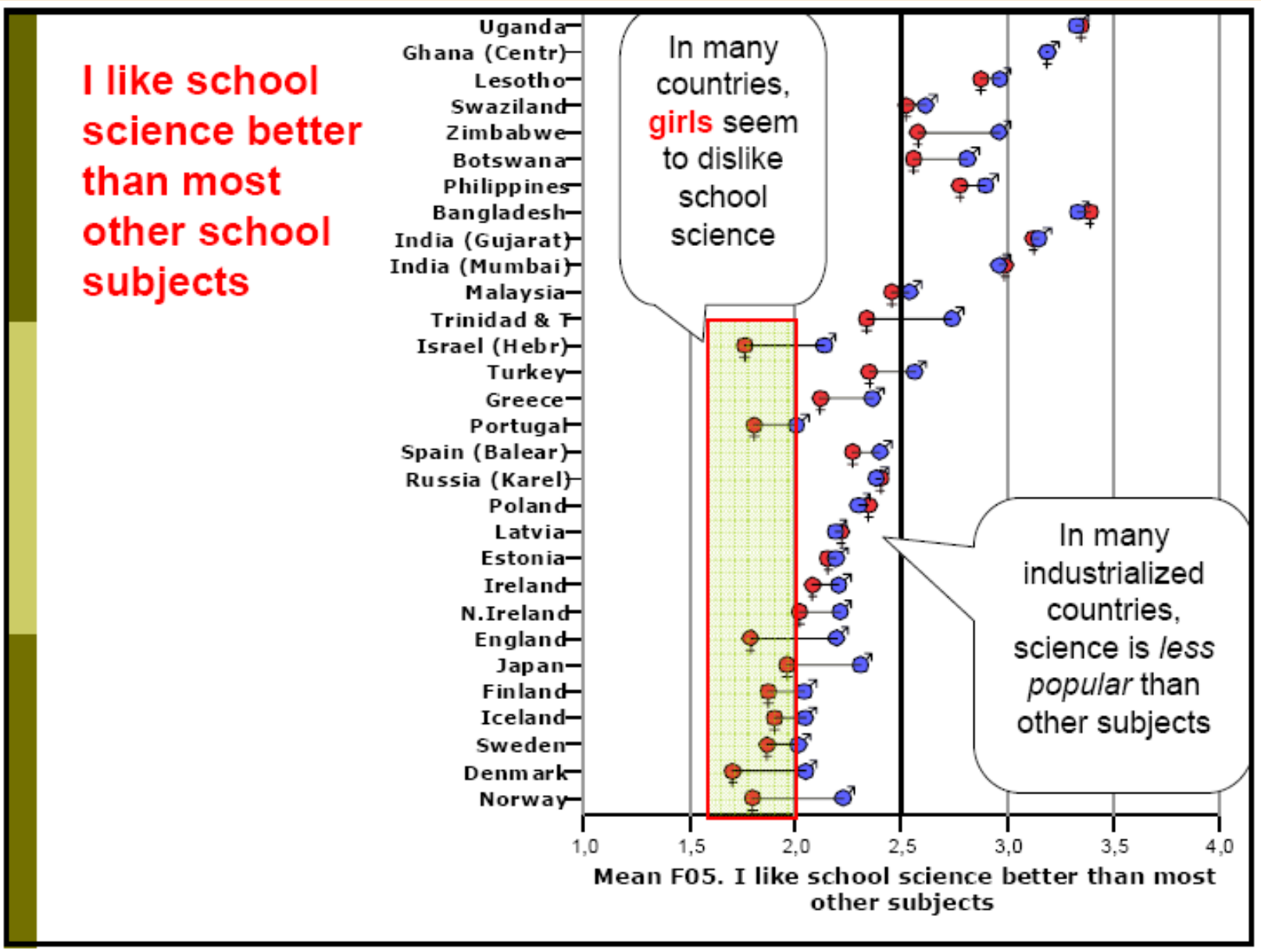
-Uniform Approach to Pupils

-Unification of Information Sources

Decline of credibility of natural science education

Do you not believe?

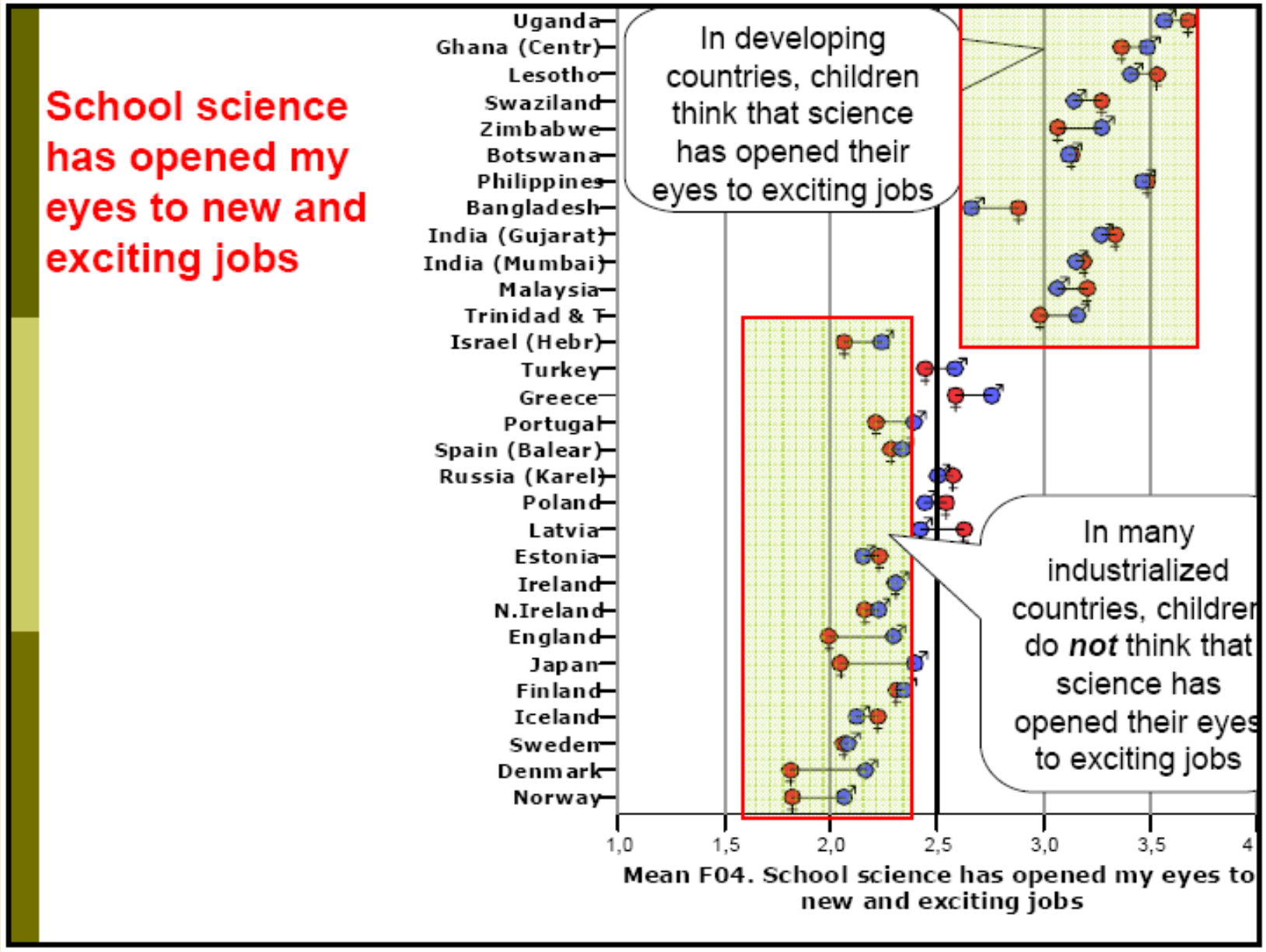
A few results of the ROSE project (*The Relevance of Science Education*)



Do you not believe?

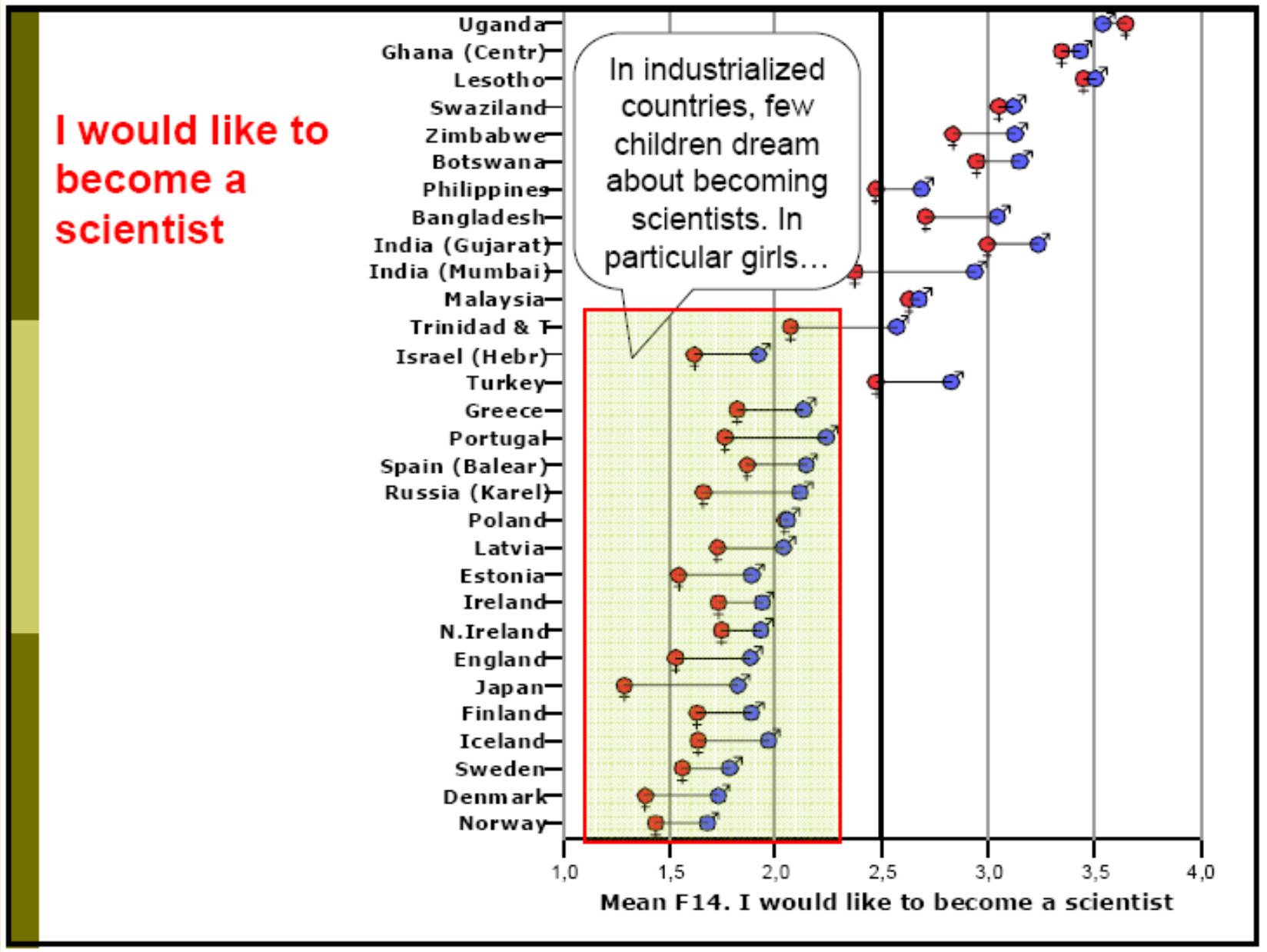
A few results of the ROSE project (*The Relevance of Science Education*)

School science has opened my eyes to new and exciting jobs



Don t you believe?..

A few results of the ROSE Project (*The Relevance of Science Education*)



Přírodní vědy		Řešení problémů	
Země	Průměr	Země	Průměr
Finsko	548	Korea	550
Japonsko	548	Hongkong	548
Hongkong	539	Finsko	548
Korea	538	Japonsko	547
Lichtenštejnsko	525	Nový Zéland	533
Austrálie	525	Macao	532
Macao	525	Austrálie	530
Nizozemsko	524	Lichtenštejnsko	529
Česká republika	523	Kanada	529
Nový Zéland	521	Belgie	525
Kanada	519	Švýcarsko	521
Švýcarsko	513	Nizozemsko	520
Francie	511	Francie	519
Belgie	509	Dánsko	517
Švédsko	506	Česká republika	516
Irsko	505	Německo	513
Maďarsko	503	Švédsko	509
Německo	502	Rakousko	506
Polsko	498	Island	505
Slovensko	495	Maďarsko	501
Island	495	Irsko	498
USA	491	Lucembursko	494
Rakousko	491	Slovensko	492
Rusko	489	Norsko	490
Lotyšsko	489	Polsko	487
Španělsko	487	Lotyšsko	483
Itálie	486	Španělsko	482
Norsko	484	Rusko	479
Lucembursko	483	USA	477
Řecko	481	Portugalsko	470
Dánsko	475	Itálie	469
Portugalsko	468	Řecko	448
Uruguay	438	Thajsko	425
Srbsko	436	Srbsko	420
Turecko	434	Uruguay	411
Thajsko	429	Turecko	408
Mexiko	405	Mexiko	384
Indonésie	395	Brazílie	371
Brazílie	390	Indonésie	361
Tunisko	385	Tunisko	345

Natural Sciensis – Problem Solving
Country Country Average

Research in natural science literacy and abilities to solve problems in 15-year old pupils

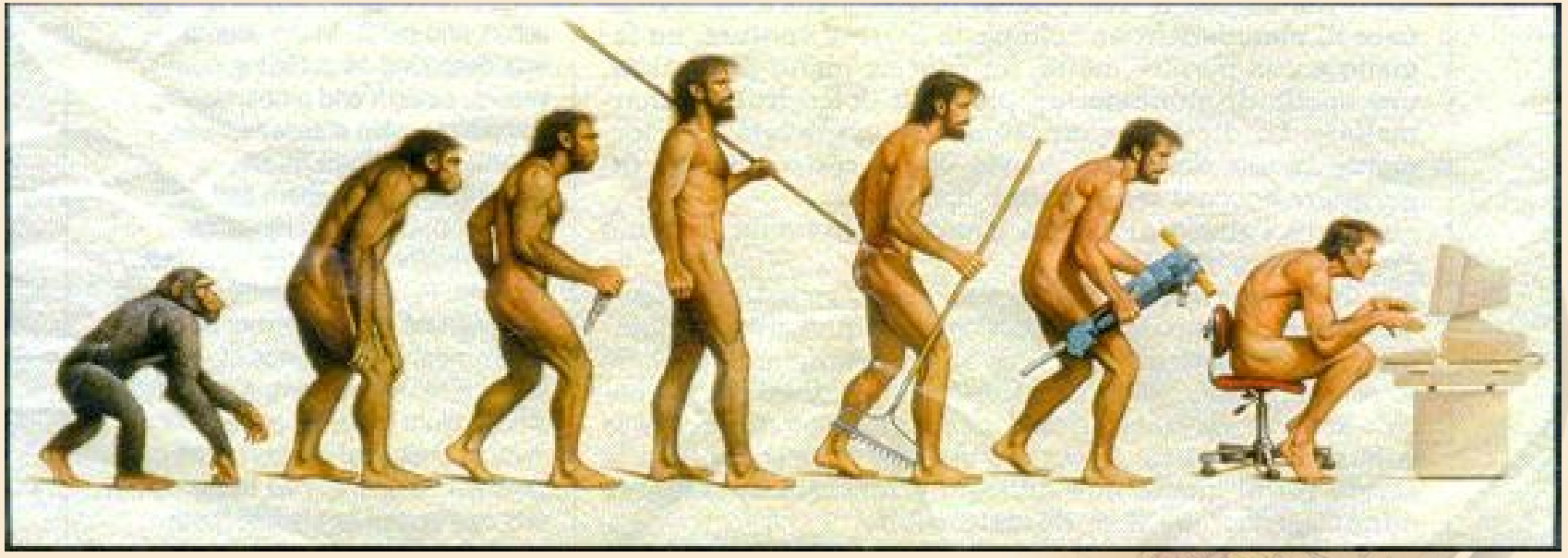
according to the OECD PISA 2003

Czech Republic

Natural sciences….

…natural science subjects…

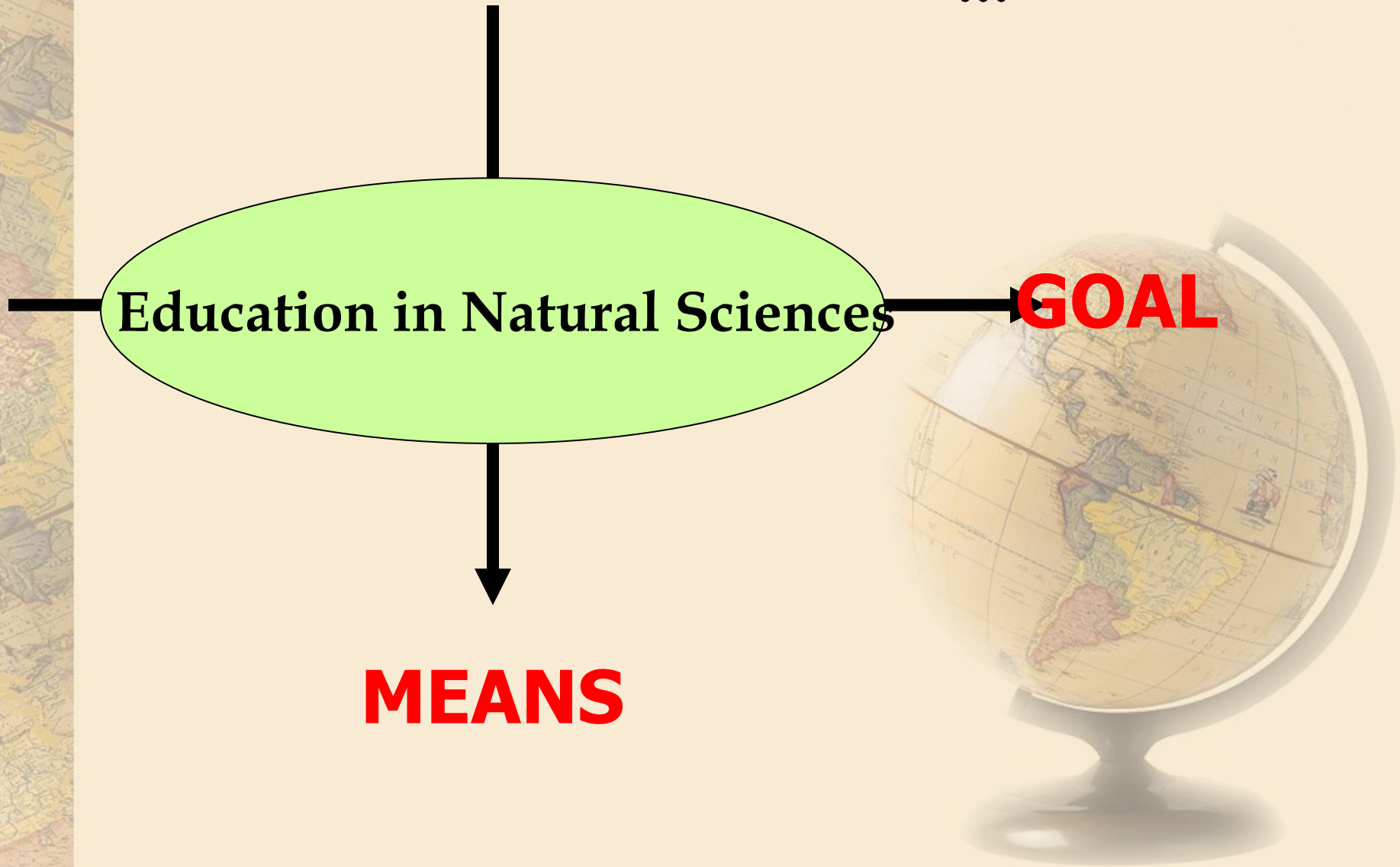
…their didactics,



as well as our understanding of their meanings,

are gradually developing and changing

Different Competences
!!!



A MEANS

… but a means of what?

What will man need to know in the course of the following 40-50 years of his professional career?

What is school expected to prepare him for?

..And to equip him with?

Key purposes and key competenses according to General Educational Programmes

Competence to learning

Competence to problem solving

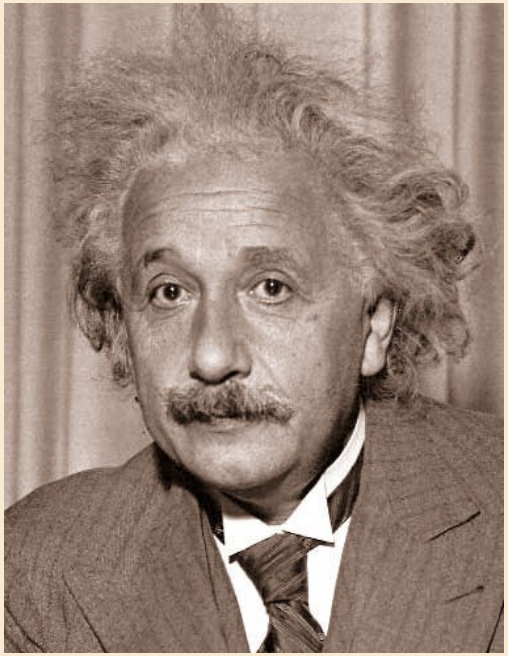
Communicative Competence

Social and Personal Competence

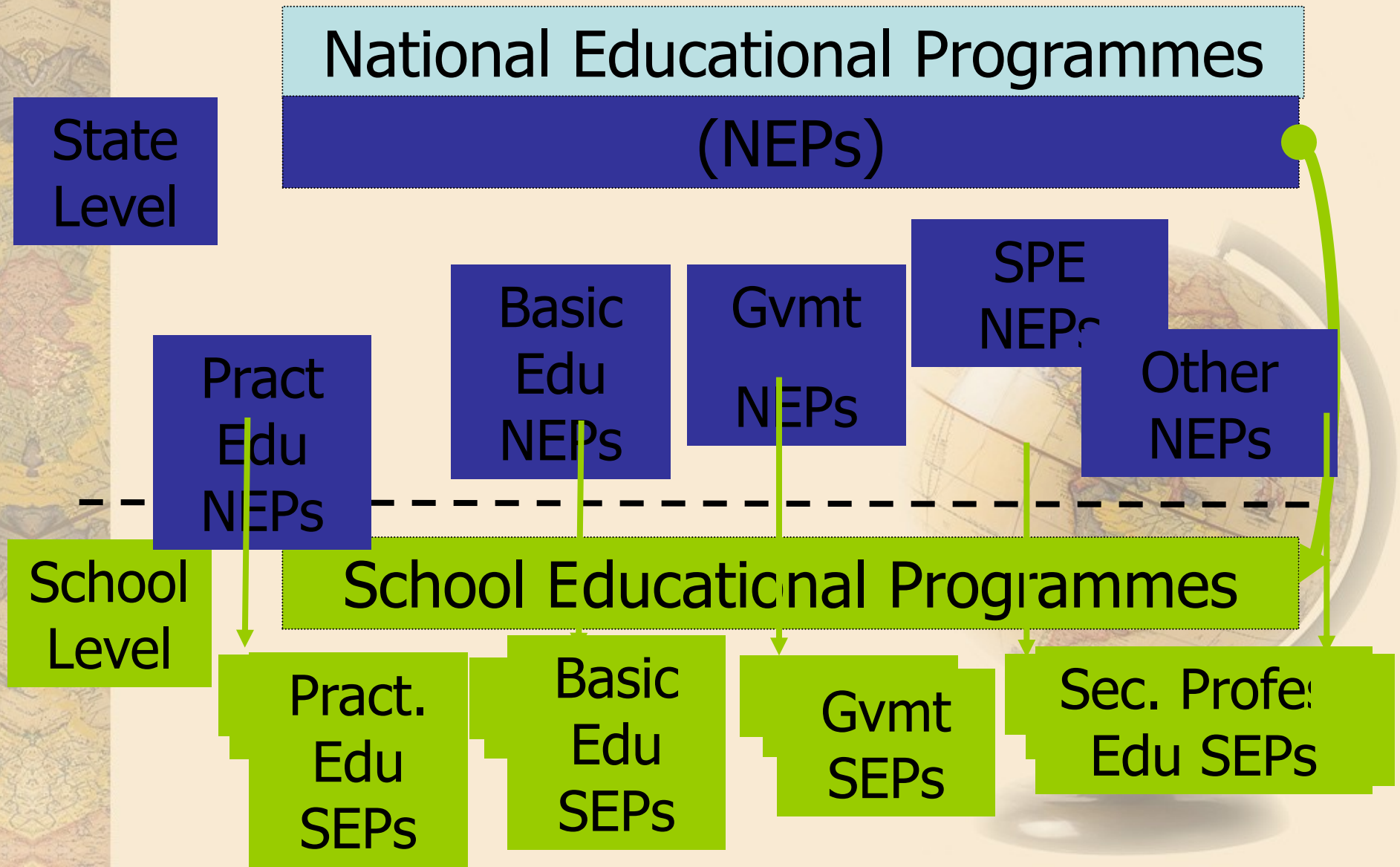
Civil Competence

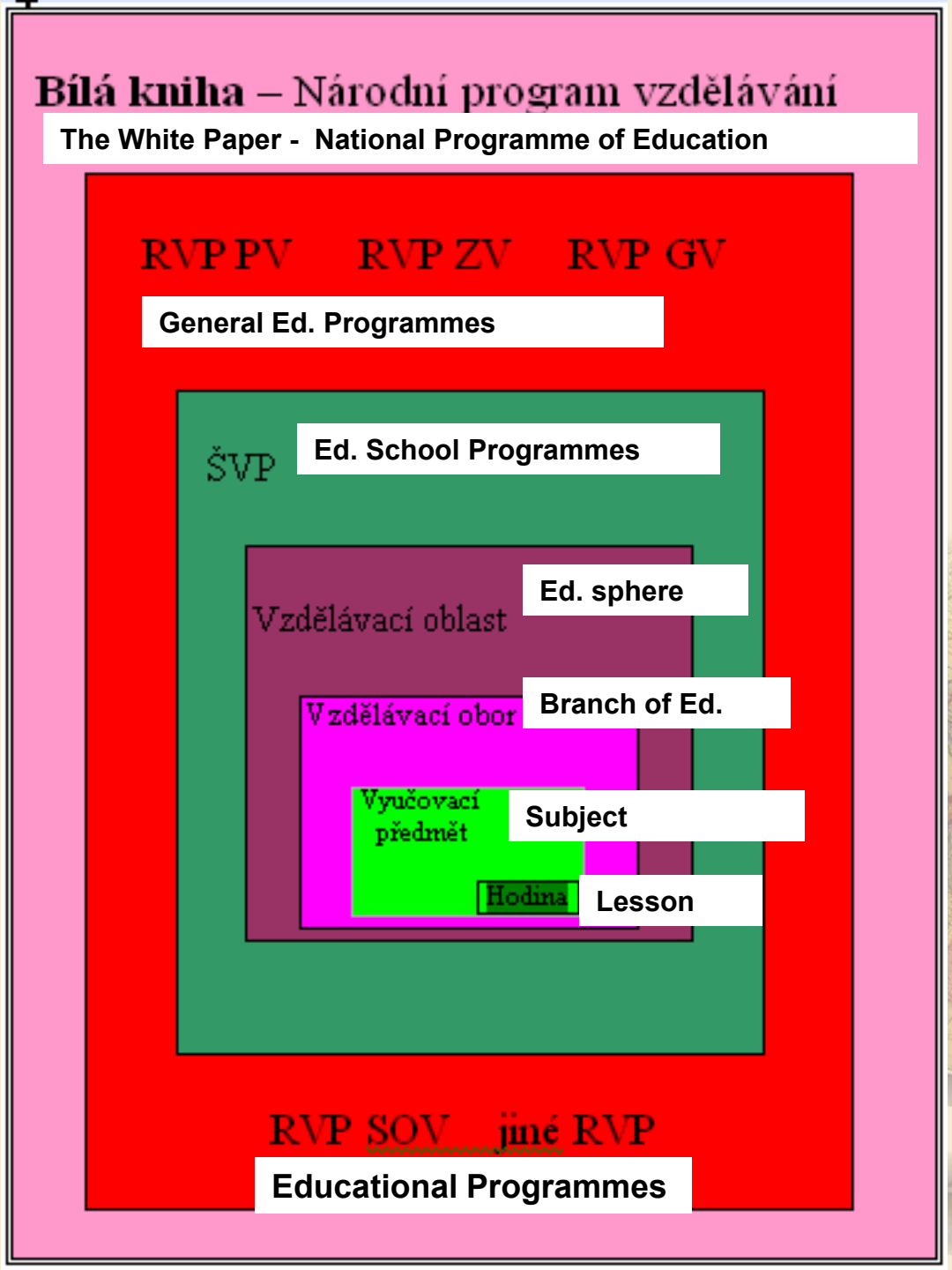
Working Competence

Who meets competences given by General Educational Programmes?

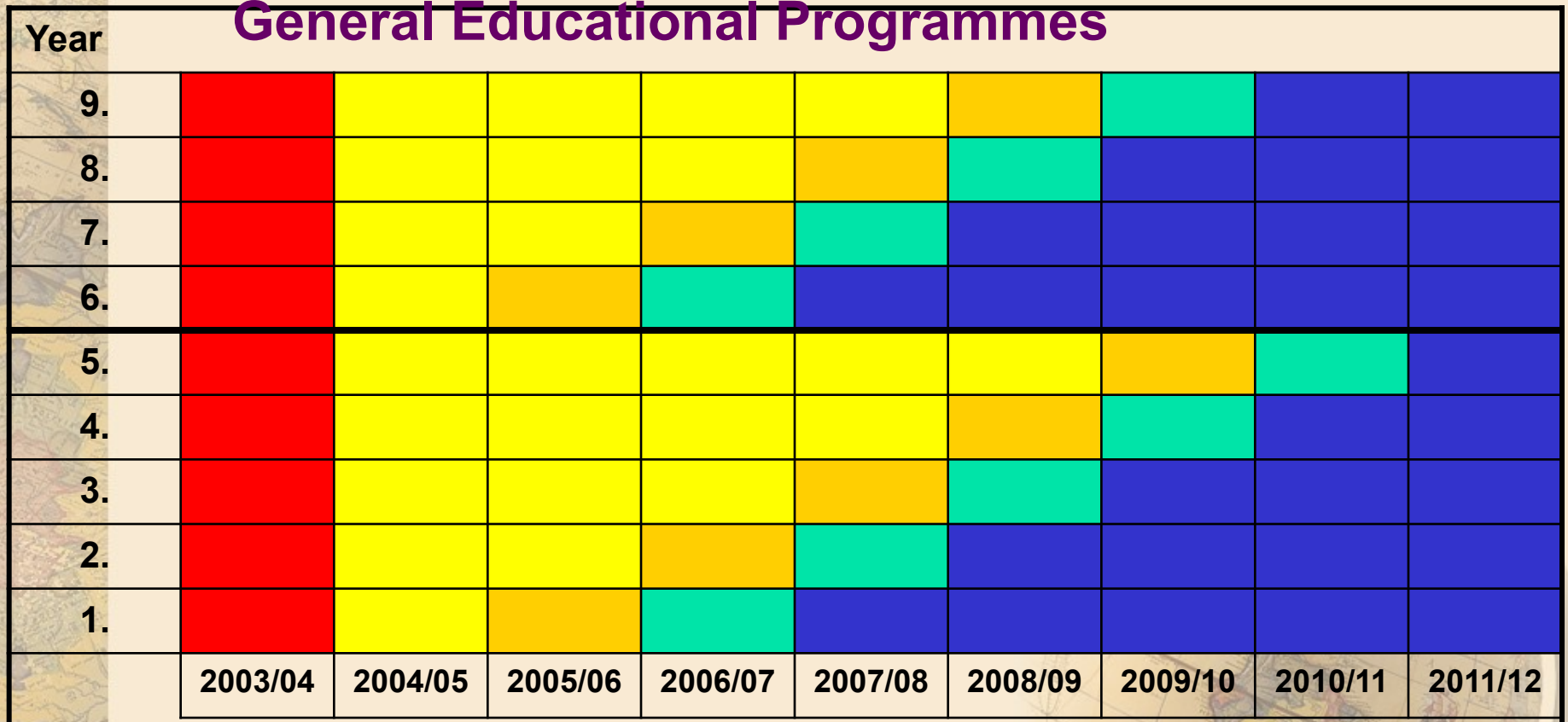


System of Curricular Documents




Bílá kniha – Národní program vzdělávání
The White Paper - National Programme of Education
RVP PV
RVP ZV
RVP GV
General Ed. Programmes
ŠVP
Ed. School Programmes
Vzdělávací oblast
Ed. sphere
Vzdělávací obor
Branch of Ed.
Vyučovací předmět
Subject
Hodina
Lesson
RVP SOV
jiné RVP
Educational Programmes

Schedule of the Startup Time of General Educational Programmes

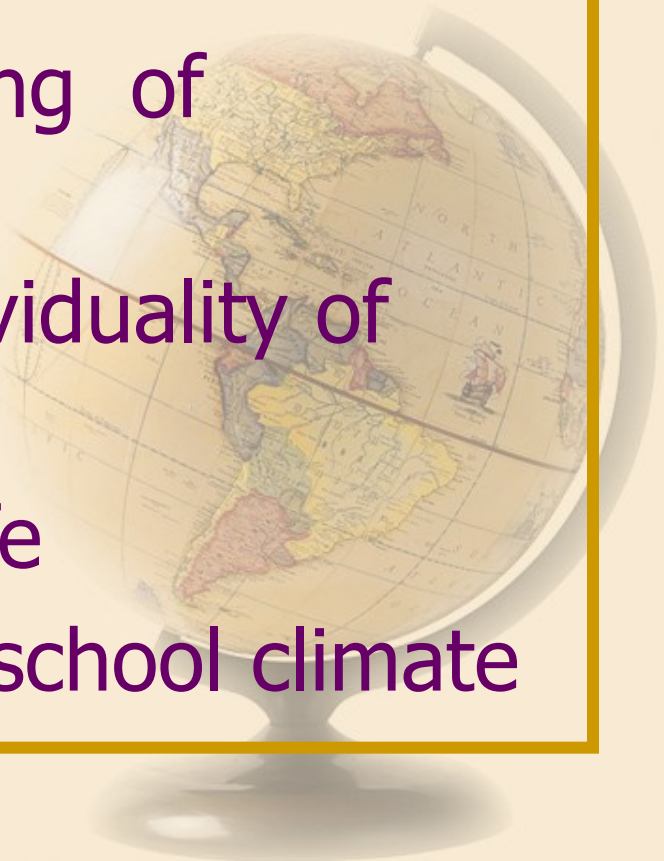


Notes

	Only pilot schools, checking/testing elements of Basic Education GEP
	Only pilot schools, checking/testing the full scope of teaching
	Schools according to their own decision, always from the first and sixth forms
	Obligation of all schools, always from the first and sixth forms

What are expected changes based on?

- Concept of whole-life education
- Concept of variability of educational programmes at the school level
- Concept of the strengthening of pedagogical autonomy
- Concept of developing individuality of each pupil
- Concept of education for life
- Concept of changes in the school climate



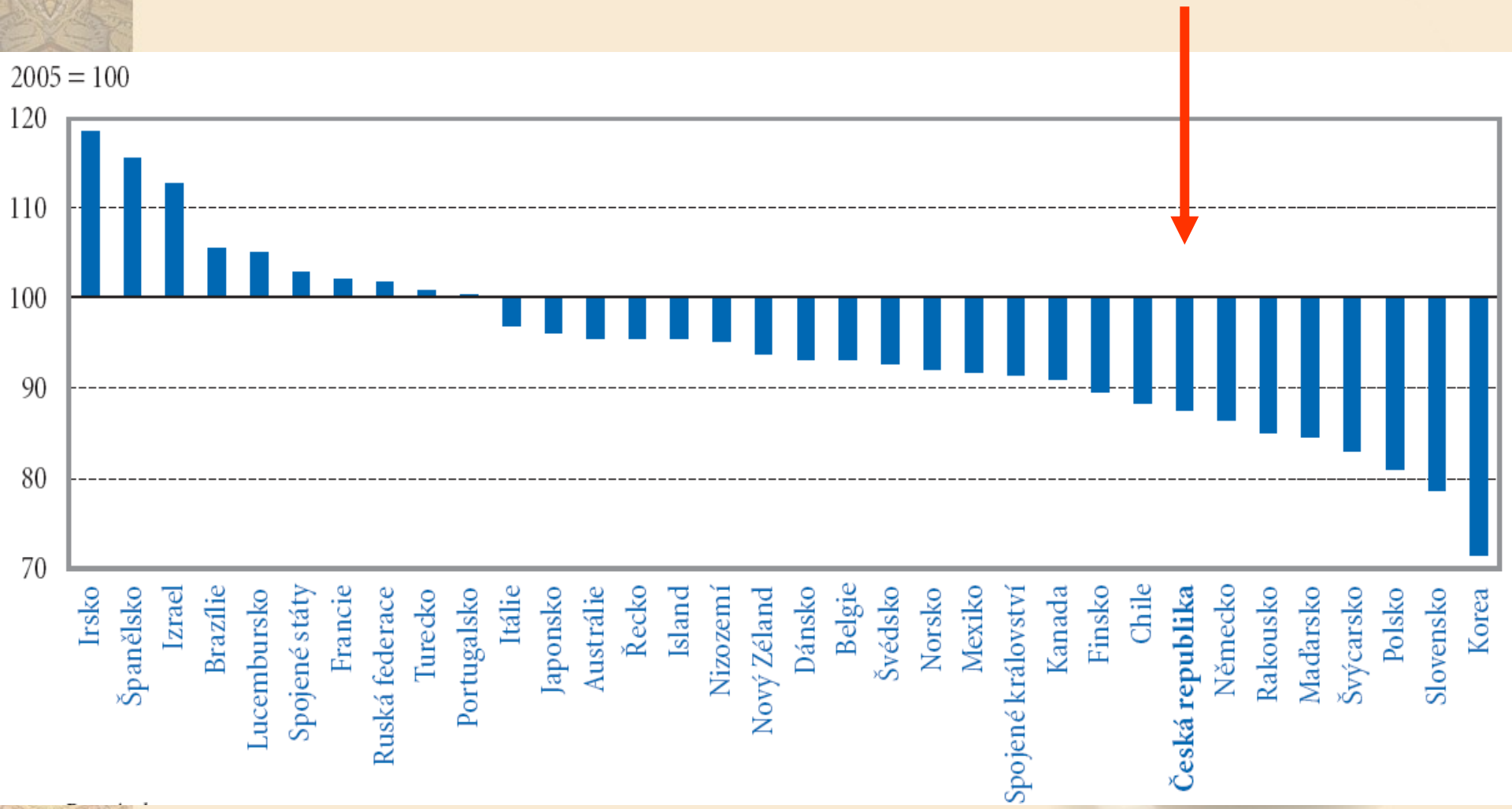
Possibility of school profiling

Possibility of wider specialisation of schools

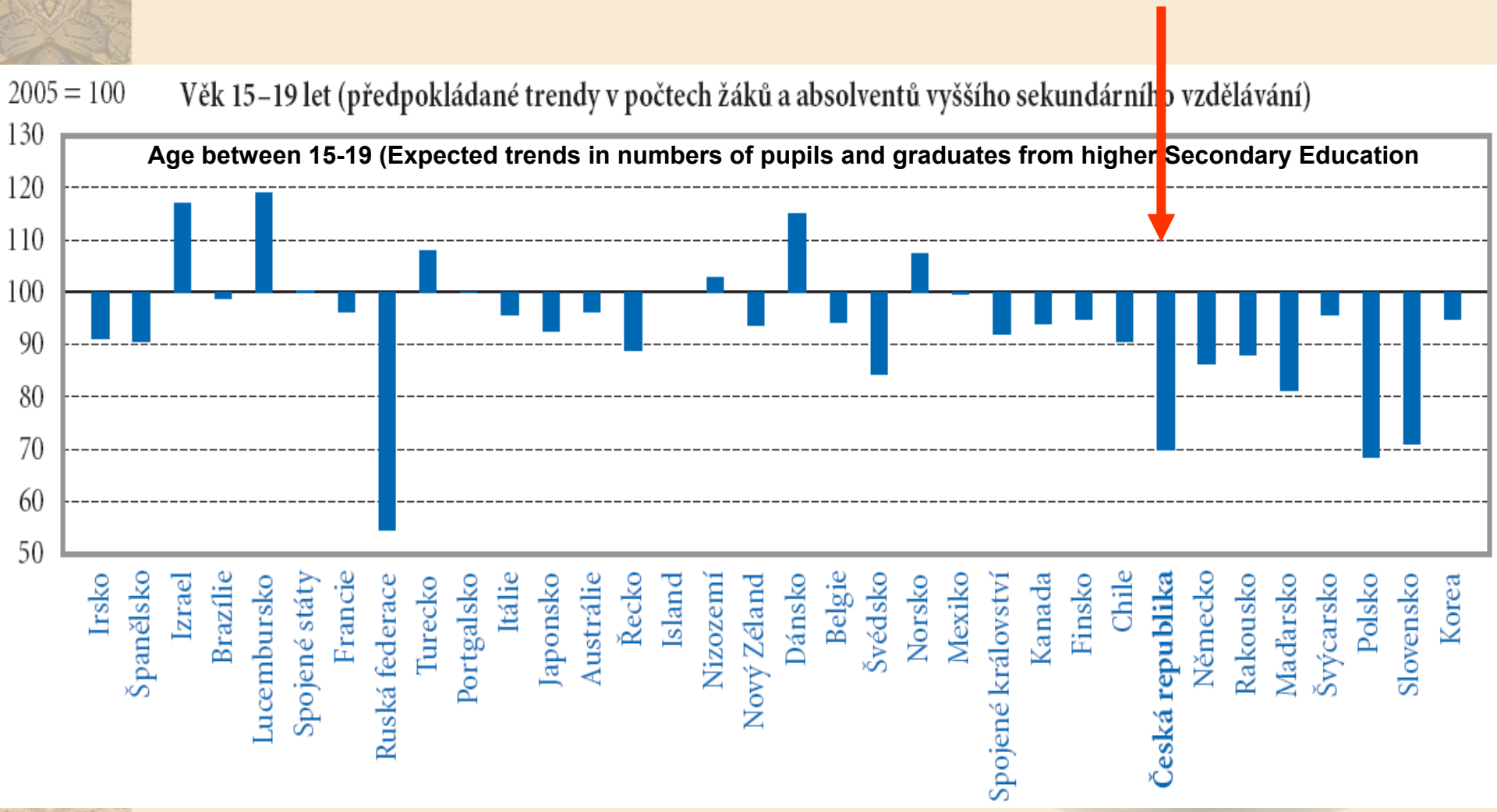
Implementation of the marketing strategy of schools

COMPETITION BETWEEN SCHOOLS

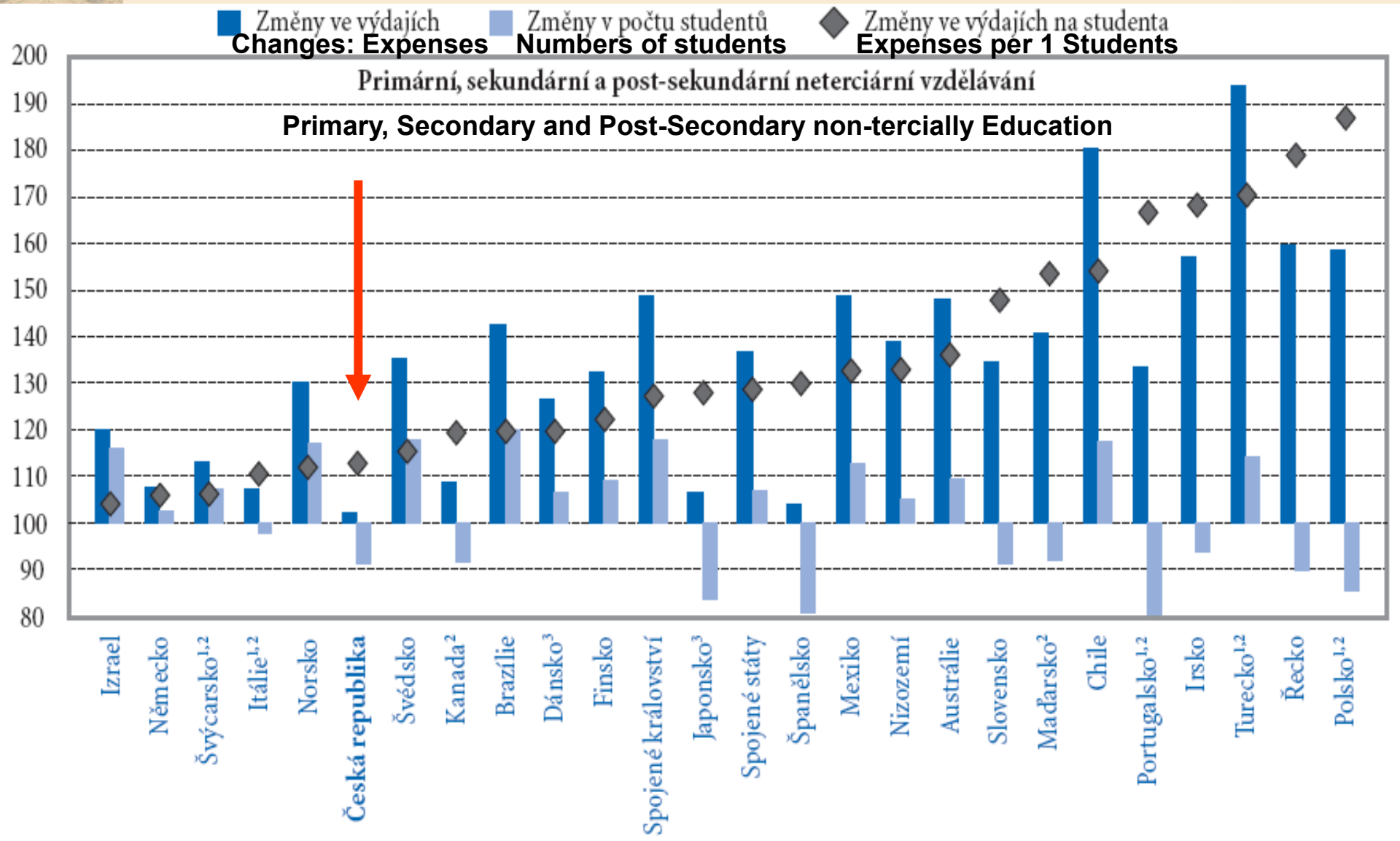
Expected demographic changes in the population aged 5-14 in the next decade



Expected demographic changes in the population aged 15-19 in the next decade



Changes in expenses per student between the years 1995 and 2003



Language and Language Communication

(Czech Language and Literature, Foreign Languages)

Mathematics and Its Applications

(Mathematics and Its Applications)

Information and Communication Technologies

(Information and Communication Technologies)

Man and His World (Man and His World)

Man and Society

(History , Education for Citizenship)

Man and Nature

(Physics, Chemistry, Natural Science, Geography)

Art and Culture

(Music Education, Art Education)

Man and Health

(Health Education, Physical Education)

Man and the World of Work

(Man and the World of Work)

General Educational Programme for Basic Education (Basic Edu GEP)

Social and Character/Personality Education

Education of a Democratic Citizen

Education Focused on Processes of Thinking in European and Global Implications

Multicultural Education

Environmental Education

Media Education

General Educational Programme for Basic Education (BE GEP)

Cross-Section Themes

Language and Language Communication
(Czech Language and Literature, Foreign Languages)
Mathematics and Its Applications
(Mathematics and Its Applications)
Information and Communication Technologies
(Information and Communication Technologies)

Man and Society

(Civil and humanitarian base, Story)

Man and Nature

(Physics, Chemistry, Natural Science, Geography)

Art and Culture

(Music Education, Art Education)

Man and Health

(Health Education, Physical Education)

Man and the World of Work

(Man and the World of Work)

General Educational Programme for Grammar School (Secondary General) Secondary Edu GEP Cross-Sectional Themes

Social Skills Education

Education to Thinking in European and Global Implications

Multicultural Education

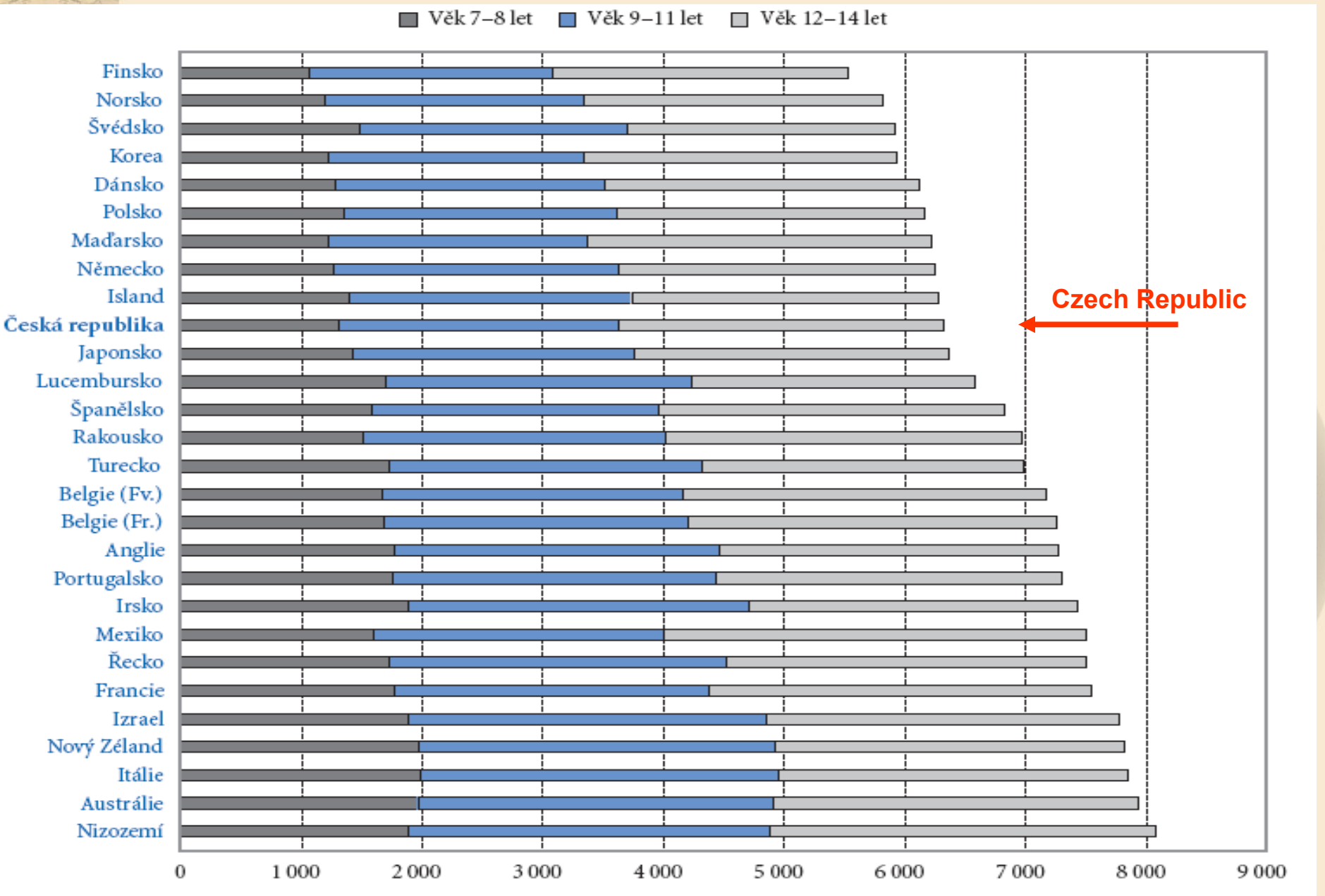
Environmental Education

Media Education

General Educational Programme for Grammar School (Secondary General) Secondary Edu GEP Cross-Sectional Themes

Vzdělávací oblasti Education Areas	Vzdělávací obory BranchesFields of Ed.	1. stupeň 1st degree 1. - 5. ročník	2. stupeň 2nd degree 6. - 9. ročník a odpovídající ročníky víceletých středních škol
		Minimální časová dotace	
Jazyk a jazyková komunikace	Český jazyk a literatura	38	16
	Cizí jazyk	9	12
Matematika a její aplikace		22	16
Informační a komunikační technologie		1	1
Člověk a jeho svět		12	-
Člověk a společnost Society	Dějepis	-	12
	Výchova k občanství		
Člověk a příroda Man and Nature	Fyzika	-	22
	Chemie	-	
	Přírodopis	-	
	Zeměpis	-	
Umění a kultura Culture	Hudební výchova	12	10
	Výtvarná výchova		
Člověk a zdraví Health	Výchova ke zdraví	-	11
	Tělesná výchova	10	
Člověk a svět práce	Work	5	4
Průřezová témata	Cross-Section Themes	P	P
Disponibilní časová dotace	vázaná [1] fixed	-	10
	volná free	9	8
Celková povinná časová dotace	Total Obligatory time Endowment	**118**	**122**

Total Number of Lessons in Pupils Aged 7-14



What new elements are brought to education by General Educational Programmes?

Change of pupils key competences

Freedom to create the thematic plan

Making use of innovative and alternative methods of learning

…and a POSSIBILITY OF INTEGRATING THE EDUCATIONAL PROCESS

How far did the integration of teaching natural science subjects get in the EU countries?

DENMARK						
Subjects:	*Language Branch*			*Mathematics Branch*		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Mathematics	-	*135*	*127*	132	135	*127*
Physics	-	-	*127*	79	108	*127*
Chemistry	-	-	*127*	79	*135*	*127*
Biology	79	-	*127*	79	*135*	*127*
Geography	-	81	-	-	81	-
Natural Science (Science)	79	108	-	-	-	-

How far did the integration of teaching natural science subjects get in the EU countries?

ESTONIA			
Subjects:	Year 1	Year 2	Year 3
Mathematics	9 35-lesson courses, i.e. 315 hours in 3 years		
Geography	3 35-lesson courses, i.e. 105 hours in 3 years		
Biology	4 35-lesson courses, i.e. 140 hours in 3 years		
Chemistry	4 35-lesson courses, i.e. 140 hours in 3 years		
Physics	6 35-lesson courses, i.e. 210 hours in 3 years		

How far did the integration of teaching natural science subjects get in the EU countries?

FINLAND					
Subjects:	*Lower Level*			*Higher Level Courses*	
	Year 7	Year 8	Year 9	Obligatory	Specialised
Mathematics	9			6 – 10	2 – 3
Biology and Geography	7			-	-
Physics and Chemistry	6			-	-
Biology	-	-	-	2	2
Geography	-	-	-	2	2
Physics	-	-	-	1	7
Chemistry	-	-	-	1	3

How far did the integration of teaching natural science subjects get in the EU countries?

FRANCE				
Subjects	*Prepara-tory Cycle*	*Main Cycle*		*Specialisa-tion Cycle*
	Year 6	Year 5	Year 4	Year 3
Mathematics	4	3.5 – 4.5	3.5 – 4.5	4
History, Geography, and Civics	3	3 – 4	3 – 4	3 – 3.5
Biology and Sciences about the Earth	1.5	1.5 – 2	1.5 – 2	1.5
Technology	1.5	1.5 – 2	1.5 – 2	2
fyzika a chemie	-	1.5 – 2	1.5 – 2	1.5 – 2

How far did the integration of teaching natural science subjects get in the EU countries?

IRELAND					
Subjects:	*Junior Cycle*			*Senior Cycle*	
	1.	2.	3.	1.	2.
Natural Science (Science)	Number of hours prescribed			-	-
Group of Natural Science Subjects					
Mathematics	-	-	-	Not specified	
Physics	-	-	-		
Chemistry	-	-	-		
Physics and Chemistry	-	-	-		
Biology	-	-	-		
Applied Mathematics	-	-	-		
Applied Sciences					
Physics and Chemistry	-	-	-	Not specified	
Agriculture	-	-	-		
Group of Social Sciences					
Geography	-	-	-	Not specified	

How far did the integration of teaching natural science subjects get in the EU countries?

ITALY			
Subjects:	Year 1	Year 2	Year 3
Mathematics and Natural Sciences	6	6	6
History and Geography	4	4	5
Technical Education	3	3	3

How far did the integration of teaching natural science subjects get in the EU countries?

CYPRUS			
Subjects:	Grade A	Grade B	Grade C
Mathematics	4	3	4
Geography	1	1	1
Physics	-	2	2
Chemistry	-	1	1
Botany and Zoology	2	-	-
Anthropology	-	1	-
Biology	-	-	1

How far did the integration of teaching natural science subjects get in the EU countries?

LIECHTENSTEIN				
Subjects:	Year 1	Year 2	Year 3	Year 4
Obligatory Subjects				
Mathematics	3	5	5	5
Natural Sciences	3	3	3	3
History, Political Sciences, Geography	3	4	3	4
Elective Obligatory Subjects				
Mathematics	1	2	2	2
Natural Sciences	-	-	-	2

How far did the integration of teaching natural science subjects get in the EU countries?

LATVIA		
Subjects:	Year 11	Year 12
Mathematics	5	5
Natural Sciences (Biology, Physics and Astronomy, Chemistry)	4	4

How far did the integration of teaching natural science subjects get in the EU countries?

MALTA				
Subjects:	*District School*		*Junior Lyceum*	
	Years 1-2	Years 3-5	Years 1-2	Years 3-5
Mathematics	5	5	5	5
Integrated Natural Science (Physics, Chemistry, Biology)	4	4	4	4
Geography	1	1	2	1

How far did the integration of teaching natural science subjects get in the EU countries?

THE NETHERLANDS			
Subjects	Year 1	Year 2	Year 3
Geography	140		
Mathematics	400		
Physics and Chemistry	200		
Biology	120		
Technology	180		

How far did the integration of teaching natural science subjects get in the EU countries?

POLAND			
Subjects	Year 1	Year 2	Year 3
Mathematics	12		
Physics and Astronomy	4		
Chemistry	4		
Biology	4		
Geography	4		
Technology	2		

How far did the integration of teaching natural science subjects get in the EU countries?

PORTUGAL				
Subjects:	*Cycle 2*		*Cycle 3*	
	Year 5	Year 6	Year 7	Year 8
Mathematics and Natural Sciences	7		-	-
Social Sciences, History, Geography	-	-	7	
Mathematics	-	-	6	
Natural Sciences, Physics, Chemistry	-	-	6.5	

How far did the integration of teaching natural science subjects get in the EU countries?

AUSTRIA				
Subjects	Year 5	Year 6	Year 7	Year 8
Geography and Economy	7 – 12			
Mathematics	14 – 20			
Biology and the Environment	7 – 12			
Physics	1.5 – 4			
Chemistry	5 – 10			

How far did the integration of teaching natural science subjects get in the EU countries?

ROMANIA				
Subjects	Year 5	Year 6	Year 7	Year 8
Mathematics	4	4	4	4
Physics	-	2	2	2
Chemistry	-	-	2	2
Biology	1–2	2	2	1–2
Geography	1–2	1–2	1–2	2
Technical Education	1–2	1–2	1–2	1–2

GREECE (Obligatory Subjects)			
Subjects:	Grade 1	Grade 2	Grade 3
Major Obligatory Subjects (for all specialisations)			
Mathematics	4–5	4	-
Mathematics and Statistics	-	-	2
Physics and Chemistry	4–5	-	-
Physics-Chemistry-Biology	-	4	-
Physics and Biology	-	-	2
Obligatory Subjects of Natural Science Specialisation			
Mathematics	-	3	5
Physics	-	2	3
Chemistry	-	2	2
Biology	-	-	2
Obligatory Subjects of Technical Specialisation			
Mathematics	-	3	5
Physics	-	2	3
Chemistry and Biochemistry	-	-	2

How far did the integration of teaching natural science subjects get in the EU countries?

GREECE (Elective Subjects)			
Elective Subjects			
Environmental Sciences	-	2	-
Astronomy and the Universe	-	2	-
Biology	-	2	-
Chemistry	-	2	-
Management of Water Resources	-	2	-
Statistics	-	-	2
Agronomy	-	-	2

How far did the integration of teaching natural science subjects get in the EU countries?

SLOVAKIA					
Subjects:	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**
Geography	2	2	2	2	1
Mathematics	5	5	5	4	4
Physics	-	2	2	2	1
Chemistry	-	-	-	2	3
Natural Science	2	2	2	2	1

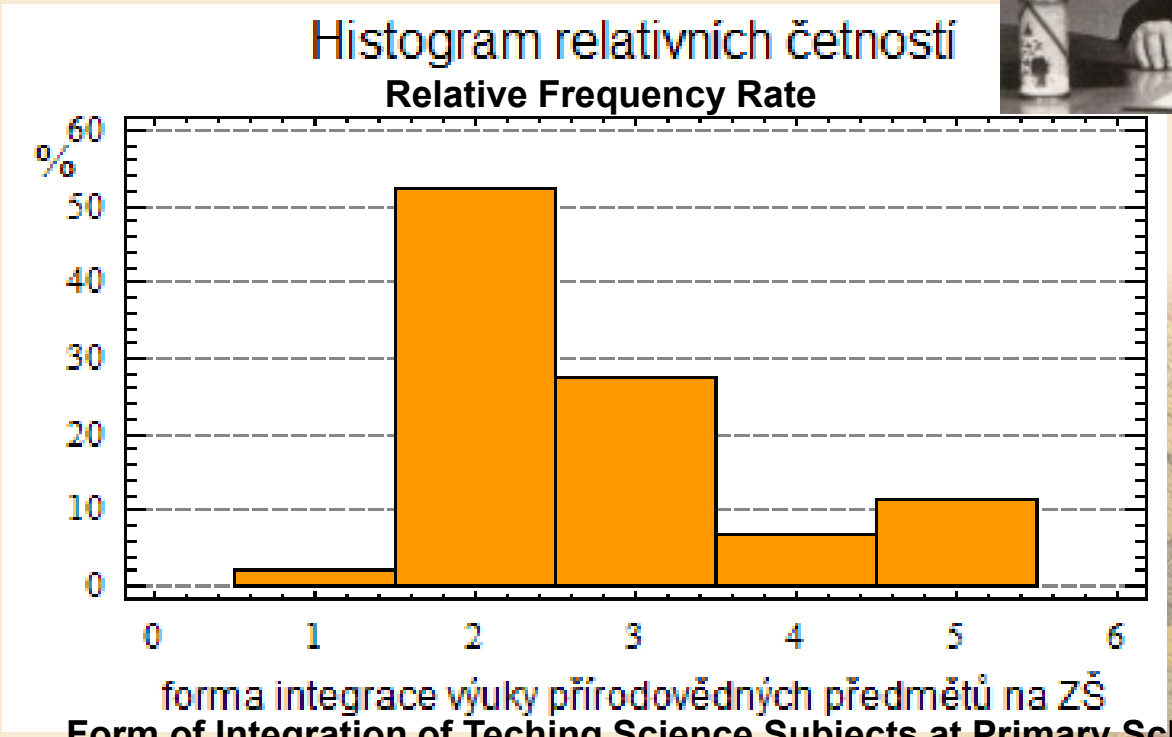
How far did the integration of teaching natural science subjects get in the EU countries?

SLOVENIA					
Subjects:	Year 4	Year 5	Year 6	Year 7	Year 8
Geography	-	-	70	66	48
Natural Science (Science)	70	70	-	-	-
Biology	-	-	70	66	48
Chemistry	-	-	-	66	64
Physics	-	-	-	66	64
Mathematics	175	140	140	132	128
Natural Science Days	16	12	16	12	16

How far did the integration of teaching natural science subjects get in the EU countries?

SPAIN (Selected Provinces)												
Subjects:	*Andalusia*				*Galicia*				*Basque Region*			
	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.
Mathematics	3	4	3	3	4	4	3	3	4	4	3	3
Social Sciences History, Geography	3	3	3	3	3	3	3	3	3	3	2.5	3
Natural Sciences	3	3	4	-	3	2	-	-	2	3	4	2.5
Physics and Chemistry	-	-	-	3	-	-	2	3	-	-	-	-
Biology,Geology	-	-	-	3	-	-	2	3	-	-	-	-
Technology	3	3	2	3	2	3	2	3	2	2	2.5	2.5

What is the approach of our teachers to the integration of education?



Form of Integration of Teching Science Subjects at Primary School

Individual independent subjects (zero integration)	1
More emphasis on cross-subject relationships within the framework of independent subjects	2
Joint (integrated) teaching of selected themes	3
A wider range of integration- e.g. by means of project work	4
Full integration of two or more natural science subjects	5

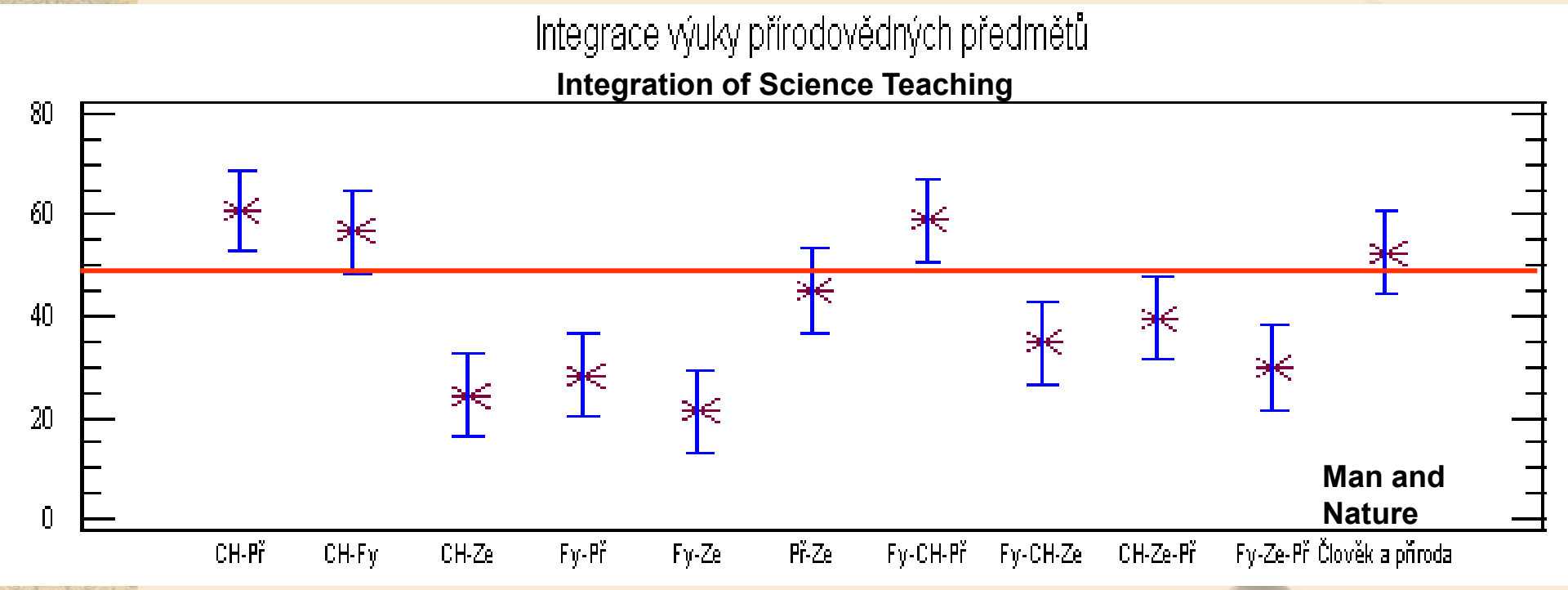
What is the approach of our teachers to the integration of education?

Suitability of full integration of subjects at Primary School

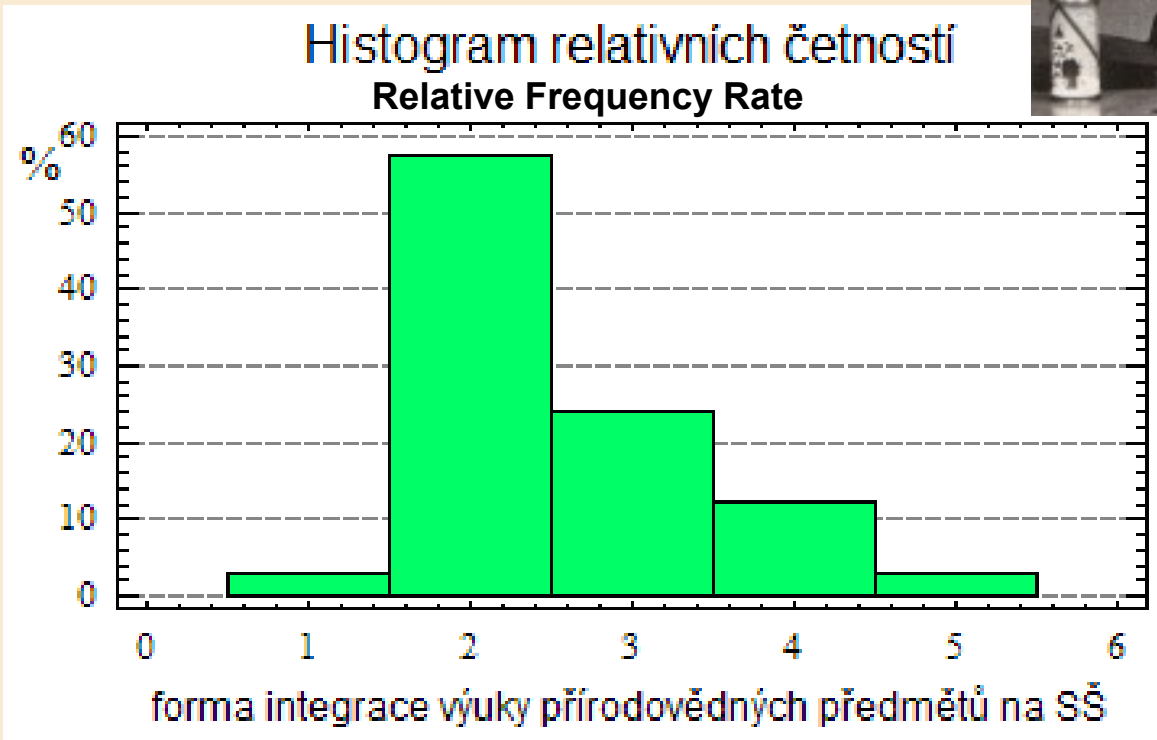
1.	Chemistry-Natural Science	60.90%
2.	Physics-Chemistry-Natural Science	58.90%
3.	Chemistry- Physics	56.60%
4.	Man and Nature (Physics-Chemistry-Geography-Natural Science)	52.60%
5.	Natural Science – Geography	45.10%
6.	Chemistry-Geography-Natural Science	39.60%
7.	Physics-Chemistry-Geography	34.80%
8.	Physics-Geography-Natural Science	29.90%
9.	Physics – Natural Science	28.30%
10.	Chemistry-Geography	24.50%
11.	Physics-Geography	20.00%

What is the approach of our teachers to the integration of education?

Suitability of full integration of subjects at Primary School



What is the approach of our teachers to the integration of education?



Form of Integration of Science Subjects at Secondary Schools

Individual independent subjects (zero integration)	1
More emphasis on cross-subject relationships within the framework of independent subjects	2
Joint (integrated) teaching of selected themes	3
A wider range of integration- e.g. by means of project work	4
Full integration of two or more natural science subjects	5

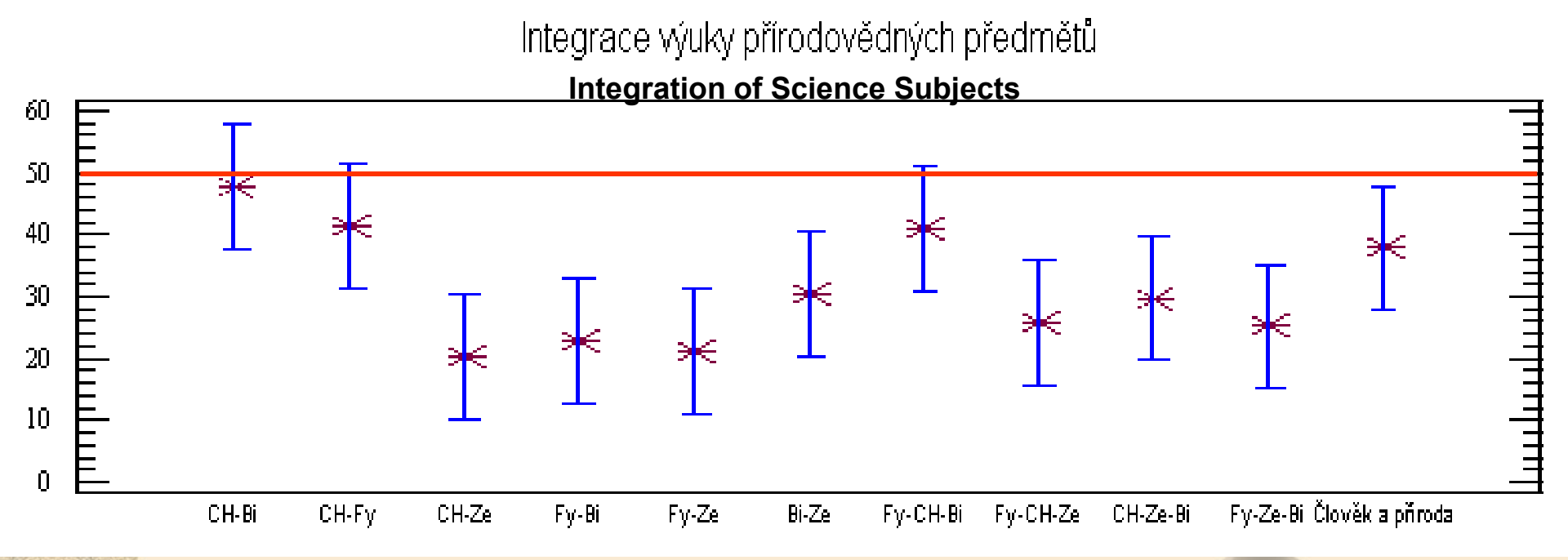
What is the approach of our teachers to the integration of education?

Applicability of full integration of subjects at secondary school

Chemistry – Biology	47.60%
Chemistry- Physics	41.30%
Physics-Chemistry-Biology	41.10%
Man and Nature (Physics-Chemistry-Geogr.-Biology)	37.90%
Biology – Geography	30.40%
Chemistry-Geography-Biology	29.60%
Physics- Chemistry- Geography	25.80%
Physics – Geography- Biology	25.30%
Physics-Biology	22.90%
Physics-Geography	21.00%
Chemistry-Geography	20.40%

What is the approach of our teachers to the integration of education?

Full integration of subjects at secondary school is suitable



What is the approach of our teachers to the integration of education?

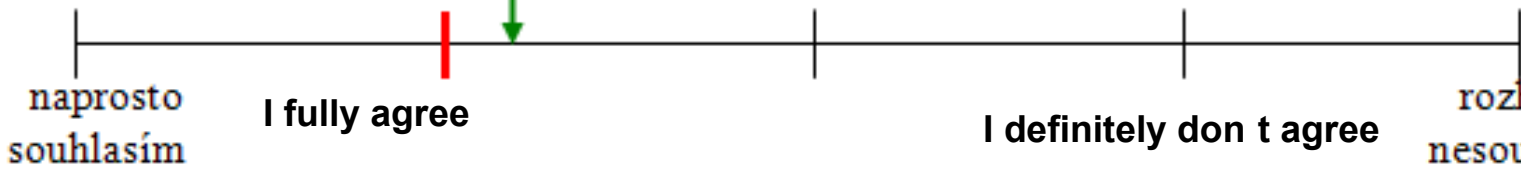
Optimised plan of teaching natural science subjects at primary school

Subjects	Year 6	Year 7	Year 8	Year 9
Chemistry	0	1	2	2
Physics	1	1	2	2
Geography	2	2	1	1
Natural Science		2	2	1

What is the approach of our teachers to the integration of education?

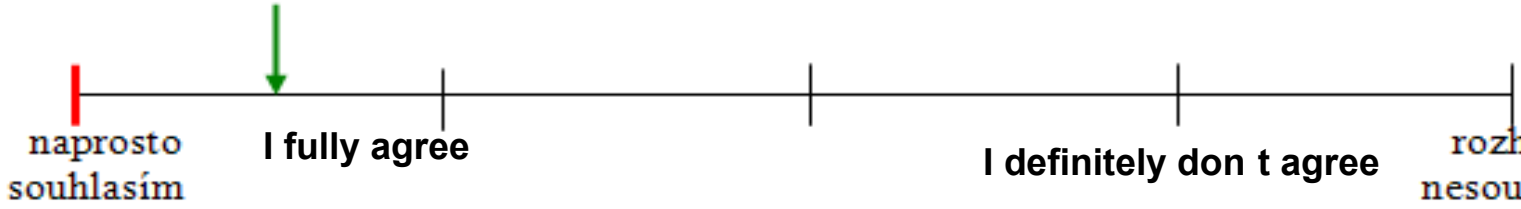
Mám dostatek informací o RVP ZV.

I have enough information about GEP of Basic Education



Podílím se na tvorbě ŠVP na svém pracovišti.

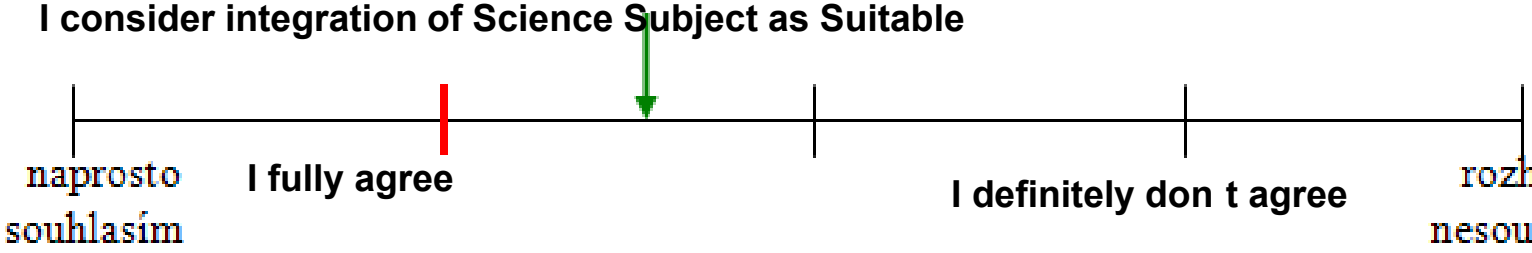
I participate in creating SEP in my work place



What is the approach of our teachers to the integration of education?

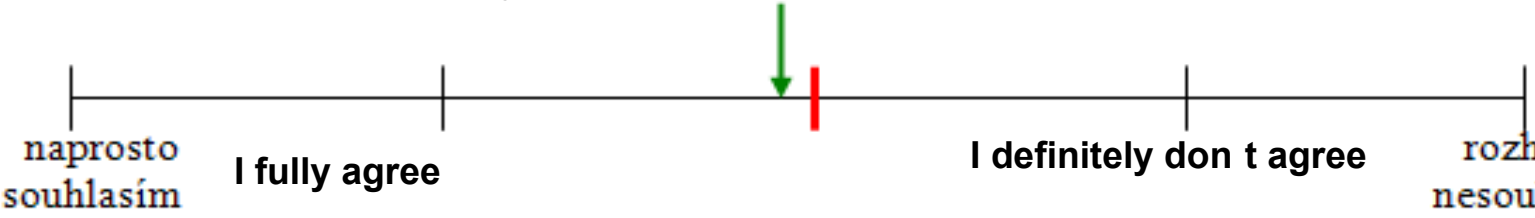
Integraci výuky přírodovědných předmětů pokládám za vhodnou.

I consider integration of Science Subject as Suitable



RVP zjednoduší a zatraktivní výuku přírodovědných předmětů.

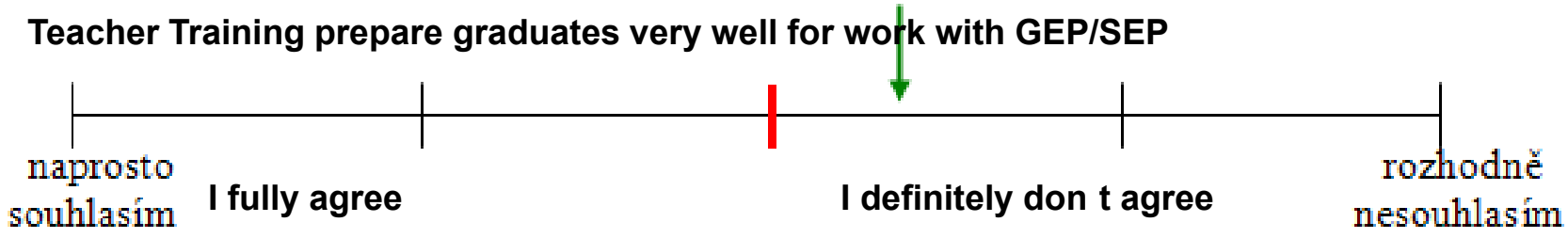
GEP will make science subjects easier and more attractive



What is the approach of our teachers to the integration of education?

Vysoká škola v současné době dobře připravuje své absolventy pro práci se ŠVP.

Teacher Training prepare graduates very well for work with GEP/SEP



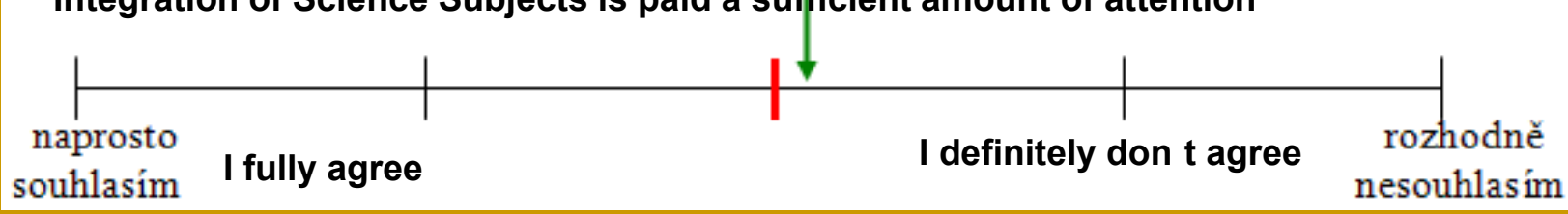
Pokládám se za odborně způsobilého/způsobilou k plně integrované výuce přírodovědných předmětů.

I consider myself a teacher professionally qualified to transfer GEP at integration Form

What is the approach of our teachers to the integration of education?

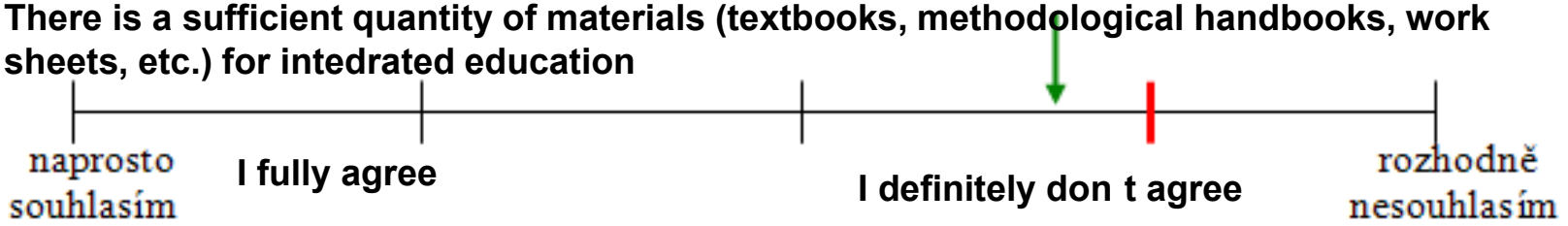
Integraci výuky přírodovědných předmětů je věnována dostatečná pozornost v rámci programů dalšího vzdělávání učitelů.

Integration of Science Subjects is paid a sufficient amount of attention



Pro integrovanou výuku je k dispozici dostatek materiálů (učebnice, metodické příručky, pracovní listy atd.)

There is a sufficient quantity of materials (textbooks, methodological handbooks, work sheets, etc.) for intedrated education

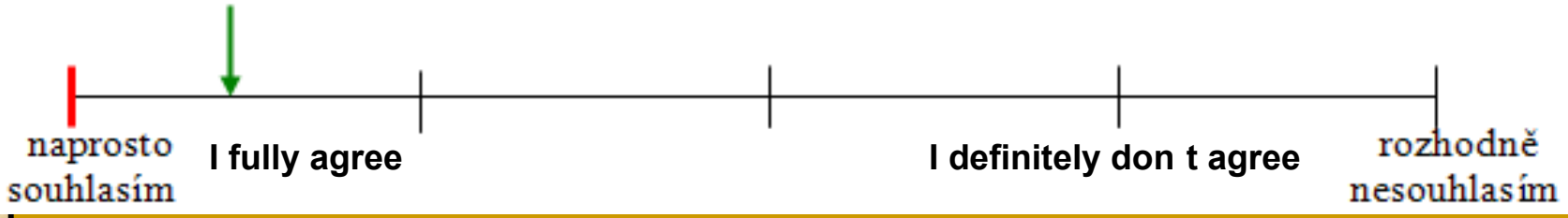


And what is the approach of our teachers to integrated education of natural science subjects?

Integrated education will be more demanding for teacher preparation

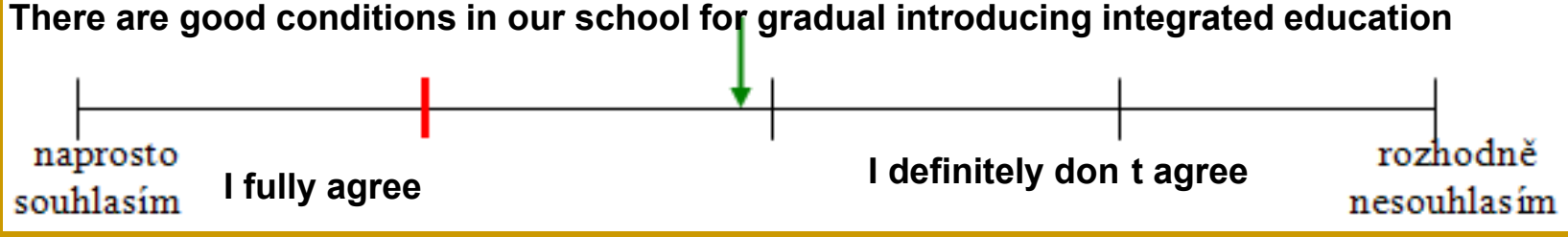
Integrovaná výuka přírodovědných předmětů bude náročnější na přípravu učitelů.

Integrated education will be more demanding for teacher preparation



Pro postupné zavádění integrované výuky přírodovědných předmětů jsou na naší škole vhodné podmínky.

There are good conditions in our school for gradual introducing integrated education



What is it that prevents most the introduction of integrated education of natural science subjects into schools?

Teachers specialisation in 1 or 2 subjects
Insufficient professional qualification of teachers

Lack of certain textbooks

Lack of financial funds, predominantly for finishing the equipment of specialised classrooms and laboratories

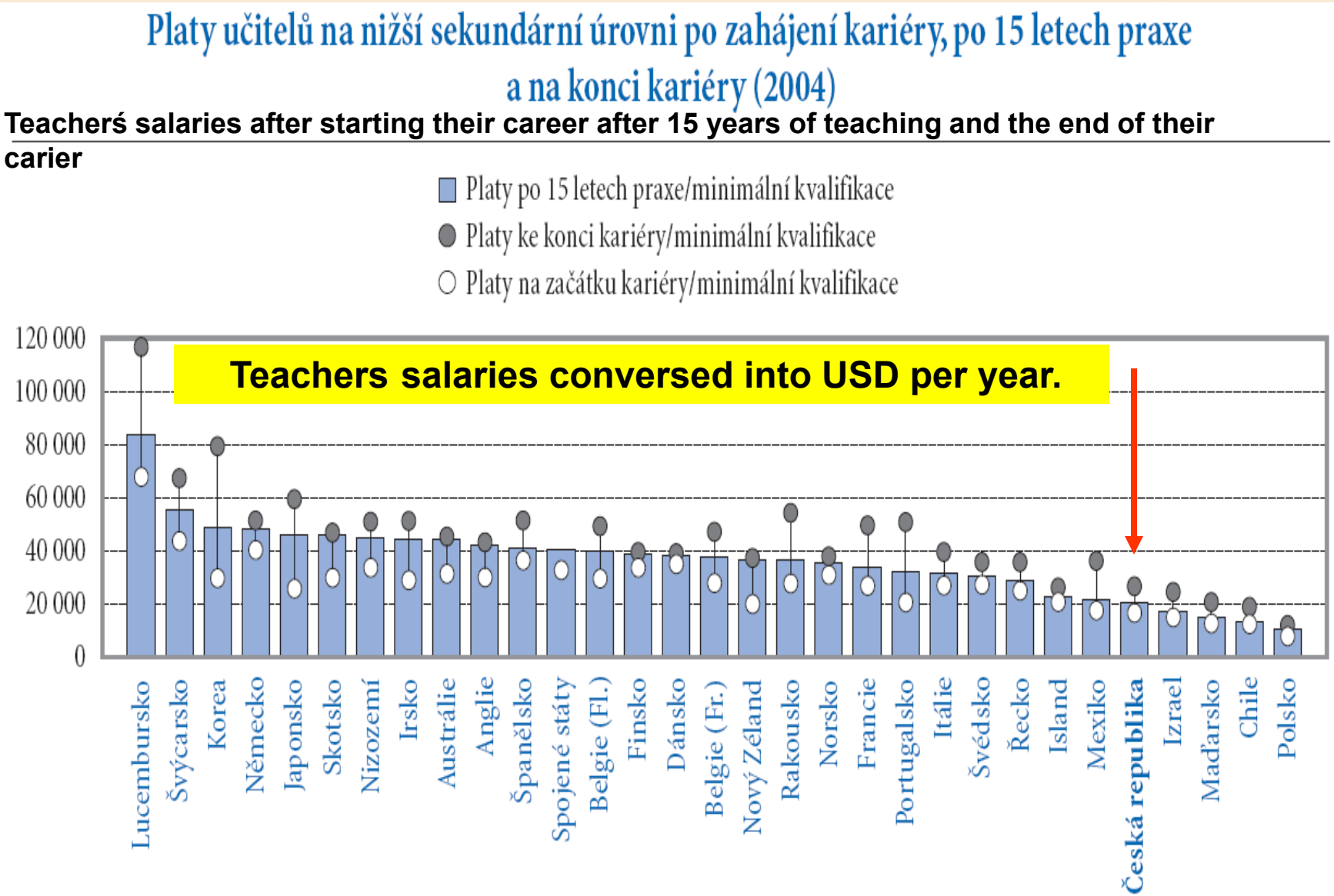
What is it that prevents most the introduction of integrated education of natural science subjects into schools?

Difficulties associated with the formation of the timetable

Unwillingness of teachers to change traditional ways of teaching

Insufficient motivation

… and when we speak about motivation



What is the biggest obstacle that prevents integrated education of natural science subjects from being introduced into schools?

Lack of cooperation between subjects

Time-consuming character of these subjects

Lack of interest in pupils
Lack of interest in school management

Possibilities of integration in the currently valid educational programmes

Basic School **General School** **National School**

roč.	Základní škola				Obecná škola				Národní škola			
	F	Ch	Př	Z	F	Ch	Př	Z	F	Př	Ch	Z+D
6.	6	-	6	6	1	-	2	1	3		-	3
7.		-			1	-	1	2	4		-	3
8.		4			2	1	1	1	4+možnosti ztzv. nadstavbové části			2
9.					1 (+1)	2 (+1)	1 (+1)	1 (+1)				

Physics-Chemistry-Natural Science-Geography

Possibilities from superstructure parts

Interdisciplinary themes in teaching natural science subjects at primary schools

Substances and Objects (properties of substances, condition of substances)	Physics Year 6	Chemistry Year 8		
Elemental Composition of Substances (atom and its composition, proton, neutron, electron, ion, molecule)	Physics Year 6	Chemistry Year 8		
Properties of Liquids and Gases, Air, Atmospheric Pressure, Introduction to Meteorology	**Physics** Year 6	Geogra-phy Year 7	Natural Science Year 6	Chemis-try Year 8
Light Phenomena, Light (Photosynthesis),Shadow, Eclipse of the Sun and the Moon	Physics Year 6	Natural Science Year 6	Geography Year 6	

Interdisciplinary themes in teaching natural science subjects at primary schools

Electric Charge, Electrical Element, Electric Current, Accumulator, Redox of the Action, Electrolysis	Physics Year 8	Chemistry Year 9	
Energy and Its Metamorphoses, Internal Energy, Activating Energy, Exo- and Endothermic Reactions	Physics Year 8	Chemistry Year 9	
Production/Manufacture of Energy, Renewable and Non-Renewable Sources of Energy	Physics Year 8	Geography Year 8	Chemistry Year 8
The Universe, the Universe and its Composition, the Star and the Apparent (Solar) Day	Physics Year 9	Geography Year 9	
Clean Air, Thermal Inversion, Smog, Acid Rains, Ozone Holes	Geography Year 8	Natural Science Year 6	Chemistry Year 8

Interdisciplinary themes in teaching natural science subjects at primary schools

Fossil Fuels, Coal, Crude Oil and Their Excavation and Ecological Risks	Natural Science Year 9	Chemistry Year 9	Geography Year 8
Ability to Distinguish Organic and Anorganic Substances, Their Characteristic Features and Properties	Natural Science Year 6	Chemistry Year 9	
Radioactive Radiation, Nuclear Energy, Impact of Nuclear Radiation on Organisms	Physics Year 8	Natural Science Year 9	
Bioorgnaic Substancesy, Biopolymers, Nucleic Acids, Heredity	Natural Science Year 8	Chemistry Year 9	
The Earth as a Planet, Its Natural Elements and Development	Geography Year 6	Natural Science Year 9	

Interdisciplinary themes in science teaching: subjects at secondary schools

Phy	Molecular Physics and Thermic Processes	Relative Atomic and Molecular Weight, Quantities of Substances, Avogadr Constant, Molar Weight and Volume, Weight of Atoms and Molecules	Introduction to Studying Chemistry	**Ch**
Phy	Physics of the Microworld	Electron Envelope, Quantization, Quantization of Atom Energy, Atomic Orbitals, Their types, Valence Electrons	Composition and Structure of Chemical Substances	**Ch**
Phy	Molecular Physics and Thermic Processes	Backgrounds to Termochemistry, Enthalpy, Internal Energy, Thermodynamic Laws	Qualitative and Quantitative Side of Chemical Reactions	**Ch**
Phy	Electricity and Magnetism	Backgrounds to Electrochemistry, Faraday Laws	Law behind Transformations of Initical Substances into Products	**Ch**

Interdisciplinary themes in science teaching: subjects at secondary schools

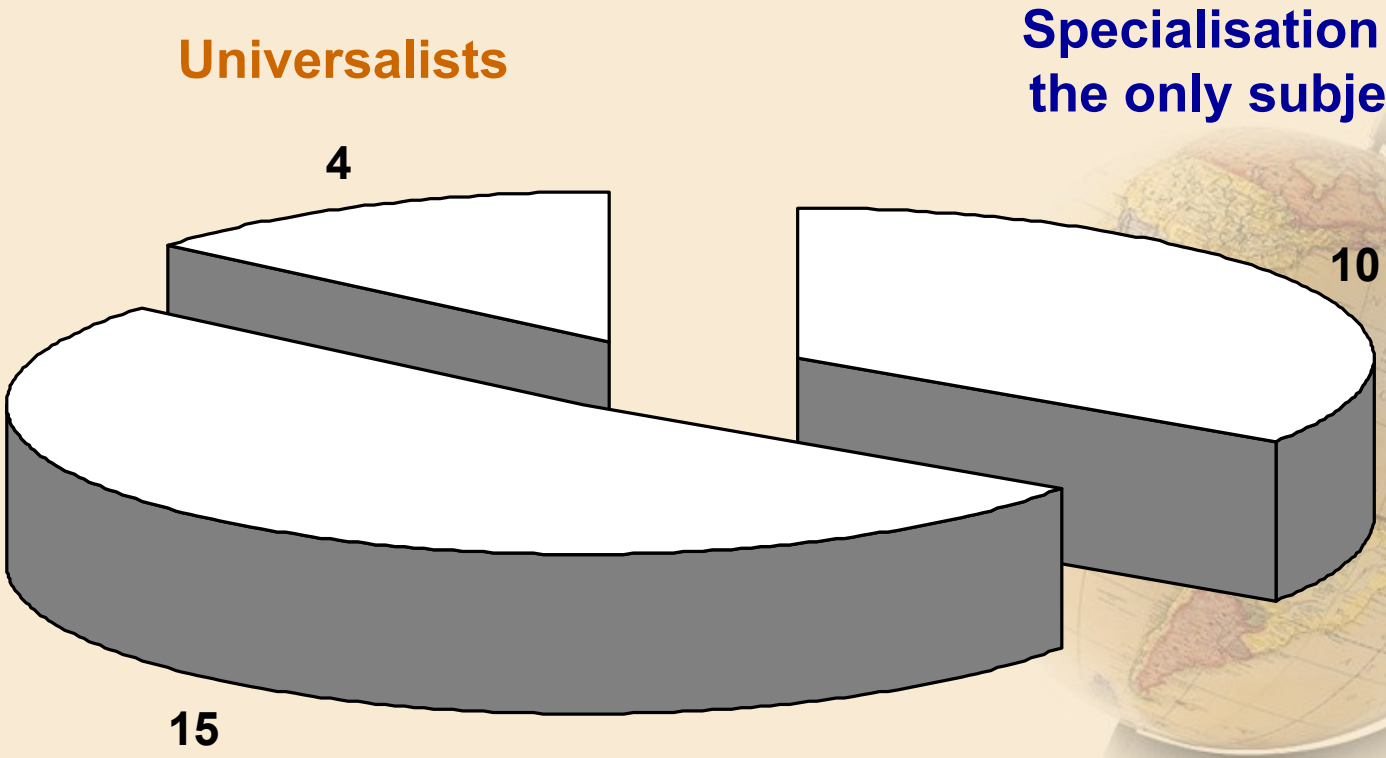
Bi	Basic Actions at the Cellular Level	Enzymes and their significance, Anabolism, Catabolism, Breathing, Fermentation, Photosynthesis, Proteosynthesis, NK Synthesis Bioenergetics	Fundamentals of Biochemistry	**Ch**
Bi	Biology of Man	Toxicomania, Alcoholism, Addictive Substances, Chemistry of natural Substances	Chemistry of Natural Substances	**Ch**
Bi	Ecology	Biochemical Cycles of the following elements: C, N, P, Ca…	Backgrounds of Inorganic Chemistry	**Ch**
Bi	Ecology	Ekological Problems within the Framework of Sustainable Development of Society	Chemistry and the Environment	**Ch**

Interdisciplinary themes in science teaching: subjects at secondary schools

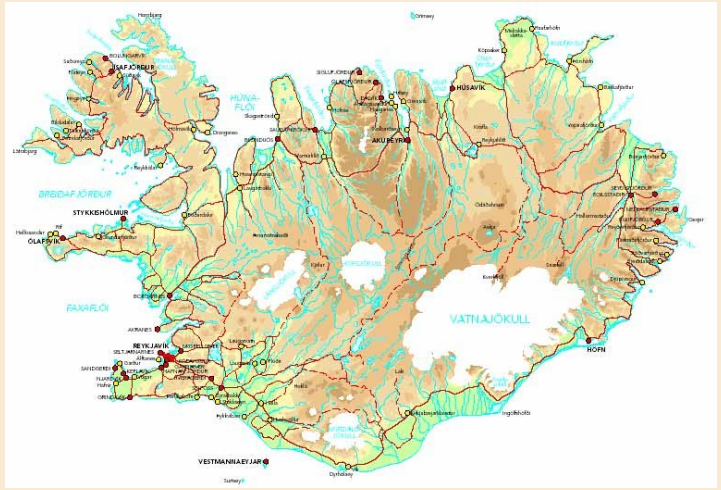
Geo	The Earth as an Object of the Universe	Basic structure/composition of the Universe, stars and planets The Earth as part of the Universe	Astrophysics	**Phy**
Geo	Natural Picture of the Earth	Organisms on the Earth and their environment, biosphere as one of the biospheres of the Earth, biosphere and man, antropogennous impacts on the biosphere, ecoclogical valence and abiotic factors.	Ecology	**Bi**
Geo	Landscape and the Environment	Životní prostředí, ochrana a rozvoj životního prostředí, trvale udržitelný rozvoj lidské společnosti.	Ecology	**Bi**

Teacher of Natural Science Subjects – Specialist or Universal Teacher?

Situation in EU Countries



Teacher of Science subjects – a specialist or a universal teacher?



ICELAND

Teachers with a wider range of subject specialisation are qualified for teaching all subjects included in obligatory education.

What are general educational programmes and what will they bring?

“The current educational system is not being replaced by something better, only by something new“

Prof. RNDr. František Kuřina, CSc.

?

What are General Educational Programmes and What Will They Bring?

Undisputable Positives:

- Chance to a Change

- A Possibility for schools to have a better profile

-Support to Innovative Trends in the Process of Teaching/Learning

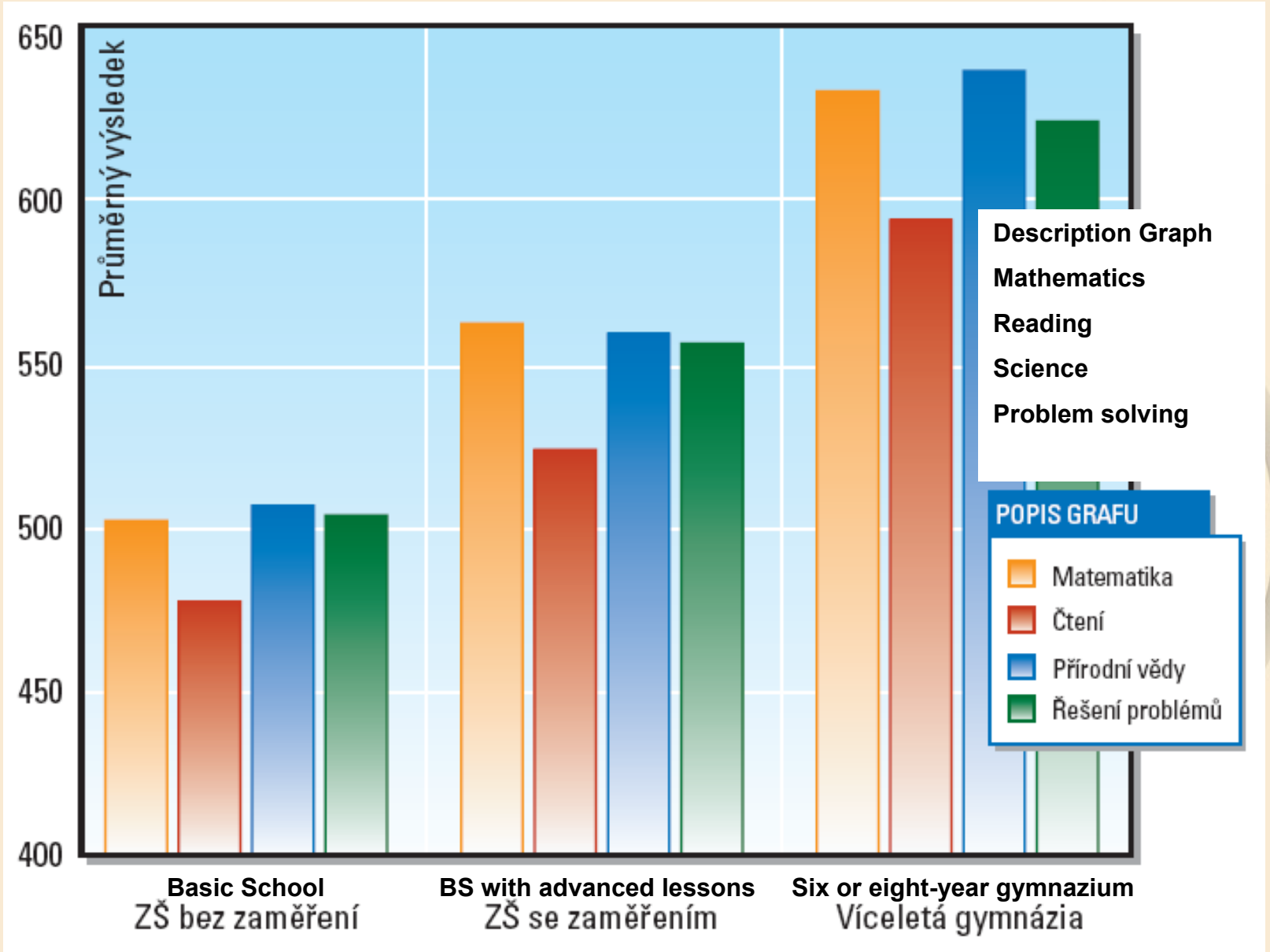
- Path from Knowledge to Skills

-Development of Teachers or Pupils Individualities

- A Wider Scope of Autonomy, adaptability

Is the profile of schools advantageous?

Results in pupils of Year 9 (accord. to OECD PISA 2003)



What are General Educational programmes and what changes will they bring?

Undisputable negatives:

- National experiment on people

- Reduction of horizontal permeability of the educational system or even its frustration

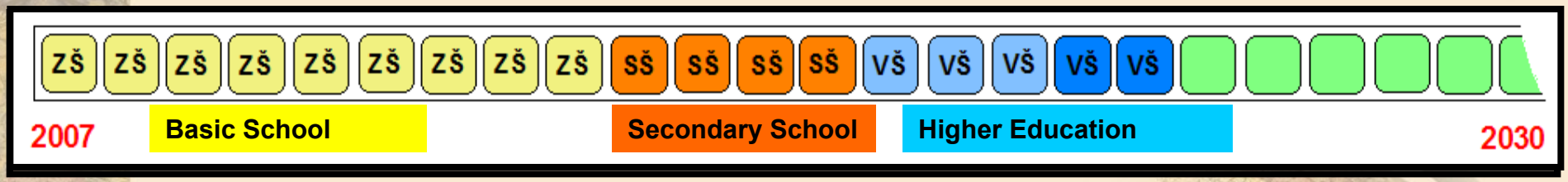
- Lack of qualified teachers (eg. Those for integrated education).

- Excessive dependance of schgool educational programmes on the current state|/condition of schools (facilities, human resources, etc.)

- Entrance examination for entering a higher school degree

Evaluation of General Educational Programmes

… or when do we find out whether the idea is good or wrong?



“Reform is always made by the teacher“.

Prof. PhDr. Zdeněk Kolář, DrSc.

Destiny and further progress of the Czech Educational System is now in your hands.

Thank you for your attention and your patience and wish you a lot of success and strong nerves in your further pedagogical work.