

The development of scientific literacy, the present and future challenges in Finland

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8.3.2008

Outline of the presentation

- Characteristics of Finland and an equal educational system
- All-round education and scientific literacy
- Natural sciences as a focus of interest
- Science curriculum in Finland
- Teacher training
- Future challenges for scientific knowledge
- Future challenges for science teaching

Characteristics of Finland and an equal educational system

Structure of school system

Basic education		Upper secondary	Academic education
Forms 1-6, ages 7-12	Forms 7-9, ages 13-15	Vocational	
		ages 16-19	
Compulsory		Non-compulsory	

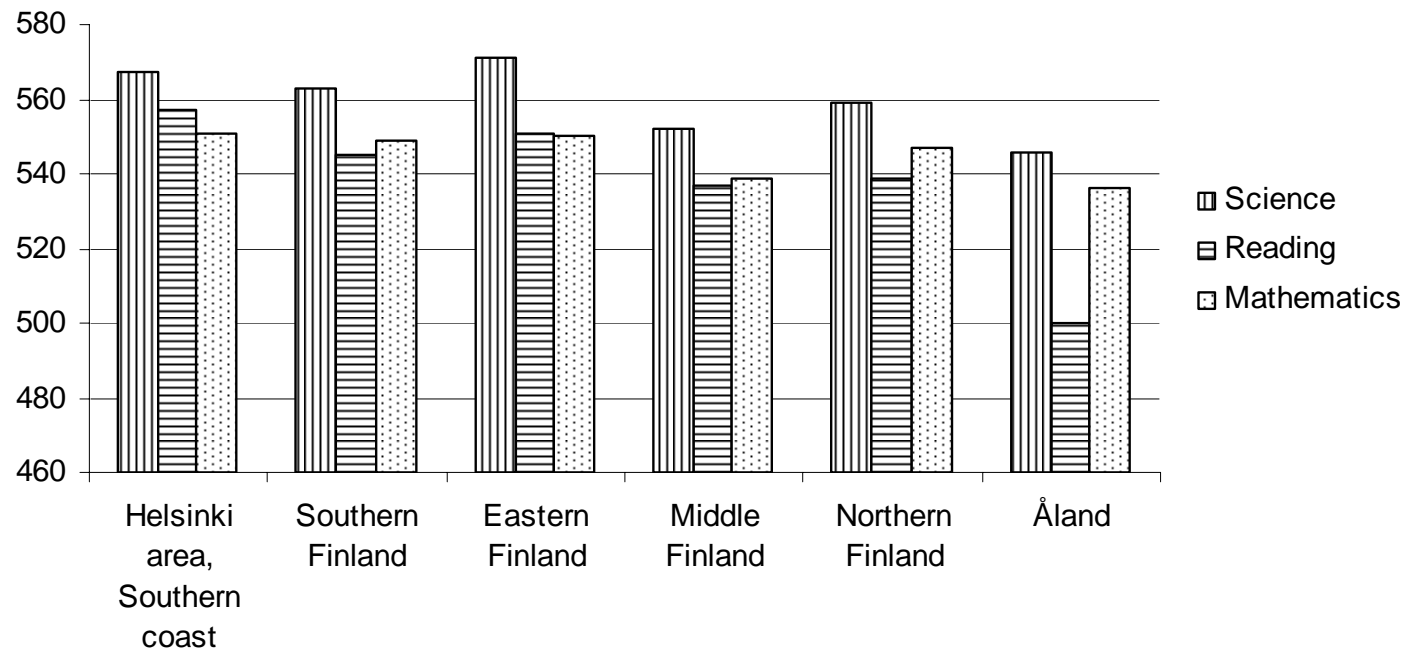
- Significant reforms in the 1970's
 - teacher training to the universities - master's degrees
 - development of a uniform basic school - nine-grade basic school open to all and basic education compulsory to everyone

These two major reforms have enabled the development of the present-day high-quality educational system.

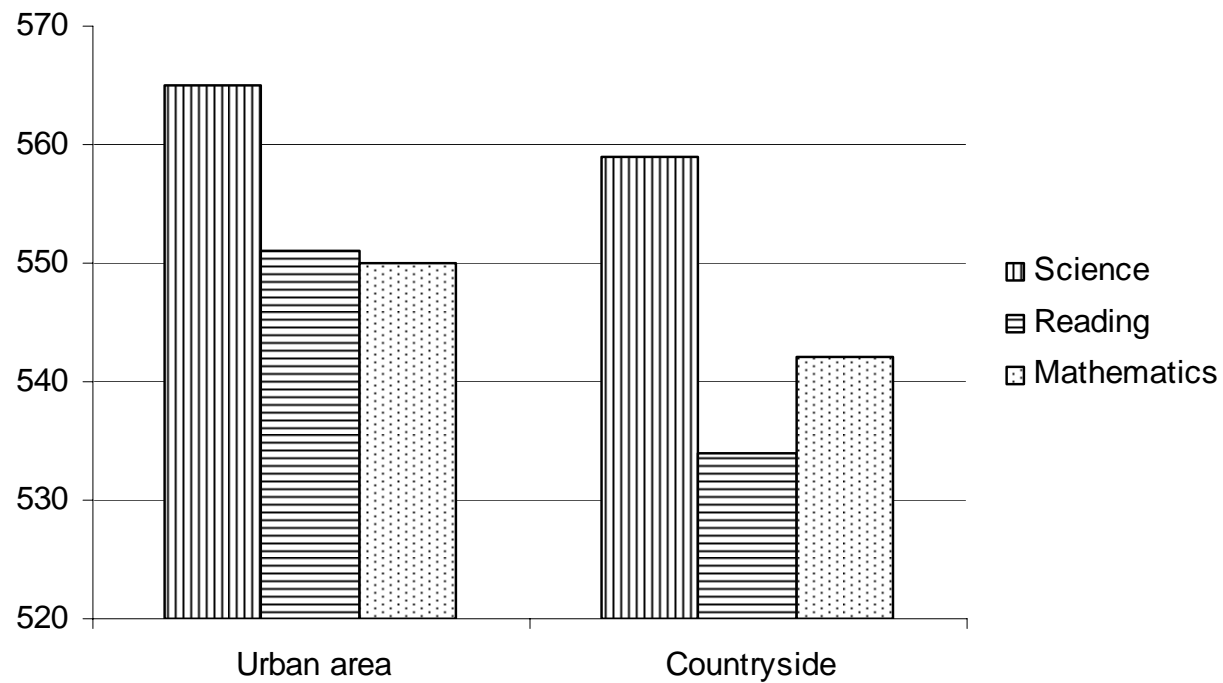
A uniform and free (from basic school to university) educational system guarantees an equal education for everyone regardless

- of place of residence,
- wealth and
- native language.

PISA results 2006 on different areas of Finland:



PISA results 2006 on different areas of Finland:



- A broadly accepted vision of information society,
 - educational equality,
 - trust and the delegation of responsibility and decision-making to a local level
- are the cornerstones of Finnish educational policy.**

All-round education and scientific literacy

An even more diverse all-round education is needed both now and in the future.

An individual needs the kinds of information, skills and values that enable them to form their own world view and to get along in a global society.

Education has to be able to respond to this challenge.

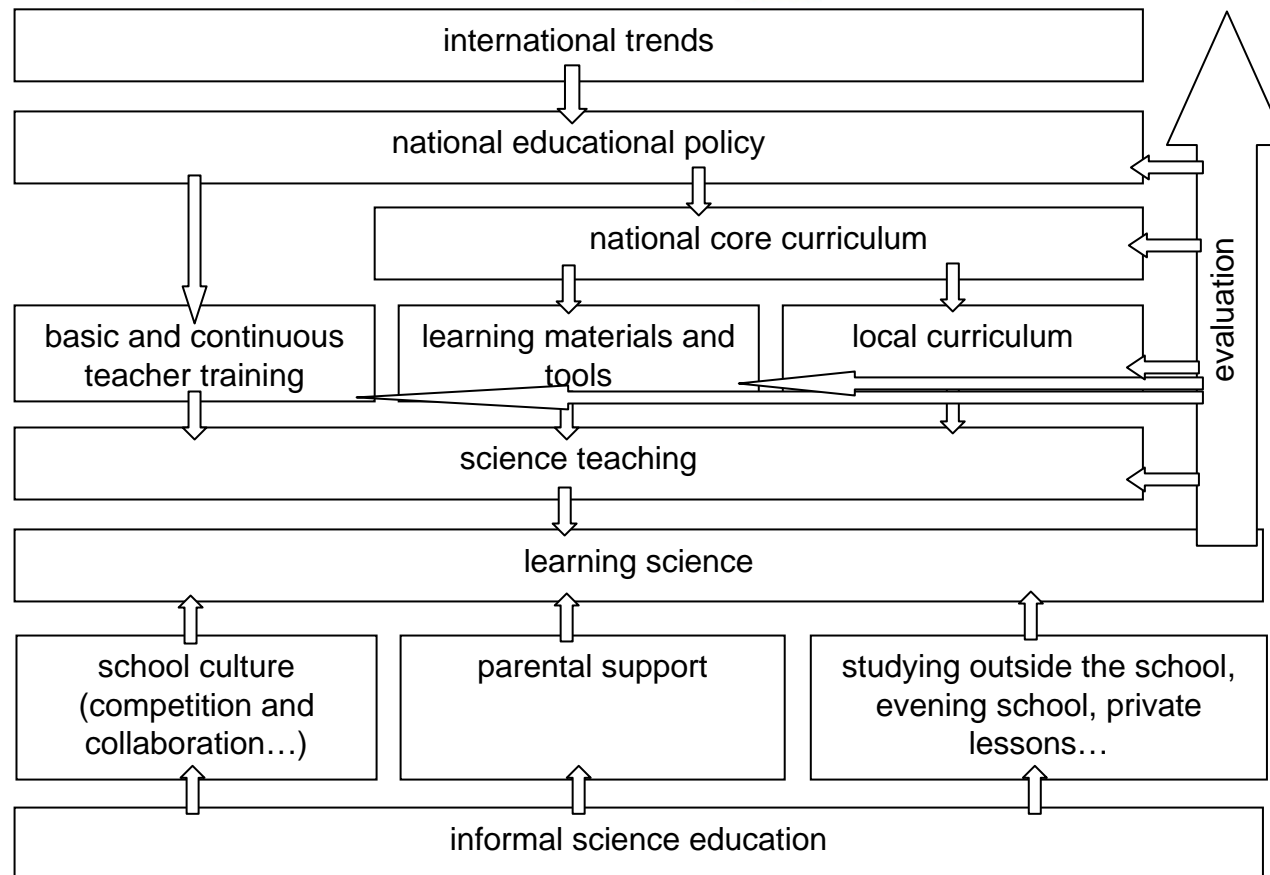
All-round education and scientific literacy

BROAD SENSE

- scientific knowledge
- critical and rational thinking
- skills for future development

NARROW SENSE

- physical sciences
- life sciences
- mathematics
- computer science and technology



Informal science education

- Science clubs and camps and other types of science hobbies
 - more meaningful learning
 - opportunity to succeed or fail without fear of getting poor grades
 - safe environment
 - competent adult
- In national core curriculum clubs
 - can deepen and inspire interest in science
 - differentiate science teaching
 - offer an opportunity to concentrate on genuine interdisciplinary questions
 - solve problems across subject boundaries

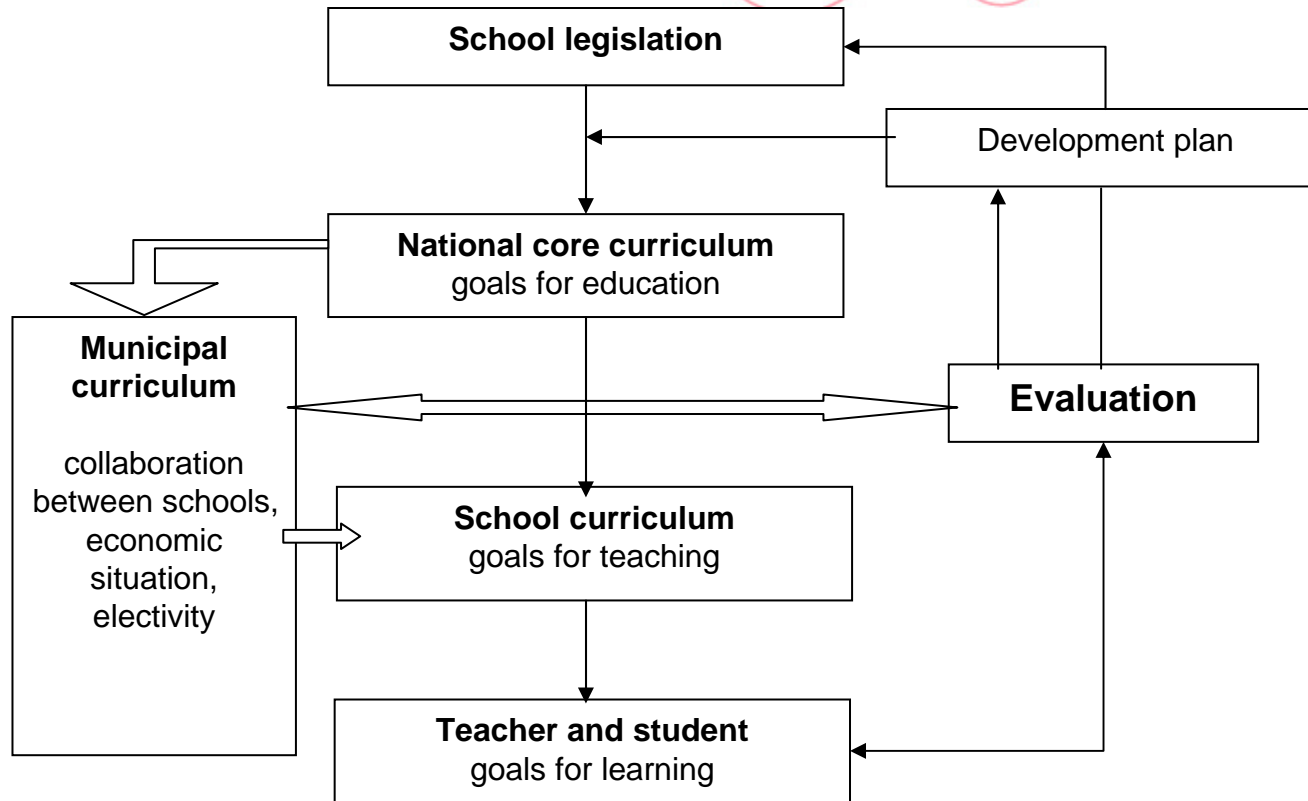
Natural sciences as a focus of interest

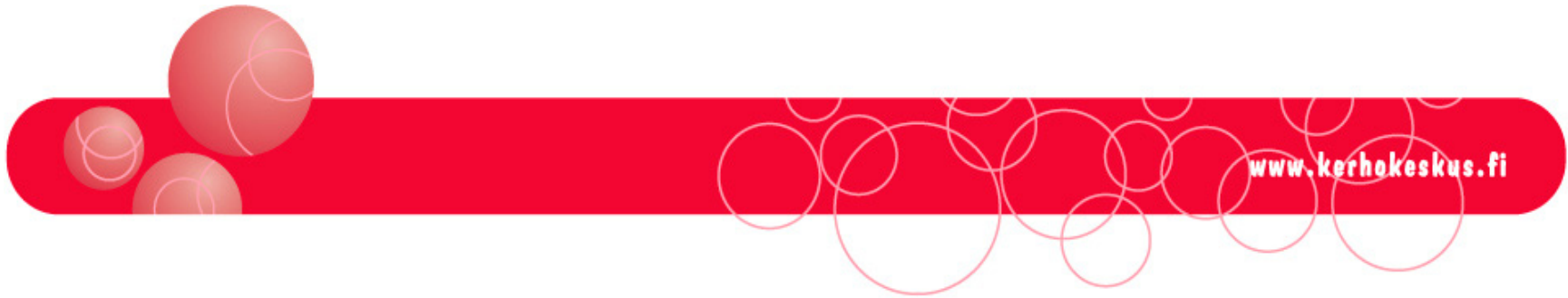
- Interest in science is quite high
 - informal science education and
 - all what happens outside the classroom
- Science learning in a classroom
 - rarely offers opportunities to study and learn genuinely interesting things
 - learning of basics requires effort and hard work

1. Business man/woman
2. Solicitor
3. Journalist
4. Doctor
5. Athlete
6. Engineer
7. Artist
8. Scientist (researcher)
9. Judge
10. Politician

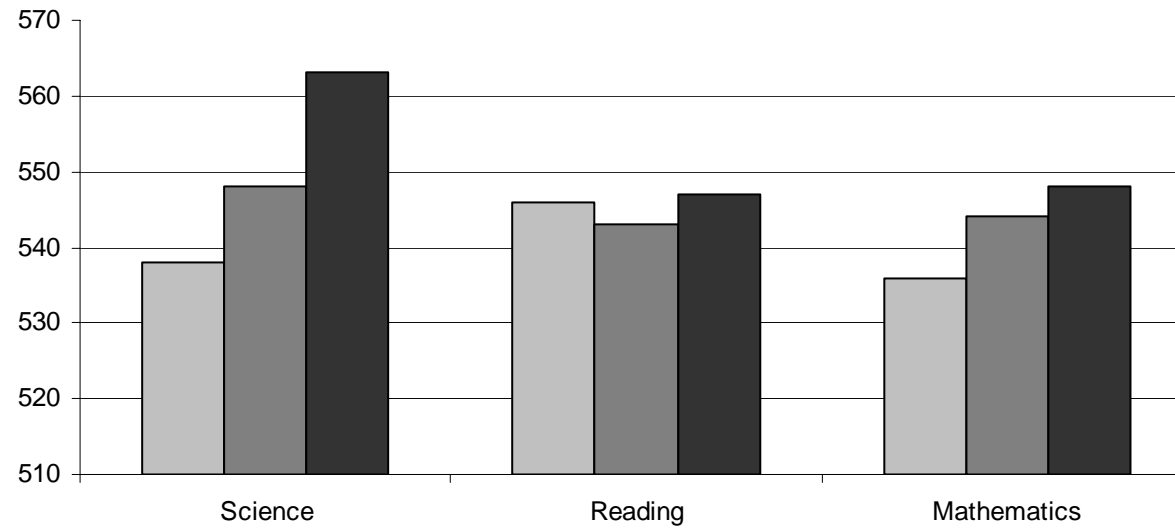
Science curriculum – the key to success?

- Science is taught in Finnish schools on all forms all the way to the upper secondary school.
- The curriculum always includes compulsory courses and a varying number of optional courses.
- Electivity is broader on forms 7-9 and in the upper secondary school.
- The Finnish national core curriculum is revised every ten years.
- Expert groups comprised of researchers, civil servants, teachers and representatives of economic life etc. are formed for the planning of subject-specific curriculum.



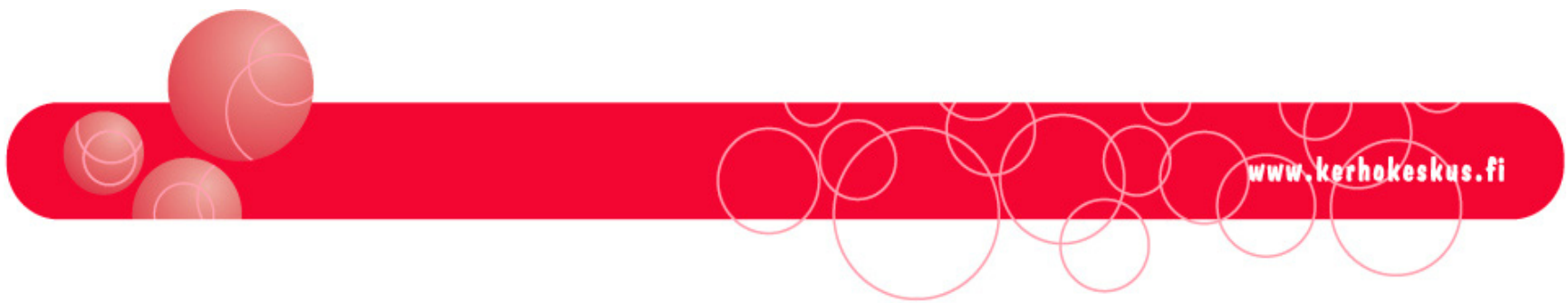


Development of PISA result in 2000-2006 in Finland:

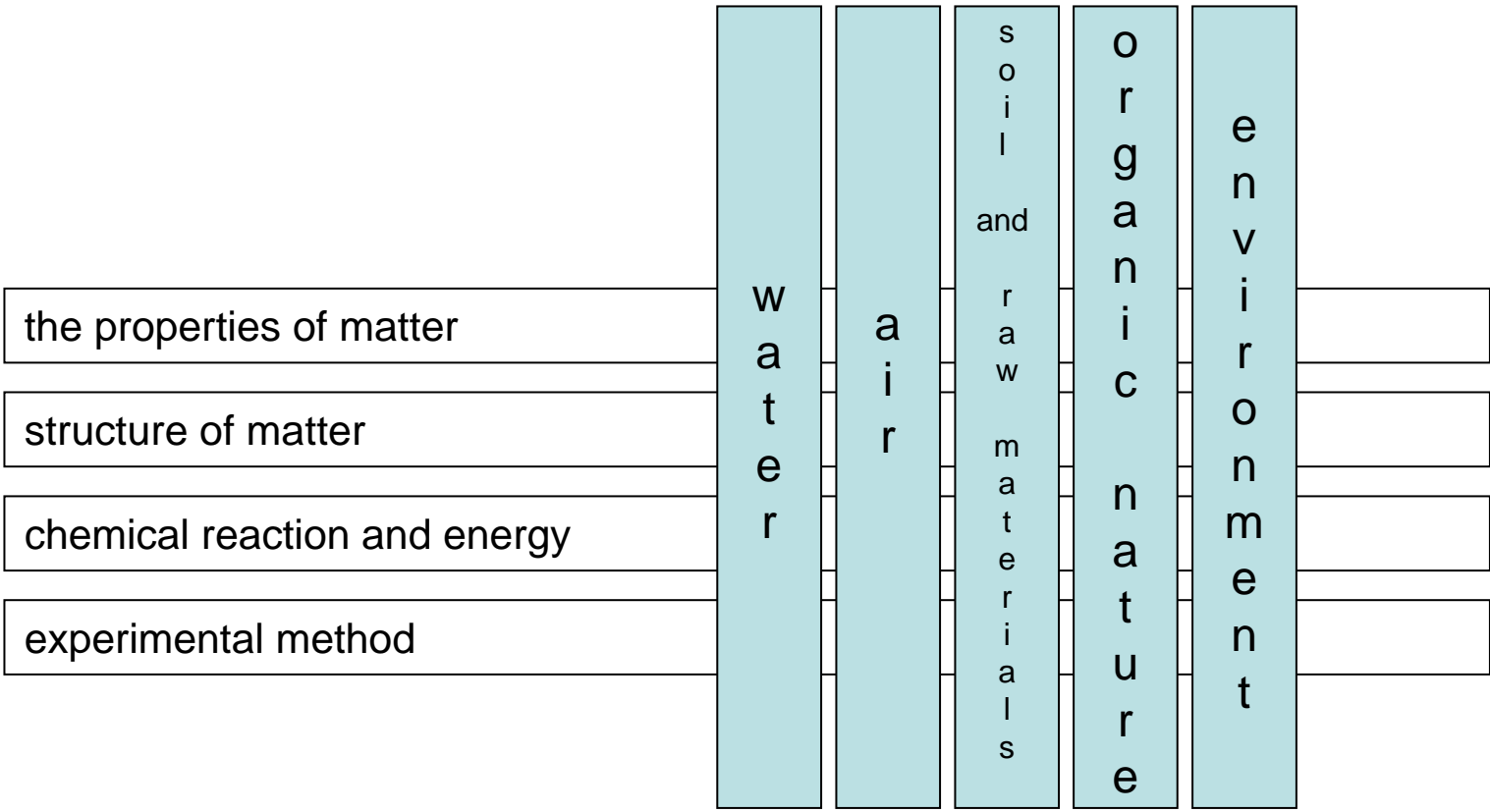


Form	1	2	3	4	5	6	7	8	9
Age	7	8	9	10	11	12	13	14	15
Environmental and natural science (integrated health education)	2.5	2.5	2.5	2.5					
Biology and geography					1.5	1.5			
Physics and chemistry (integrated health education)					1	1			
Biology							1.2	1.2	1.2
Geography							1.2	1.2	1.2
Physics							1.2	1.2	1.2
Chemistry							1.2	1.2	1.2
Health education							1	1	1



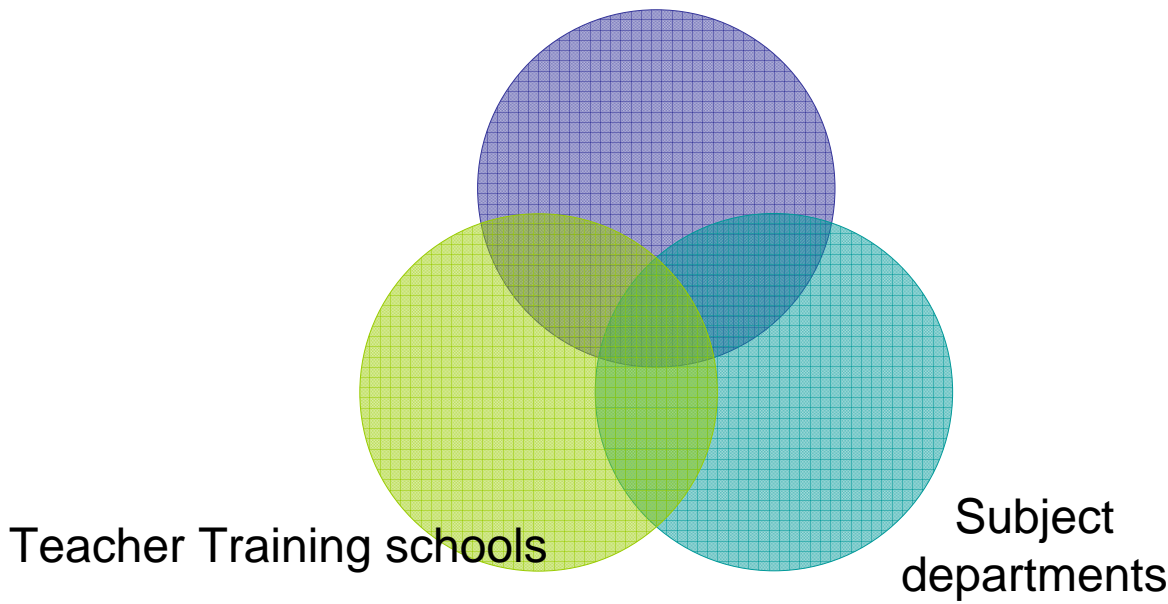


Structure of chemistry subject in national core curriculum:



Good teacher training is the basis of everything

- Teacher training in Finland
 - class teachers: forms 1-6
 - subject teachers: forms 7-9 and upper secondary



Structure of studies of subject teachers:

- subject studies 70%
- pedagogical studies 20%
- other studies 10 %

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During the curriculum development work teacher have to think about things like

- *How is my subject a part of the school's activity on the whole?*
- *How does my subject teaching take into account the different interests of the genders?*
- *How does my subject support the student's growth into an independent and good person?*
- *What is all-round science education and what is its share of all-round basic education?*
- *How does my subject teaching develop the student's abilities for further studies?*

Teachers are experts in different fields:

1. Expertise in their own subject
 - excellent knowledge of the subject
 - an understanding of information and the nature of the field of information and
 - an understanding of how new information is obtained
2. Pedagogical expertise
 - encompasses planning the teaching
 - the ability to take into account different types of learners
 - good assessment skills
 - command of good working practices
 - the ability to control the psychological, social and philosophical conditions, etc.
3. The development their own profession
 - ability to constantly develop oneself and
 - to learn new information about the subject as well as pedagogical knowledge
 - the ability to assess one's own competence

Future challenges for scientific literacy

- Globalisation
- Welfare
- Changes in the nature of work
- Changes in people's mental resources
- Changes in the cultural environment
- Global and local environmental issues must be understood, and solutions must be found to things like water, waste and energy problems.
- Faster adaptation to environmental changes is also necessary.

- Most Finns consider the television and radio (93%) and the newspapers (82%) to be the most important sources of information.
- Internet
- Critical analysis of information in particular must be learned at an early age. The increasing amount of information makes both learning and teaching more and more interdisciplinary.

Future challenges for science teaching

- The greatest challenge for science teaching in Finland is maintaining the current good level and the good survey results achieved through it.

Creation of good civics

- a solid all-round education
- basic knowledge of science and technology
- the utilization of information and communication technologies and networks
- maintaining good health
- dialogic interaction skills
- communication skills
- cultural and social skills

The basic aim is therefore not the mass production of researchers, but to raise healthy and happy people.

Increase in the number of immigrants

- students with immigrant backgrounds
- challenges to teacher training
- the producers of learning materials
- curriculum planning in general

Are the teachers and teacher trainers ready to encounter and utilize multiculturalism?

Highly talented children and ones needing special support both attend the same classes in the same schools

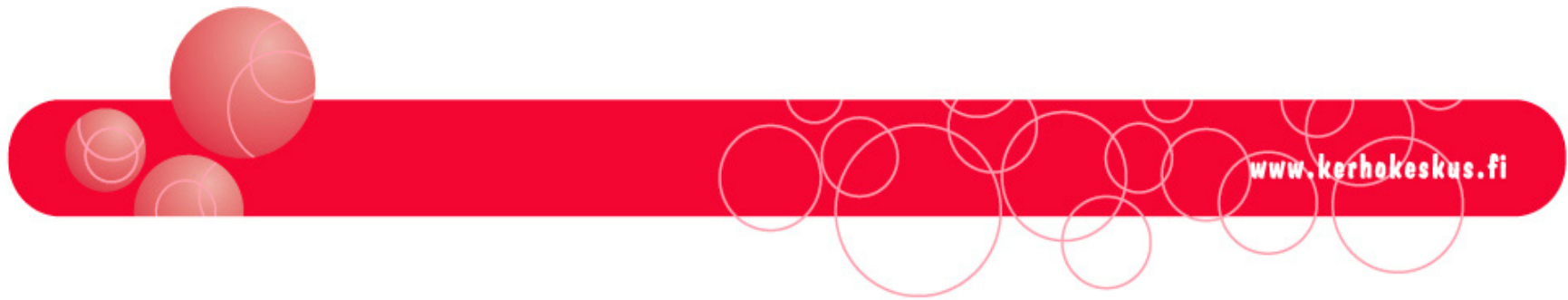
- Should the talented be supported in basic school?
- How big a percentage is the share of the highly talented among the entire age group?

Current teacher training concentrates especially on helping poorly performing students, and in the future, this needs to be changed.

In Finland, funds for the educational system are used effectively – good results have been achieved even with small resources.

The adequacy of research funding is also problematic, and probably the most important reason why talented young researchers choose not to stay in Finland.

Therefore the challenge is not only finding the most talented students in an average class, but also getting them to stay in Finland.



Kiitos!
Thank You for You Attention!