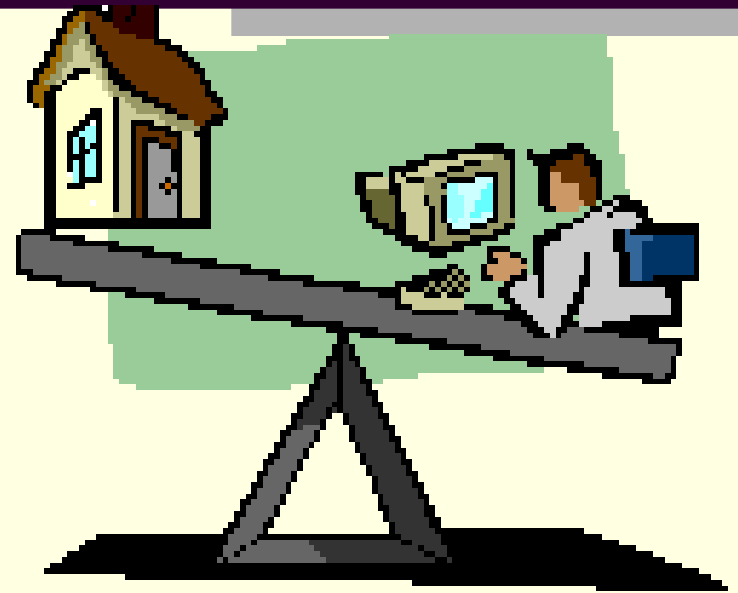


THE MAIN CHALLENGES AND TRENDS IN SCIENCE EDUCATION



In developing a modern diverse and rapid life of society we have started going too fast and thus our life can become dangerous from a long term perspective!

QUESTIONS

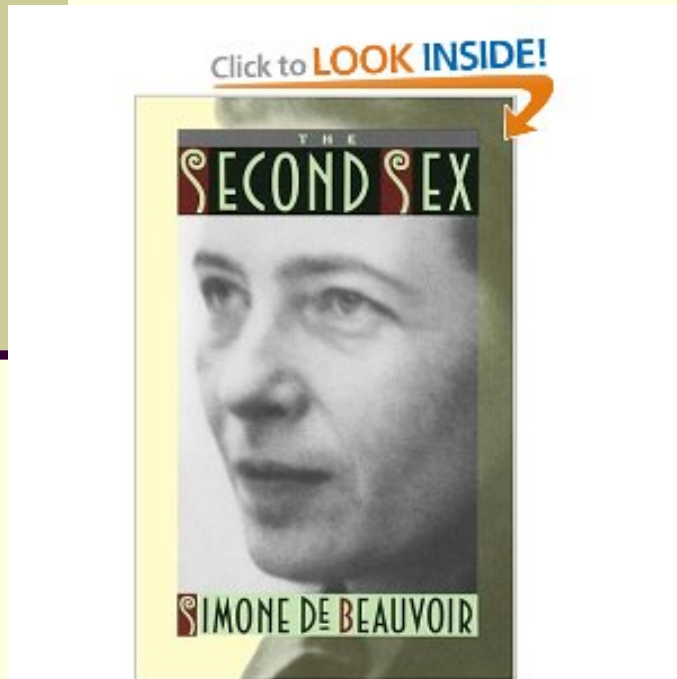
- What are the main natural science education research trends in the Czech Republic?
- What scientific researches have been conducted in your university recently? Do you know this?
- How can you assess your knowledge and understanding of the constructive science teaching/learning?
- How do you understand the relationship between instructivist and constructivist approach in science education area? What is the right balance?

SOME RELEVANT TOPICS

- Science and technology literacy in general;
- Climate science literacy (climate change is not just an environmental problem, this an education problem too);
- Effective use of modern ICT in science education;
- The relation of different cultural contexts in science education:
 - Western countries tend to associate student interest in a subject with its teaching;
 - Asian countries, commonly refer to the place of values in the curriculum.

SOME RELEVANT TOPICS

- Developing socio-cultural and human values in science and technology;
- Women as “The Second Sex” in science;



Simone de Beauvoir (1949).
The Second Sex. France.



WHY SHOULD WE CARE?

(according E.K.Henriksen, 2010)

- S&T needs women because it needs more people in general.
- S&T needs women because women bring new perspectives and ways of working.
- Women need S&T in order to influence their own life and the development of the world.
- Everyone (including women) should have a real, not only a formal, free choice of education.

QUESTION IN PREVIOUS CONTEXT

■ How to increase
the participation
of women in
science and
technology?



THE INFLUENCE OF TEACHER GENDER ON STUDENTS' ENGAGEMENT AND ACHIEVEMENT IN SCIENCE

- There are some relationships between teacher's gender and a range of variables relating to adolescent students' perceptions of their classroom engagement, quality of teaching and responses to their teacher, and their own achievements in science (Elstad, Turmo, 2009);

INTEREST IN SCIENCE AS A PROBLEM

- The declining interest for science and technology among pupils in the Western world is a threat against economical growth, the welfare system and also a democratic problem (S.Engstrom, P.Gustafsson, 2010)

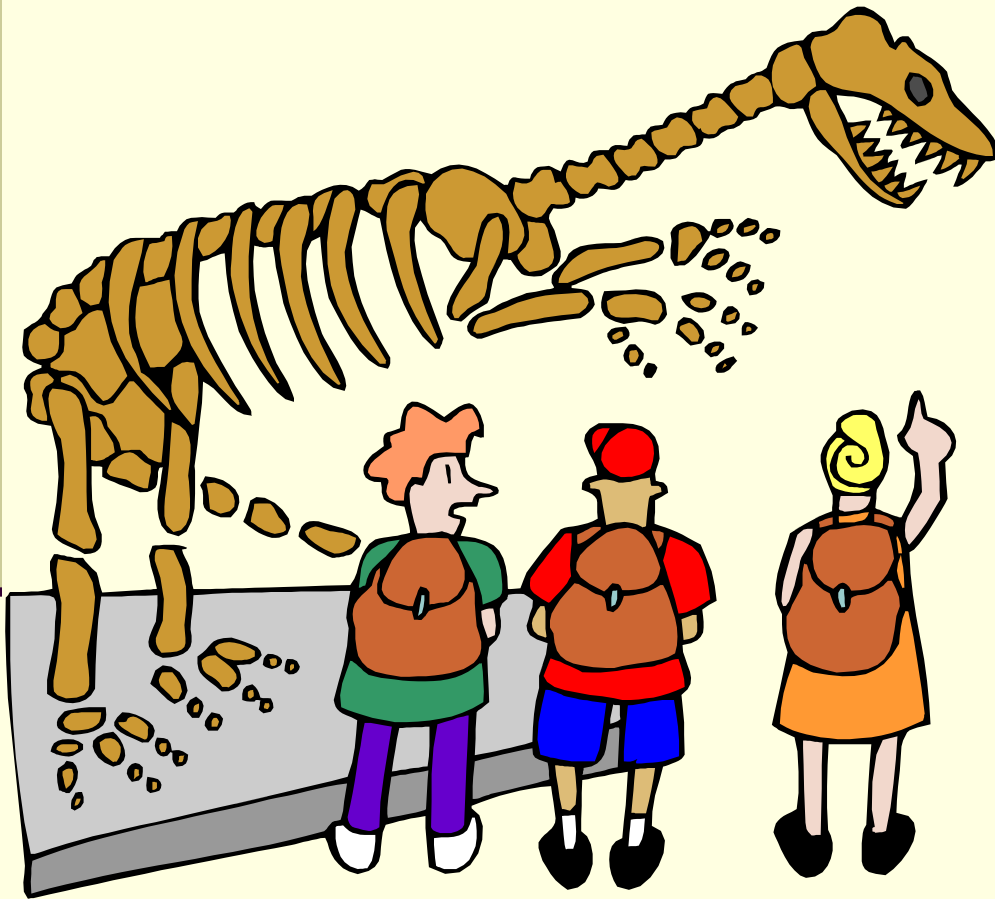
What kind of scientific knowledge, skills or understanding do they (pupils) think they need for dealing with everyday life?

(Osborne, Collins, 2000)



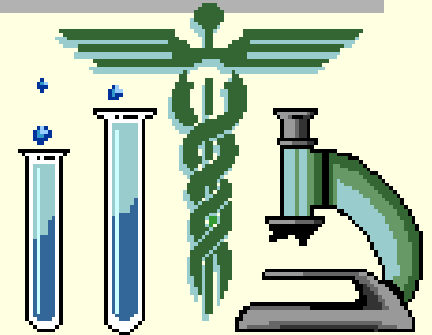
IS IT A PARADOX?

**School
science as
fossils**



THREE MAIN NEEDS

- **Science as a method of enquiry.**
 - It seeks answers to questions by experimentation, testing etc.
- **Science as culture.**
 - Our youth should know the place and role of science in our society.
- **Science as a source of knowledge.**
 - Some of the outcomes of science obviously are important for people.



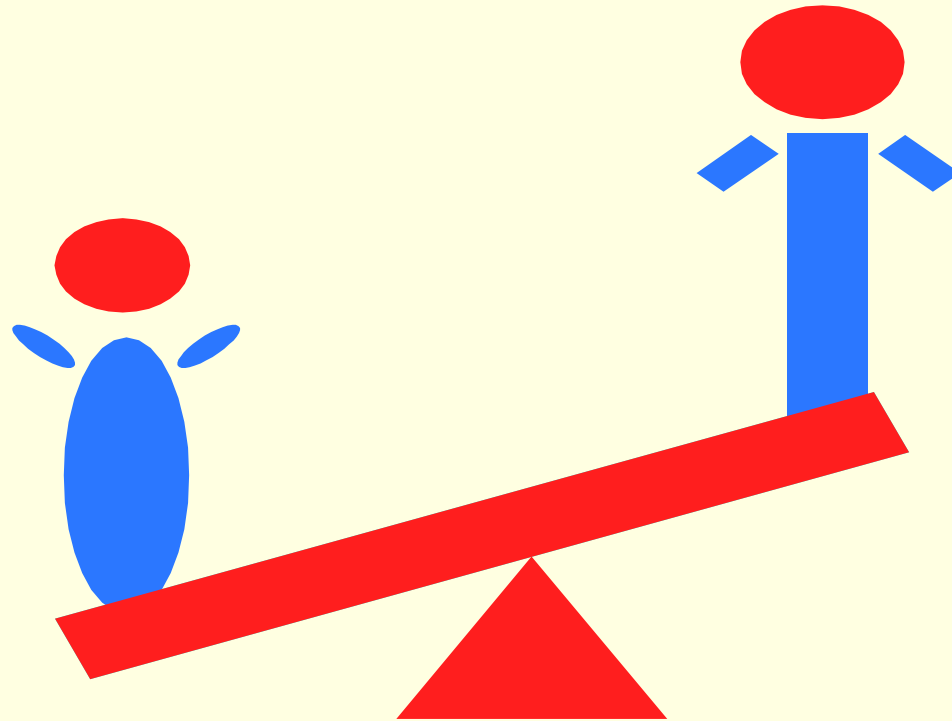
SEARCH OF THE NEW WAYS FOR EDUCATION

- Family science and technology education as a new teaching and learning strategy:
 - FS&T is expanding knowledge and skills from the school into the homes of students;
 - Hands-on experiments and activities play a very important role (**constructivist view**);
 - The appropriate educational contents are daily lives;
 - FS&T helps to identify students gifted in science and technology.

“DOING SCIENCE” *AND/OR*

“LEARNING SCIENCE”

Practical work
at schools does
not engage
students in
“doing science”
in any
meaningful sense
(Hodson, 1990;
Osborne, 1997)



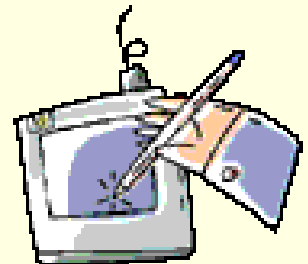
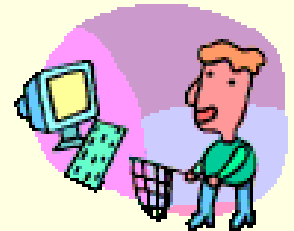
Learning
science
involves a
number of
learning
strategies of
which
practical work
is a part

Negative points in learning physics, biology, geography and chemistry (N/%).

Physics	Chemistry	Biology	Geography
1) theory and tasks are difficult - 340/29.1 2) not indicated 314/26.9 - 3) formulae, equations and laws are too complex 255/21.8 - 4) simply don't like, don't understand, it's hard 147/12.6 - 5) don't like the teacher and his/her teaching method - 71/6.1 6) don't like tests - 18/1.5 7) little experimentation, practice - 12/1.0 8) too many difficult concepts - 5/0.4 9) don't like laboratories - 4/0.3 10) names, rules are hard to understand -2/0.2	1) difficult formulae, assignments, reactions equations - 548/46.9 2) not indicated - 369/31.6 3) simply don't like, don't understand, it's hard - 107/9.2 4) don't like the teacher - 68/5.8 5) not enough experimentation, laboratories - 29/2.5 6) too many tests - 17/1.5 7) a lot of different names and rules - 14/1.2 8) it's hard to remember concepts and definitions - 10/0.9 9) don't like homework - 6/0.5	1) not indicated - 534/45.7 2) too much difficult theory, no interest in studying the structure of organisms - 158/13.5 3) don't like some topics (for example, plants, cell structure, etc.) - 146/12.5 4) a lot of names, the concepts are difficult to understand - 83/7.1 5) not interesting, a misunderstanding subject - 82/7.0 6) don't like the teacher - 81/6.9 7) don't like homework, tests and workbook assignments - 36/3.1 8) don't like telling, a boring subject, textbooks is the only source - 33/2.8 9) little experimentation, laboratories - 15/1.3	1) not indicated - 575/49.2 2) much theory, plenty of material learning by heart - 224/19.2 3) don't like the teacher - 111/9.5 4) don't like reading maps, making geographical calculations - 90/7.7 5) much reading, narration is a must - 61/5.2 6) simply don't like, don't understand - 36/3.1 7) don't like some topics (for example, the EU, Lithuania) - 34/2.9 8) don't like tests, workbooks - 21/1.8 9) don't like homework, projects - 16/1.4

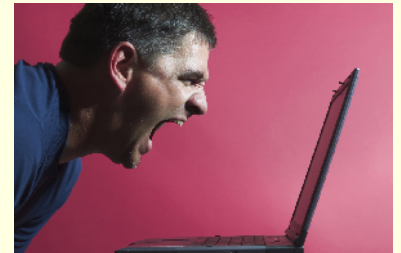
CASE

- Cognitive Acceleration through Science Education.
- Is cognitive acceleration possible?
- Yes, it is.
- The main idea is to **improve** children's thinking processes by **accelerating** progress towards high-order thinking skills.
- Why do we need that?
- Because we need a **scientifically literate** society.



“HOLY TRINITY”

- Teaching /learning time.
- Teaching / learning resources.
- Cognitive development.

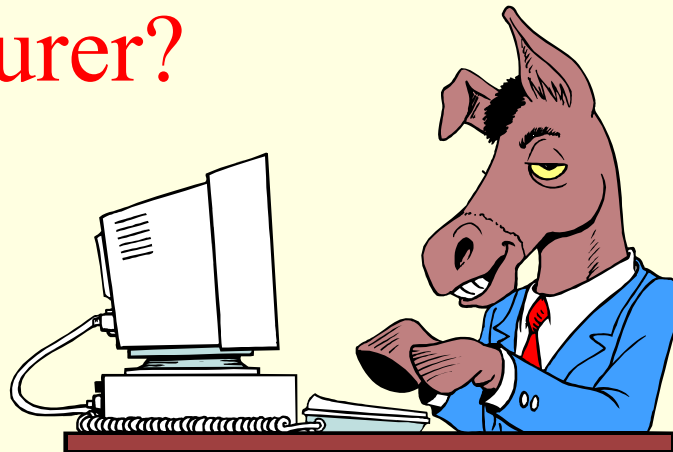


AN IMPORTANT QUESTION

- How can the school science curriculum meet the needs of the **science-bound minority** and of all students in an increasingly, S&T influenced society? (*according prof. P.Fensham*)
- Science for all or science for minorities?
- Science for all Czech people or only for a small group?

THE TRUTH IS THAT STUDENTS MAY KNOW COMPUTER TECHNOLOGY BETTER THAN TEACHERS / LECTURERS DO

How to
become a
successful
teacher /
lecturer?



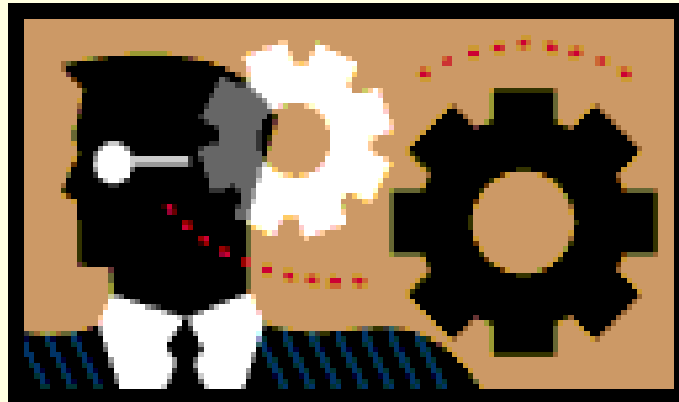
WHICH CLASSROOM IS BETTER?

- Tech-free or tech-charged classrooms?
- A lot of students say that the tech-free classrooms are the most engaging.
- Class time should be reserved for discussion especially now that students can download lectures online and find libraries of information on the Web.



NO POWER IN POWERPOINT

- Some early predictions that going digital would force professors to rethink their lectures are broken.



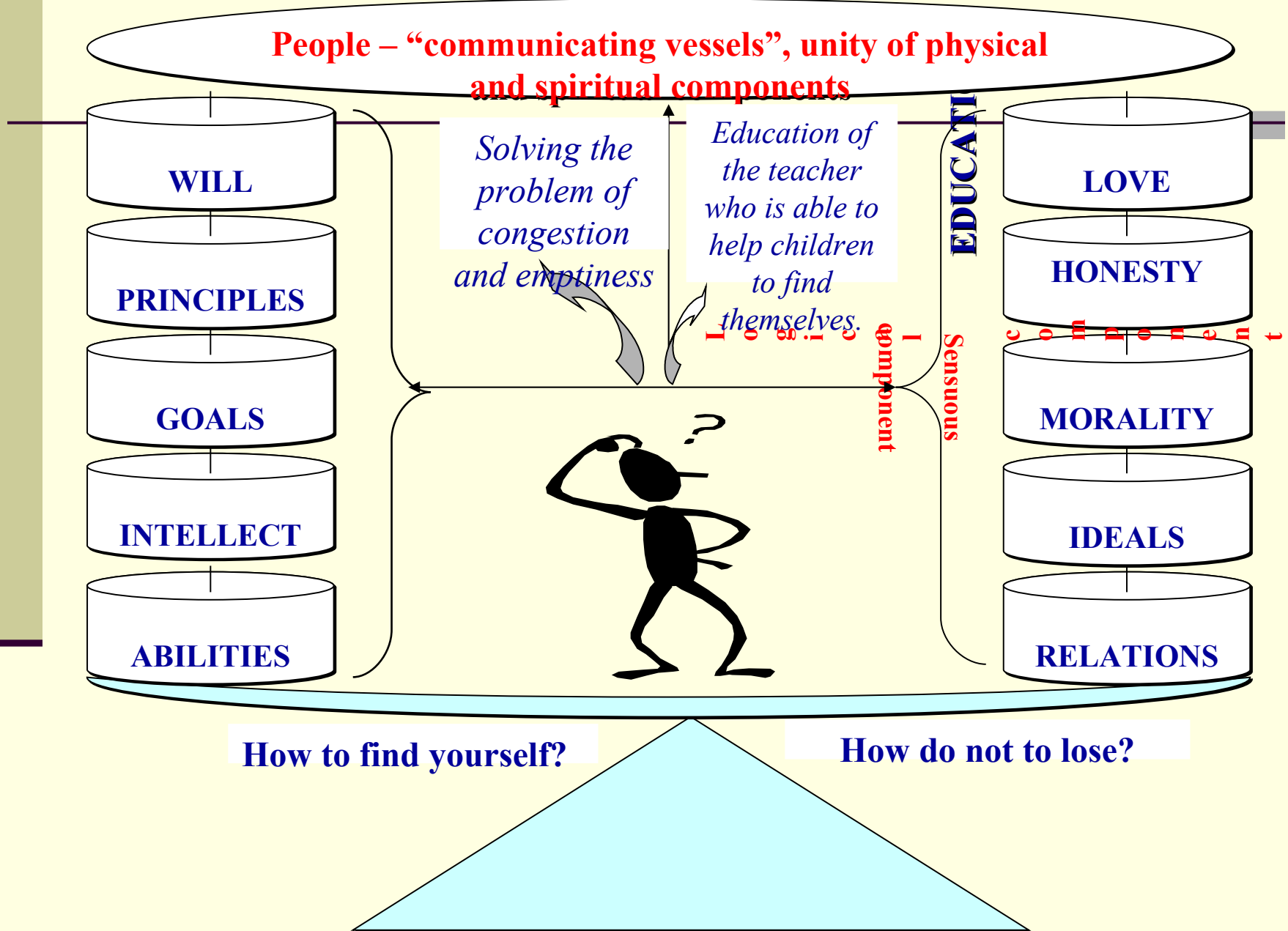
SIMPLE TRUE

- The teacher / lecturer must have some way of keeping learners / students paying attention to them, they must be passionate about the subject which they teach, or they will have no hope of keeping students enthralled by the subject

WHAT DOES IT MEAN TO BE A CONSTRUCTIVIST TEACHER?

- “A *constructivist teacher* is aware that learning is **complex**, and involves **interactions** between what students are told, what they know, and what they want to know. So the teacher **checks** beliefs before and after each topic, with a range of subtle measures – more than simple tests... *Constructivist teachers talk with*, not at, their students. There is not, of course....listen, listen to your students. You will then know what to do. There is more to teaching than that, but **listening** is a necessary condition for constructivist teaching”.
- (Richard T. White, Monash University, Australia, cited : *Journal of Science Education*, 2006, Vol. 7, No. 1)

HUMAN EDUCATION: CONTINUOUS SEARCHING FOR BALANCE



WHAT SCIENCE TEACHER FOR WHAT SCHOOL???

- Teacher missionary
- Teacher ascetic
- Teacher loner/eremite
- Teacher professional
- Teacher artificer
- Teacher haphazard/stray



Your
questions,
please! ...
Only simple
questions

Thanks for
your
attention
and don't
be boring

