

Impact of Multimedia Program SUPERCOMET 2 on the Teacher and Pupils

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Evaluation of SC2 Program in the Czech Republic

Big package of Evaluation materials was prepared by Harvey Mellar

We start evaluation in March 2007, according to curricula when electricity and magnetism finished

10 Teachers (7 male, 3 female)

257 pupils, age of 16 to 18

- Teacher questionnaire
- Pupils questionnaire
- Pupils test (by Harvey Mellar)

Pupils questionnaire		Yes %	No %
1.	Was learning electricity and magnetism more interesting with animations from SC2 program?	90	10
2.	Did you better understand physical phenomena?	77	21
3.	Would you like to use similar program of other parts of physics?	91	9
4.	Do you recommend SC2 program when you learn new subject matter for other classes?	84	16
5.	Do you think that SC2 program is enough for understanding - without teacher explanation?	24	75
6.	Do you recommend SC2 program when you repeat subject matter for other classes?	87	13
7.	Do you have possibly to work with SC2 program independently?	76	23

Pupils test

1. How can the way in which materials interact with a magnetic field classified and how do these interactions vary?

	kvarta		3. A	
	male	female	male	female
a	0 %	0 %	18 %	38 %
b	83 %	100 %	35 %	13 %

Pupils test

2. In a closed circuit a change in magnetic flux will generate a current and this current is maintained as long as the flux varies

- a) Is this always the case?
- b) Justify the answer

	kvarta		3. A	
	male	female	male	female
a	42 %	27 %	47 %	75 %
b	25 %	13 %	18 %	0 %

Pupils test

3. In metals and conductors in general the electrical resistance is a function of temperature, when the temperature increases so does the resistance. Why?

	kvarta		3. A	
	male	female	male	female
a	100 %	80 %	71 %	50 %
b	33 %	53 %	12 %	0 %

Pupils test

4. By superconductivity we mean that the resistivity of the material is zero below some critical temperature, T_c . Is this transition a reversible or irreversible process? Justify your answer.

kvarta		3. A	
male	female	male	female
75 %	67 %	59 %	13 %

Pupils test

5. When a small magnet is brought towards a superconducting pellet which is below its critical temperature ($T < T_c$) it levitates. If the same small magnet is placed on a superconducting pellet which is above its critical temperature and is then cooled below T_c the magnet again levitates. Explain the observation in both cases.

kvarta		3. A	
male	female	male	female
42 %	7 %	6 %	0 %

Pupils test

6. For both type I and type II superconductors describe what happens to the electric field inside as the sample is cooled below its critical temperature.

kvarta		3. A	
male	female	male	female
58 %	0 %	35 %	0 %

Pupils test

7. How can superconductors be divided into groups and how are they characterized?

	kvarta		3. A	
	male	female	male	female
a	33 %	53 %	65 %	50 %
b	25 %	47 %	35 %	50 %

Pupils test

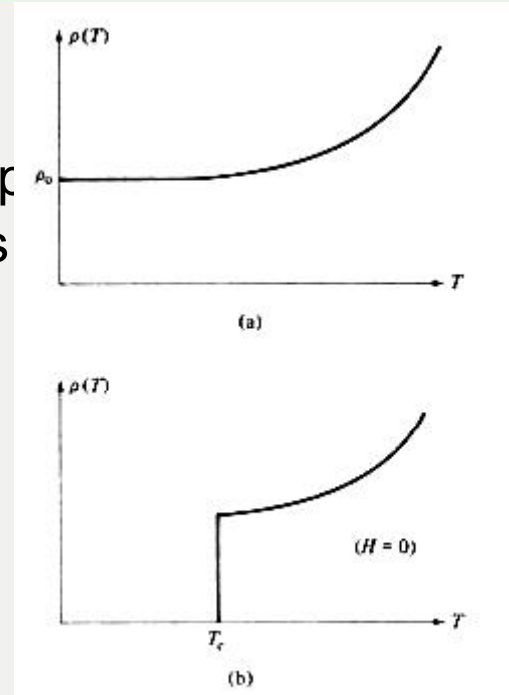
8. Which are the critical differences between the superconducting state and the normal state of a material and that influence their behaviour?

kvarta		3. A	
male	female	male	female
42 %	40 %	59 %	50 %

Pupils test

9. The graphs (a) and (b) below illustrate the relationship between resistivity and temperature for conductors and superconductors.
- Which graphs represent which?

What is the difference between the relation between resistivity and temperature in a superconductor and in a normal conductor?



	kvarta		3. A	
	male	female	male	female
a	83 %	100 %	76 %	75 %
b	50 %	100 %	29 %	50 %

Pupils test

10. In which commercial sectors are superconductors employed?

kvarta		3. A	
male	female	male	female
50 %	20 %	0 %	38 %

Pupils test

11. What difficulties are found in the manufacture of technological components that utilize superconductors?

kvarta		3. A	
male	female	male	female
75 %	67 %	59 %	13 %

Teacher questionnaire

1. Is the SC2 program useful and helpful for explanation physical phenomena?

All answer yes

Teacher questionnaire

2. In which part of lesson is better use SC2 program?

Teachers prefer – after demonstration of real experiments, with recapitulation of subject matter

Teacher questionnaire

3. Do you recommend SC2 program for teachers from other schools?

Yes, there are many useful animations...

Teacher questionnaire

4. Do need the teachers attend special seminar about using SC2 program?

No, all the secondary school teacher have university education in physics and teacher training in physics and using ICT too.

Teacher questionnaire

5. Is for you useful Hi-Tech experimental equipment (you need liquid nitrogen)?

No, it is no possible use in our school.

One answer: Yes, I have superconductor and LN2 is no problem for us. (Prague)

Teacher questionnaire

6. How is possible use different themes of SC2 program?

- 1) Magnetism of conductor with current and permanent magnets 90 %
- 2) Magnetism of solenoids and other materials? 95 %
- 3) Electromagnetic induction 93 %
- 4) Electric current 93 %
- 5) Superconductivity 50 % (More in special seminars)
- 6) History of superconductivity 47 % (More in special seminars)

Teacher questionnaire

7. Which parts of SC2 program do you prefer for using in lessons?

All part, but 5 and 6 in special seminar.

Teacher questionnaire

9. Your opinion...

- Pupils need support by other browser then Explorer (such as Mozilla)
- There are some mistakes in SC2 program
- The understanding of pupils was better after they saw real experiments of superconductivity in MFF UK

Conclusion

- SC2 program is useful for pupils and teachers,
- Teachers are able use this program effectively with connection to our curriculum
- Pupils need teacher's instruction and explanation
- SC2 program is useful for supporting teaching/learning process
- Low possibility for autonomous student learning - according to curricula