

**Zborník referátov z 12. medzinárodnej konferencie
DIDFYZ 2000
(Račkova dolina, 18. - 21. októbra 2000)**

**Ciele vyučovania fyziky
v novom miléniu**

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**Objectives of teaching physics
in the new millennium**

Nitra 2001

CONTENT OR EMOTION – THE MAIN PURPOSE OF EDUCATION OF PHYSICS

ARKADIUSZ WIŚNIEWSKI

M. Curie - Skłodowska University, Dublin, Poland

The interaction of emotions with physics learning is very interesting for Physics Teachers because students don't like physics and we ought to do something to change this situation.

I've decided to check this problem from the teacher's and future teacher's point of view. I used a questionnaire based on the questionnaire prepared by American Association of Physics Teachers [1] and administered it to Physics Teachers and Students of the last year of Physics who in next year could teach Physics at primary and secondary schools. Then I compared my results with those received among Danish and American Teachers.

The questionnaire was consisted of 7 items describing various classroom scenarios. I asked teachers and students to select only one, most likely response on each scenario. For each scenario, one of the four answers was emotion weighted (E), one was content weighted (C) one was balanced (EC) and one was unweighted.

Four groups participated in my studies: 52 the third year students of chemist-physics college (**group I**), 110 the fourth year students of physics (**group II**), 27 the fourth year students of non-resident physics (**group III**) and 75 physics teachers (**group IV**).

Below I present all scenarios from questionnaire and results I've received.

1. The lab performance of your students seems to be getting worse. More of them are not completing the experiment during the lab period. You would:
 - a) emphasize the importance of laboratory work and the necessity for accomplishing the lab assignments. (C)
 - b) use conversation to show your concern and to encourage the students. (E)
 - c) discuss the function of experimental work in science and work with the students to improve the quality of their performance. (EC)
 - d) Let the students be responsible for themselves.

Table 1. Responses of each group on scenario 1.

Group	a	b	c	d
I	4%	19%	77%	0%
II	3%	15%	77%	5%
III	0%	11%	85%	4%
IV	11%	19%	62%	8%

2. Your students bombed the first hour exam. You have stressed the grading standards for the course. Classroom participation is beginning to improve. Now the second exam is coming up. You would:
 - a) engage in helpful friendly interactions and continue to make sure all students are aware of your standards. (EC)
 - b) be satisfied with the improvement and take no further action.
 - c) praise the class for its improved participation and let each student know you care about his/her work. (E)
 - d) emphasize the importance of good study habits and the completion of each homework assignment. (C)

Table 2. Responses of each group on scenario 2.

Group	a	b	c	d
I	10%	2%	50%	38%
II	15%	0%	54%	31%
III	11%	4%	63%	22%
IV	13%	6%	52%	29%

3. You are teaching the course for the first time. The students are doing badly on the exams; perhaps the course is moving too fast. You have decided to make some changes. You would:
 - a) invite open class discussion in developing change. Do not direct. Allow class to formulate the basis for change in classroom activities. (E)
 - b) slow down and see what happens. (C)
 - c) incorporate group recommendations but direct change. (EC)
 - d) give up to make some change because you think that students adapt to speed of moving the new course.

Table 3. Responses of each group on scenario 3.

Group	a	b	c	D
I	38%	23%	37%	2%
II	30%	20%	48%	2%
III	29%	41%	30%	0%
IV	29%	36%	30%	5%

4. Students have been complaining that the subject is too abstract. Some of them have asked that you include some applications in the course. You would:
 - a) pick out applications for inclusion in your lectures. (C)
 - b) ask them to come up with a list of applications of interest to them and from this list let them select the three most relevant. You then include these topics in your lectures. (E)
 - c) ask the class for some applications of interest to them. You pick out a few for inclusion in your lectures. (EC)
 - d) explain to them that science is based on abstract reasoning and that once they understand the basic principles, the applications will be easier to understand.

Table 4. Responses of each group on scenario 4.

Group	a	b	c	d
I	15%	48%	31%	6%
II	37%	25%	31%	7%
III	44%	19%	29%	8%
IV	42%	31%	24%	3%

5. Many of the students concentrate poorly in your Friday afternoon class. You would:
 - a) accept poorer concentration in Friday afternoon classes.
 - b) ask the students for suggestions on ways to increase class concentration and use those suggestions that are consistent with course goals to stimulate interest. (EW)
 - c) inform students you will include material on exams which is covered during Friday classes. (C)
 - d) contact individual students and encourage them to be more active in the Friday classes. (E)

Table 5. Responses of each group on scenario 5.

Group	a	b	c	D
I	13%	70%	4%	13%
II	15%	58%	16%	11%
III	19%	55%	7%	19%
IV	21%	51%	5%	23%

6. You are preparing a lecture for tomorrow on some scientific law. You remember that this topic has proved difficult for students in previous years, and you are determined to improve your approach. You would:

- employ a more rigorous proof of the law and tell the students that examples similar to those done in class will appear on the exam. (C)
- omit the proof of the law, devote the entire period to solving examples, and say nothing about how the topic will be covered on the exam.
- prepare questions about the law to ask students during class. Praise students who answer correctly and tell students who don't that most students have difficulty with this topic. (E)

Do a rigorous proof very slowly taking pains to explain every step. Then ask for volunteers to explain assigned examples during a later class, and assure the volunteers that you are available to help them prepare their presentations. (EC)

Table 6. Responses of each group on scenario 6.

Group	a	b	c	d
I	8%	0%	35%	57%
II	8%	6%	33%	53%
III	4%	7%	41%	48%
IV	8%	8%	33%	51%

- You are grading a set of homework problems on which almost all of the students made the same mistakes. You would:
 - ask the students to discuss in class why their approach seemed reasonable to them and gently remind them of your rules on collaboration on homework. (E)
 - solve the problem correctly in class the next day.
 - correct all mistakes on the papers and ask the students to pay careful attention to your written comments when you return the papers next day. (C)

- ask the students to prepare corrected versions of their solutions and discuss these corrected versions with each student individually. (EC)

Table 7. Responses of each group on scenario 7.

Group	a	b	c	d
I	80%	8%	0%	12%
II	64%	25%	4%	7%
III	59%	19%	3%	19%
IV	61%	32%	3%	4%

In table 8, I place the results of my studies and I compare them with results received by Jeffrey V. Mallow [1] among Danish and American Teachers. Total score means the sum of mean E and C scores.

Table 8. Mean scores received by each group.

Group	Number	Relationship Score	Content Score	Total Score
I	52	5.69	4.00	9.69
II	110	5.16	4.13	9.29
III	27	5.18	4.00	9.18
IV	75	4.81	3.75	8.56
Danish teachers	25	5.00	4.05	9.05
American teachers	65	5.22	4.11	9.33

We can see that all groups had similar scores. Both all groups of teachers and all groups of students weighted more emotions their students and good relationships than contents but these scores are rather balanced. I think that the worst result received by Polish teachers compared with results received by Danish and American teachers is caused by relatively more difficult conditions of work in Polish school. The best score received by college students indicate that they like teacher's work but also that there is a difference between theory and daily school life.

Table 9 presents how many students and teachers prefer each teaching style. Respondents who gave at least 5 responses weighted emotions and at least 5 responses weighted content are founded in group EC. These respondents who gave at least 6 responses weighted emotions and less than 5 weighted content are in group E and these respondents who gave at least 6 responses weighted content and less than 5 weighted emotions are in group C.

Table 9. Number of respondents of each group who prefer following teaching styles: EC – emotions and content weighted, E – emotions weighted, C – content weighted.

Group	Number	EC	E	C
I	52	36%	38%	2%
II	110	26%	30%	9%
III	27	22%	22%	4%
IV	75	17%	25%	4%

I think that situation that more teachers weight and more future teachers want to weight emotions and good relationship in their work is good. In 1951 year W.F.G.Swann have written that there is no teaching in physics, there is only inspiration and that the teacher may only stimulate the mind of the student but the journey to that goal must be made by the student himself. I think that this opinion is true.

I think that further, similar studies are needful to make more precise conclusions. It would be interesting to meet also school students opinion about different styles of teacher's work.

Literature

- [1] J. Malloy, American Journal of Physics 63 (11), November 1995, 1007-1011.

INFORMAČNÍ A KOMUNIKAČNÍ TECHNOLOGIE JAKO NEDÍLNÁ SOUČÁST PŘÍPRAVY BUDOUCÍCH UČITELŮ

LIBOR KONÍČEK

Ostravská Univerzita, Ostrava, ČR

1 Důvody zavádění informačních a komunikačních technologií do přípravy budoucích učitelů

Mnoho aktivit nastupující lidské společnosti se převádí ze zpracovávání hmotných objektů do zpracovávání nehmotných objektů – informací. Nutným předpokladem pro efektivní práci s informacemi je zvládnutí technologií – informačních a komunikačních technologií (ICT). Budoucí učitelé, učitelé 21. století, kteří se s těmito technologiemi budou běžně setkávat, mají potřebu je zvládnout a naučit se s nimi pracovat. Jedním ze sěžejnějších dovedností je schopnost získávat, třídit a zpracovávat informace s využitím ICT.

2 Cíle přípravy učitelů fyziky pro vzdělávání v informační společnosti

Uvedeným trendům musí odpovídat i koncepce vzdělání pro informační společnost. Vznikají nové vzdělávací modely, jsou formulovány představy o klíčových kompetencích (schopnostech, způsobilostech, kvalitách, kvalifikovanosti) [1] jako profilu vzdělání pro informační společnost, které musejí být rozvíjeny ve všech předmětech:

- získávat, analyzovat a organizovat informace (schopnost informace vyhledat, prověřit a utřídit za účelem nalezení požadovaného údaje; zhodnotit jak získané informace, tak zdroje a metodu užitou k získání informace)
- předávat informace a porozumět komplexu vzájemných vztahů (schopnost efektivní komunikace s ostatními s využitím různých možností vyjádření)
- plánovat a organizovat různé aktivity (schopnost plánovat a organizovat pracovní aktivity včetně využití času a zdrojů, stanovení priorit)
- spolupracovat s ostatními a pracovat v týmu (schopnost efektivní interakce s ostatními lidmi; schopnost efektivní spolupráce v týmu pro dosažení společného cíle)
- používat matematické myšlení a postupy (schopnost prakticky používat matematických pojmů a postupů)