TEACHING MODEL INFLUENCE OF DISCRETE MATHEMATICS ON STUDENTS' OPINIONS AND ATTITUDES

Lujza HAMPLOVÁ

Author:	**PaedDr. Lujza Hamplová**
Workplace:	**Institute of Applied Informatics, Automation and Mathematics, Faculty of Materials science and Technology, Slovak University of Technology**
Address:	**Hajdóczyho 1, 917 24 Trnava, Slovak Republic**
Phone:	**+421 918 646 021**
E-mail:	**lujza.hamplova@stuba.sk**

Abstract

The article deals with a questionnaire used to verify working hypotheses of pedagogical research in regard to a problem of integrating a Discrete mathematical tasks (specially Combinatorics and Graph theory) in grammar school math education. The contribution presents the results of the questionnaire examining the influence of the implemented teaching model for Discrete mathematics on students' opinions and attitudes to the way of teaching Combinatorics, to its popularity and difficulty.

Key words

Questionnaire, Discrete mathematics, Combinatorics, Graph theory

Introduction

The goal of contribution is to present the results of the questionnaire for experimental and control group. It was realized after pedagogical experiment in school year 2008/2009. The questionnaire was filled by 55 experimental respondents and 52 control respondents i.e. students of the second grade at grammar school Angely Merici in Trnava. The goal of questionnaire was to examine the influence of the implemented teaching model for Discrete mathematics on students' opinions and attitudes to the way of teaching Combinatorics, to its popularity and difficulty. This questionnaire was used for verifying the second, the third and the fourth hypotheses of pedagogical research. The results of the quantitative analysis of pedagogical experiment in school year 2008/2009, mentioned in [1], validated the first hypothesis of this pedagogical research. The test of Combinatorics and Graph theory showed that students from an experimental group had better results in comparison with students in a control group.

Questionnaire evaluation

As is shown in J. Kotianová [3], numerical values 1 – 5 to answers a) – e) were attached. The most favourable choice multiplies the highest coefficient and the least favourable choice multiplies the least coefficient.

According M. Chráska [2] the Wilcoxon–Mann–Whitney U-test was used. It is a non-parametric test for assessing whether two independent samples of observations come from

the same distribution, where $|u_0| = \left| \dfrac{u_1 - \dfrac{n_1 n_2}{2}}{\sqrt{\dfrac{n_1 n_2}{12}(n_1 + n_2 + 1)}} \right|$, $u_1 = n_1 n_2 + \dfrac{n_1(n_1 + 1)}{2} - t_1$.

- **Verification of *H2***

The students from the experimental group will prefer the positive evaluation of the way of teaching Combinatorics in comparison with the students from the control group.

The second item of this questionnaire deals with students' opinion and attitude to the way of teaching Combinatorics:
Fill the sentence with possibility a) – e).
I was ………. with the way of teaching Combinatorics
a) satisfied
b) mostly satisfied
c) sometime satisfied
d) mostly dissatisfied
e) very dissatisfied

RESPONSES TO THE SECOND ITEM OF QUESTIONNAIRE   Table 1

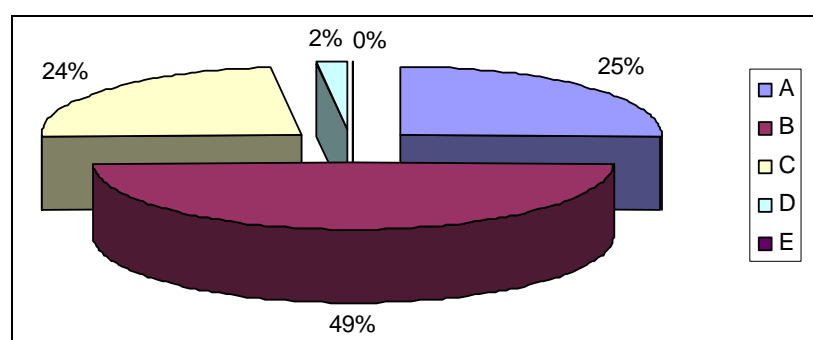|	Experimental group		Control group	
Response	Number of responses	Number (%)	Number of responses	Number (%)
A	14	25,45	8	15,38
B	27	49,09	15	28,85
C	13	23,64	21	40,38
D	1	1,82	8	15,38
E	0	0	0	0
$\sum$	55	100	52	99,99

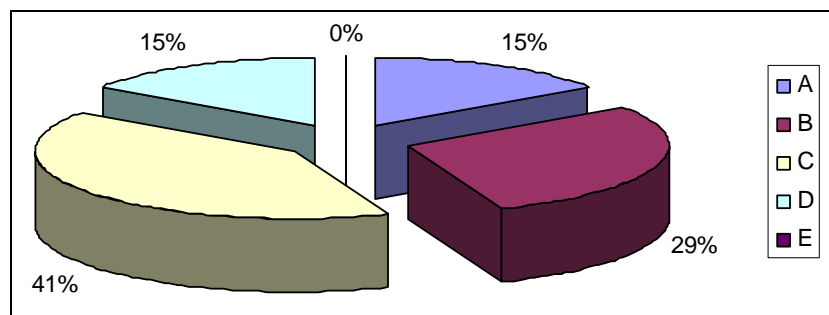*Fig. 1. Responses to the second item of questionnaire – experimental group*

Fig. 2. *Responses to the second item of questionnaire – control group*

$t_1 = 3442$

$u_1 = 958$

$|u_0| = 2,94$

$$u_{CR}\left(\frac{\alpha}{2}\right) = u_{CR}\left(\frac{0,05}{2}\right) = 1,96$$

$u_0 > u_{CR}(0,025)$, then null hypothesis can be refused.

Final result of testing: *H2* is true. The students from the experimental group preferred the positive evaluation of the way of teaching Combinatorics in comparison with the students from the control group.

- **Verification of *H3***

The students from the experimental group will like Combinatorics more than the students from the control group.

The third item of this   questionnaire deals with students' opinion and attitude to popularity of Combinatorics:

Fill the sentence with possibility a) – e).

Combinatorics is ………. topic for you

a) very popular

b) popular

c) sometime popular

d) unpopular

e) very unpopular

RESPONSES TO THE THIRD ITEM OF QUESTIONNAIRE   Table 2

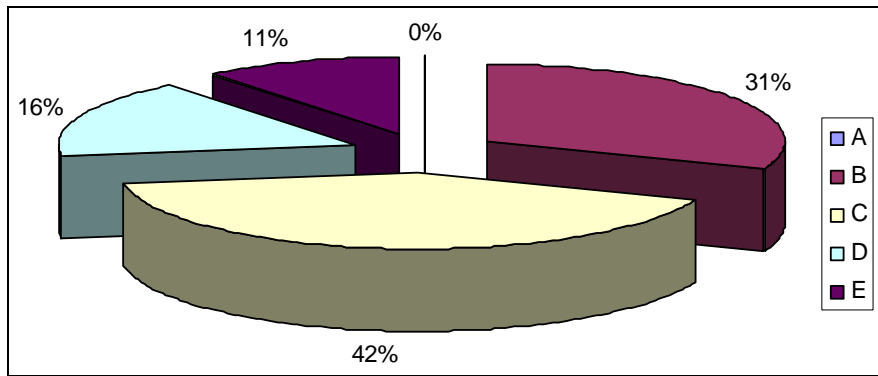| Response	Experimental group		Control group	
	Number of responses	Number (%)	Number of responses	Number (%)
A	0	0	0	0
B	17	30,91	12	23,08
C	23	41,82	17	32,69
D	9	16,36	16	30,77
E	6	10,91	7	13,46
$\sum$	55	100	52	100

3

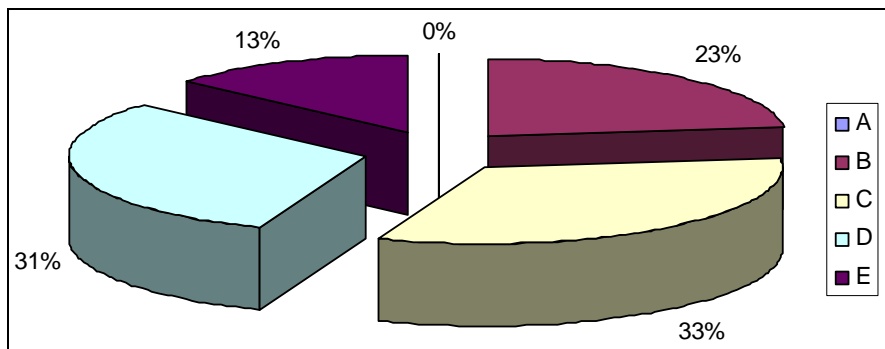***Fig. 3.*** *Responses to the third item of questionnaire – experimental group*

Fig. 4. *Responses to the third item of questionnaire – control group*

$$t_1 = 3202,5$$

$$u_1 = 1197,5$$

$$|u_0| = 1,45$$

$$u_{CR}\left(\frac{\alpha}{2}\right) = u_{CR}\left(\frac{0,05}{2}\right) = 1,96$$

$u_0 < u_{CR}(0,025)$, then alternative hypothesis can be refused.

Final result of testing: *H3* isn't true. The students from the experimental group didn't like Combinatorics more than the students from the control group.

- **Verification of *H4***

The students from the experimental group will consider Combinatorics less difficult than the students from the control group.

The fourth item of this questionnaire deals with students' opinion and attitude to difficulty of Combinatorics:

Fill the sentence with possibility a) – e).

Combinatorics is ………. topic for you

a) very difficult

b) difficult

c) average difficulty

d) easy

e) very easy

4

RESPONSES TO THE FOURTH ITEM OF QUESTIONNAIRE   Table 3

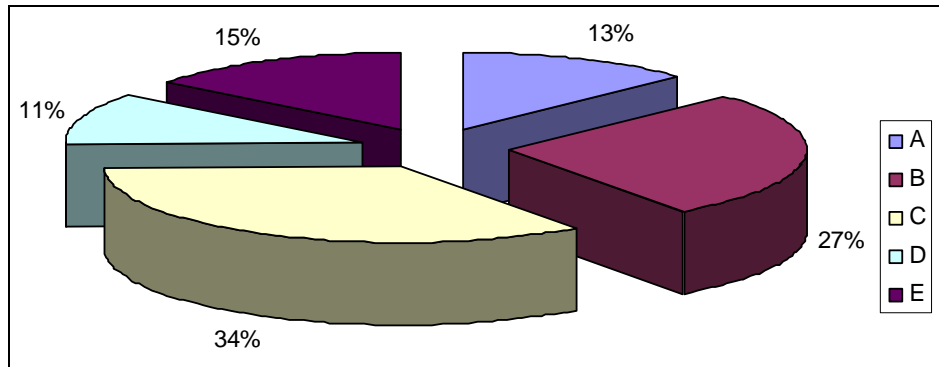| Response	Experimental group		Control group	
	Number of responses	Number (%)	Number of responses	Number (%)
A	7	12,73	9	17,31
B	15	27,27	16	30,77
C	19	34,55	14	26,92
D	6	10,91	8	15,38
E	8	14,55	5	9,62
$\sum$	55	100,01	52	100

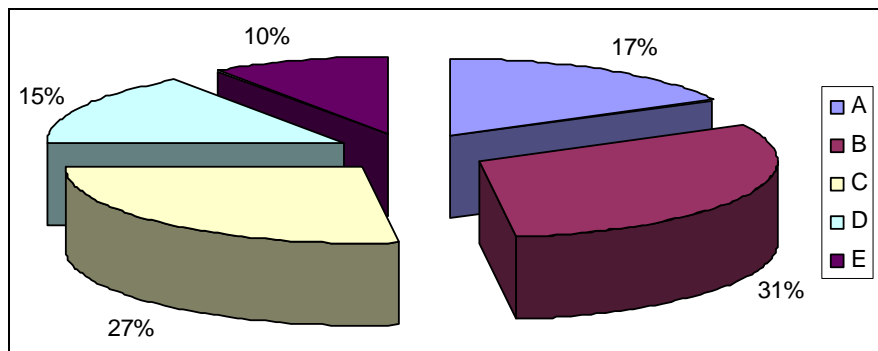**Fig. 5.** *Responses to the fourth item of questionnaire – experimental group*

Fig. 6. *Responses to the fourth item of questionnaire – control group*

$t_1 = 2851,5$

$u_1 = 1548,5$

$|u_0| = 0,74$

$$u_{CR}\left(\frac{\alpha}{2}\right) = u_{CR}\left(\frac{0,05}{2}\right) = 1,96$$

$u_0 < u_{CR}(0,025)$, then alternative hypothesis can be refused.

Final result of testing: *H4* isn't true. The students from the experimental group didn't consider Combinatorics less difficult than the students from the control group.

Conclusion

The results from the questionnaire examining the influence of the implemented teaching model for Discrete mathematics on students' opinion and attitude showed that a positive evaluation of the way of teaching Combinatorics was prefered by the experimental group. Students from the experimental group didn't consider Combinatorics less difficult and they didn't like it more than the students of the control group. The questionnaire is a part of author's dissertation thesis. Its goal is to point out the necessity of integrating a Discrete mathematics in education of mathematics.

References:

[1]   HAMPLOVÁ, L. Teaching model verification of discrete mathematics at grammar schools. In *TVV 2009, Monograph of international conference*. Olomouc: PdF UP, 2009, s. 432 – 435. ISBN 978-80-7220-316-1.

[2]   CHRÁSKA, M. *The methods of pedagogical research*. Praha: Grada, 2007, 272 s. ISBN 978-80-247-1369-4.

[3]   KOTIANOVÁ, J. *The effectiveness of mathematics education at the Faculty of Material Science and Technology via controled independent students´ selfstudy: dissertation thesis.* Trnava, MTF STU, 2006.