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THE DISLIKE BETWEEN COLLEAGUES IN THE STUDENT GROUP CAN BE AN ADDITIONAL MOTIVE FOR LEARNING

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Abstract. The formation of motivation for learning is a complex process, which also depends on external influences, often remaining unconscious to the learner. A study was conducted to reveal causes for significant differences in the learning achievements between the small administratively formed student groups. The study identifies the emotional leaders, and the working hypothesis was that they influence the learning motivation of others – the group learns and has a high average grade if emotional leaders are studious students. And vice versa, if they are weak students the whole group lowers their grades. Material and methods. The advancement in physics of 18 administratively formed groups studying veterinary medicine at Trakia University, Stara Zagora, Bulgaria, was traced objectively by computer tests. The leading criterion in the formation of the groups is which foreign language was studied in high school, i.e. the criterion does not sort students into groups by his/her pre-training or intelligence. Results: The study used a survey, a modification of Moreno's survey, in which students from each group were arranged in subgroups according to the emotional rank set by their colleagues. Students with a rank above 2/3 of the maximum were marked as "leaders". Those with a rank below 1/3 as "anti-leaders", and the rest – as "neutral". The results from the study study showed that the initial hypothesis was not confirmed – with the highest correlation coefficient with the average grade of the groups was the average grade of the subgroup of anti-leaders, if they are studious students. I.e. the main external motive for learning in the studied case was not the example of the leaders, but striving not to lag behind colleagues to whom you feel negative feelings – from dislike to hatred.

Keywords: dislike between colleagues; motivation for learning; objective grade; computer tests; leaders

1. Introduction

The effectiveness of the educational processdepends on the motivation of the learners. Forming his/her motivation for learning, the learner is also influenced by unconscious external influences, such as socio-psychological factors. At Trakia University, Stara Zagora, Bulgaria, many specialties study physics. For the practical

classes the students are administratively divided into groups. The only criterion in the formation of the groups is the studied foreign language at the previous level of education - high school.

During the semester, students studying physics are tested 10 times with a computer test. The computer test puts the grades automatically, without the participation of a man-assessor. If students are randomly assigned by intellectual qualities, motivation and learning habits, there should be no statistically significant differences in the average grades of the groups, but in practice there are statistically significant differences in the average grades between the groups.

2. Objective

The paper presents the results of a study aimed at revealing the socio-psychological prerequisites for the differences in the average group grade in physics of first-year students.

3. Material and methods

The results are obtained after processing data from a real learning process for the subject of physics. Students from one specialty with a large number of freshmen – Veterinary Medicine, were selected for the study. In order to achieve the highest possible statistical reliability of the research results, a specialty (Veterinary Medicine) was chosen with a large number of first-year students (traditionally 160 Bulgarian students and additionally foreigners), distributed in 18 administrative groups with the number of 9 – 12 people in each group.

The differences in the average group grade may be due to the uneven distribution in the groups of the more motivated students for learning, with greater intellectual abilities. To test this hypothesis, the competition score through which the students were admitted to the university was used as a measure of the initial motivation and learning habits, preparation, and intellectual abilities (hereinafter referred to as intellectual potential) of the students.. The competition score is the sum of grades from the high school diploma and the grade from the admission exam, i.e. reflects the intellectual potential of the student, formed before the existence of the students'group. In case the difference in the performance of the groups in the learning process is due to the uneven distribution of the intellectual potential between the groups, this dependence would be reflected in the dependence between the average group grades and the average group scores. The mean group scores were calculated and the correlation coefficient of the mean group scores with the mean group grades was calculated. The results rejected this possible reason for the differences in the grades of the groups. It was concluded that the main impact was of a socio-psychological nature.

The subject "physics" is mandatory, i.e. studied by all students and is studied in the second semester, when the administratively formed groups have had enough time (one semester and one session – about 6 months) for their formation as groups

in the socio-psychological sense. For them the socio-psychological influences on the effectiveness of training are possible.

The study aimed to identify emotional leaders in groups, and the initial hypothesis was that they influence the motivation of others by their positive influence – the group learns and has a high group grade if emotional leaders are studious students and vice versa if they are weak students the whole group decreases its grade.

To clarify the influencing factors that determine the mentioned differences in the average group grades, the same experiment was conducted for all groups, combining a voluntary survey and assessment of knowledge through computer tests. The survey aimed to assess the alleged socio-psychological factors influencing the group's success. It was conducted separately for each of the groups in the introductory lesson (the first one). Students were asked for assistance by participating in the survey. It was explained to them that the results of the survey would not concern them personally, the group, and their course, but would serve as conclusions about the factors influencing their success. Those students, who were interested in their individual results from the study, could learn them at the end of the experiment. The confidentiality of the answers was guaranteed. A small number of students refused to participate in the survey.

The survey used in the experiment was a modification of the survey proposed by Moreno (Moreno 1960; Bogoslovsky 1981; Dzhonev 1996), who, through a question such as: "Whom would you like to spend your free time with (name the first three of the team)?", determines the emotional leaders in teams with emotionally based conflicts.

4. Results

In the survey took part 156 people, almost 90% of the freshmen majoring in Veterinary Medicine. In each of the groups, there were a sufficient number of respondents (average 8.6) to adequately outline the picture of emotional relationships in the small group.

The survey aimed not only to reveal the emotional leaders but also to make a complete ranking of the group members by emotional status, which each member of the group determines for each of its other members. A favorable circumstance for such an arrangement was the relatively small number of members in the group. In such a group, everyone knows the others well enough and has formed an emotional attitude towards others, ranging from sympathy through emotional indifference to antipathy.

The survey in the experiment contained the following text:

"Please sort the group by member number, without including yourself, answering the question:

Which (one) of the members of the group would you invite to a pleasant activity – cinema, walk, etc., excluding sexual attraction? (In the first position, indicate the number of the first preferred, if he/she is occupied, in the second position – the number of the second, etc. until the whole group is exhausted)".

A numbered list of the group (with numbers from 1 to the number of members in the group) was written in advance on the blackboard. The students were placed in the hall so that they could not see the answers of the others.

The processing of the survey data is illustrated by the example given in table 1.

Table 1. Example of processing the questionnaires from the experiment

Weighting factor:	8	7	6	5	4	3	2	1
Position in the questionnaire:	1	2	3	4	5	6	7	8
Completed questionnaire:	**5**	**4**	**1**	**7**	**9**	**3**	**6**	**8**

The student under number 2 in a group of 9 members fills in the questionnaire by arranging the numbers of the members in the group list (without himself) according to his preferences (row "Completed questionnaire" in table 1). In the first position puts the most preferred (5th number), in the second position – the second preferred (number 4), etc., to the last (number 8). Each of the positions was assigned a weighting factor according to the rule – the highest coefficient (the number of students in the group without one – who completes the survey) is for the first position in the survey, and for each subsequent position – one less. The coefficient for the last position is 1.

From the questionnaires for the group a matrix was filled with the number of rows, coinciding with the number of members of the group and with the number of columns corresponding to the number of positions (by 1 less than the number of members of the group, table 2). The answers of each member of the group form the corresponding row of the matrix (upper half of table 2).

Table 2. Example of processing the questionnaires of a real group

	Position in the questionnaire								
Group number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1	6	2	7	9	4	5	8	3	
2	5	4	1	7	9	3	6	8	
3	2	1	7	5	6	4	8	9	
4	9	8	2	5	6	1	7	3	
5	9	8	2	1	4	7	6	3	
6	1	2	8	9	5	7	4	3	
7	2	9	8	4	5	1	6	3	
8	9	5	7	6	1	2	4	3	
9	8	5	2	7	1	6	4	3	

Group number	Weighting factor								Sum
	8	7	6	5	4	3	2	1	
1	1	1	1	1	2	2	0	0	**40**
2	2	2	3	0	0	1	0	0	**51**
3	0	0	0	0	0	1	0	8	**11**
4	0	1	0	1	2	1	3	0	**29**
5	1	2	0	2	2	2	0	0	**46**
6	1	0	0	1	2	1	3	0	**30**
7	0	0	3	2	0	2	1	0	**36**
8	1	2	2	0	0	0	2	1	**39**
9	3	1	0	2	1	0	0	1	46

The bottom half of table 2 shows how many times the number of a certain member in the group is chosen for each position (column). The number of choices for a given position is multiplied by its weighting factor (the title row of the bottom part of table 2). The products are summed. The amount obtained in the described way characterizes the emotional status in the group of each of its members. For example, the member with administrative number 2 for the group in the example (table 2) is placed two times in 1st and 2nd position with weighting factors 8 and 7, three times in 3rd (weighting factor 6), and one time in 6th (by a factor of 3). His emotional status is:

$$2 \times 8 + 2 \times 7 + 3 \times 6 + 1 \times 3 = 51.$$

The closer to the first position the given member of the group, the higher the numerical value corresponding to his/her emotional status.

4.1. Adjustments to the data

The member of the group who have been absent during the survey was chosen one time more than those who have filled out the survey. In such cases, an adjustment was made by deducting from the total sum received by the absent member the average weighting factor for the group. For example, a group with 10 members has 9 positions on the questionnaire, the average weighting factor is 5, and from the sum for the absent member 5 points are deducted.

Numerical values of emotional status depend on the number of respondents in the group and vary significantly from group to group. To be comparable for all groups, emotional status was normalized, i.e. the emotional status of each member of the group was replaced by its relative difference. It was calculated as a ratio, the numerator of which is the difference between the emotional status of each member of the group and the group's minimum status, and the

denominator is the difference between the maximum and minimum emotional status in the group. This ratio was normalized to 100, i.e. the maximum value of the normalized emotional status is 100, and the minimum 0 for each of the surveyed groups.

4.2. Division into subgroups

After the adjustments, the groups were ranked in descending order of the normalized emotional status of their members. The dependence of the size of the normalized emotional status on the position in the resulting arrangement varies in a complex way from group to group (figure 1).

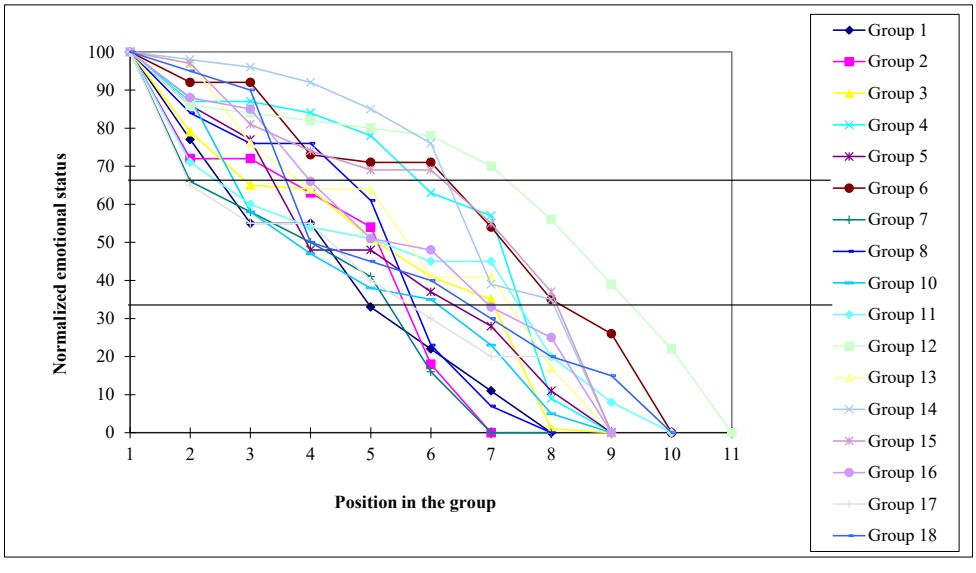

Figure 1. Normalized emotional status of the participants in the survey. Individual emotional status is indicated by a dot. Members of the same group are connected by a line. With horizontal lines (at 33 and 67), the groups are divided into "leaders", "neutrals" and "anti-leaders"

For each of the groups, 3 subgroups were determined depending on the values of the normalized emotional status. The first subgroup included the members of the group with normalized emotional status greater than 67, the second – those with values of normalized emotional status is greater than 33 but not greater than 67 and the third – with normalized emotional status not greater than 33. The members of the first subgroup were called "emotional leaders", those of the second – "emotionally neutral", and the third – "emotional anti-leaders".

The results are summarized in Table 3.

Table 3. Results of the experiment to determine the factors influencing the success of the group. (For two of the groups, there is no data on the grade of anti-leaders, as they took their exam previous year.)

	Number of surveyed students	Average group competition score	Average group grade	Number of leaders	Number of neutrals	Number of anti-leaders	Average grade of the subgroup of leaders	Average grade of the subgroup of neutrals	Average grade of the subgroup of anti-leaders
Group 1	11	28.54	4.36	5	4	2	4.28	4.82	3.64
Group 2	10	26.79	4.44	6	2	2	4.79	3.75	4.09
Group 3	9	27.84	3.68	6	1	2	3.71	4.83	3.00
Group 4	11	26.30	3.89	5	3	3	4.19	4.30	2.97
Group 5	7	25.89	3.73	3	1	3	3.70	4.44	3.52
Group 6	5	26.81	3.92	3	2	0	4.13	3.60	-
Group 7	6	25.93	4.03	3	2	1	3.72	4.45	4.11
Group 8	9	25.89	4.31	2	6	1	4.78	4.26	3.67
Group 9	8	25.76	4.33	3	3	2	4.56	4.17	4.25
Group 10	11	27.26	3.87	4	4	3	4.13	4.11	3.22
Group 11	10	25.80	4.32	4	3	3	4.41	4.28	4.26
Group 12	6	25.73	3.72	2	3	1	3.00	4.43	3.00
Group 13	8	24.22	4.12	4	3	1	3.98	4.59	3.25
Group 14	9	25.93	4.98	2	3	4	5.30	5.26	4.60
Group 15	10	25.61	3.90	4	1	5	4.19	4.40	3.56
Group 16	8	26.51	4.52	6	2	0	4.46	4.70	-
Group 17	9	25.70	3.43	4	3	2	3.82	3.38	2.72
Group 18	9	26.13	4.92	6	2	1	4.95	4.83	5.00
Average:	8.6	26.26	4.14	3.79	2.53	1.89	4.23	4.37	3.68
Sum:	156			72	48	36			

4.3. Adjustments in statistical distributions

For the subgroups of each group, the average computer grades from the tests were calculated. The density of the statistical distribution of the scores for both the individual subgroups and the groups as a whole was obtained and studied. Distributions close to normal but with some asymmetry were obtained. To bring to a normal distribution, a necessary condition for calculating the correlation

coefficients, the estimates from each of the subgroups and the average group grades were transformed by multiplication with an appropriate transformation function.

4.4. Correlations

As socio-psychological factors influencing the success of the group were suggested:

– the success of the subgroup of leaders,

– the success of the subgroup of neutrals,

– the success of the anti-leader subgroup.

The average computer grade at the end of the semester of each of these subgroups was used as a characteristic of success. A positive relationship between the personal qualities of the emotional leaders in the group and the average group success was assumed. I.e. preliminary expectations were that more studious leaders would increase the group's success and vice versa – the average group grades of groups with less studious leaders would be more modest. I.e. expectations were that the strongest relationship was between the success of the group and the subgroup of leaders.

The correlation coefficients between the average group computer grades and that of each of the subgroups were calculated, as well as between the average group computer grade and the average competition score of each of the groups.

In the questionnaires ware found some characteristic features:

– In their survey, all absolute leaders had indicated in second place the second leading position in the group;

– In some of the groups, the formation of anti-leader pairs is noticed, as each of the anti-leader pairs in the pair chooses in the first position his partner in the pair.

The division of the groups into subgroups according to normalized emotional status is shown in figure 1.

The average grade of each of the studied subgroups varied in the range of 3.68 – 4.35:

– the subgroup of leaders had an average success of 4.25;

– the subgroup of neutrals had an average success of 4.35;

– the subgroup of anti-leaders had an average success of 3.68.

The data show that in the emotional assessment of a group member's attractiveness, the average student invests as a component and his success – for example, leaders are better students than anti-leaders, but this characteristic is not the main in the group's emotional assessment of personality. The majority of students with high success are in the subgroup of neutrals – relatively back in the emotional arrangement of the group.

The average group grades and the grades for the subgroups of leaders, neutrals, and anti-leaders were transformed (with appropriate formulas) so that their statistical distributions were as close as possible to normal, using the formulas:

– for the average group grades: $(1/\ln(\text{grade}-1))^{1.5}$;
– for the grades from the subgroup of the leaders: $(1/\ln(\text{grade}-1))^{1.5}$;
– for the grades from the subgroup of the neutrals: $1/\ln(\text{grade}+2)$;
– for the grades from the subgroup of anti-leaders: $1/\ln(\text{grade}-0.5)$.

The correlation coefficients below are calculated for the transformed data sets. The comparison of the average group competition score with the average group grade from the computer test showed the inconsistency of the hypothesis that the differences in the mean group scores may be a consequence of the random selection of students with similar personal learning abilities. The correlation between the group's average competition score and its average computer grade turned out to be zero (0.00075), i.e. the success of the group does not depend on the abilities acquired by the members of the group before its formation. Although the correlation between the average competition score and the computer grade is zero, there is a small (0.31) but statistically significant positive correlation between the individual competition score and the average computer score of each surveyed student.

Of the remaining factors considered, the dependence of group success on the success of the subgroup of neutrals (correlation coefficient 0.507) proved to be the weakest. The correlation between the success of the leaders and the average group success is 0.760. The dependence of the average group grade on the anti-leader grades proved to be the strongest (correlation 0.886). For a significance level $\alpha = 0.05$ and a degree of freedom $k = 16$, $t_{\alpha k} = 2.12$ (Ivanova 1981). It turned out that only the correlation coefficients for average group grades with grades for anti-leaders and leaders are significant. The correlation coefficient for neutrals is insignificant.

5. Discussion

The presented results show that the strongest socio-psychological factor influencing the success of the group is the success of the anti-leaders. In other words, the average student is influenced not so much by the positive or negative examples of leaders, but by the success of anti-leaders. For him/her it is not so important to be like leaders, then not to lag behind anti-leaders. Stimulating (ambitious, provocative competitive spirit) is rather the high success of the anti-leaders. When the anti-leaders are studious students, the whole group has a high success, i.e. the main socio-psychological motive for learning in the small group is the desire not to lag behind those who are unpleasant to you to some extent. Weak anti-leaders are irrelevant as an incentive to learn and they reduce the group's success purely arithmetically, not as a negative role model.

The teacher can increase the success of the group not only by active individual work with each of its members but also by stimulating competition in the study group by paying noticeably more attention to the anti-leaders with low success.

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