

Experiment is the Central Part of the Topic and Realized by IBSE Method

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Abstract - This paper presents a pedagogical experiment which was conducted in three departments socio-linguistic direction in which experiment is the central part of the topic and realized by IBSE (Inquiry-Based Science Education) method. The first section is done was working by IBSE method, the second instruction was supported with demonstration experiment and multimedia contents, while in the third teaching was organized by a classic method. The research results are expected and the first department showed a statistically significant increase in the quantum of knowledge.

Keywords – IBSE method, Pedagogical experiment

1. Introduction

For teaching science was created IBSE (Inquiry-Based Science Education) method, is a method where students who are involved in it do not know the answer to a question or problem that has been studied [1]. It means that students progressively develop the key scientific ideas through learning how to explore and develop their knowledge and understanding of the world around them. At the same time then use the skills used by scientists and scientific method [2], ask questions, collect data, reason and question the data obtained in accord with what is already known, draw conclusions and discuss the results.

Implementation of IBSE methods in teaching physics in terms of real class-system of teaching in the school caused the authors to design a class that primarily needs to be well organized in time. This includes all required structural and methodological parts at the lesson: repetition, introduction, and the final part of the class, with outstanding goals, objectives, methods and modalities [3]. The idea of introducing IBSE methods in the classroom as an effective learning methods in physics, with emphasis on time experiment which is a central part of the content-themes include the following: first, the organization of the lesson focused on the experiment, the second the active participation of students in it, and third, the motivation of students with modern teaching aids, so that the results of the measurements and data processing can be seen instantly and discussed in class, and finally go back to, discuss and ask; Fourth, determine the knowledge through homework; Fifth,

the selection of a representative experiment for the topic sixth, identifying - evaluating whether the lesson is through! So that's the plan, which is now called the teaching scenario, and before preparing for a lesson class. The main disadvantage of scenario is that it is intended for processing new materials class so that all students can not participate in the experiment due to limited time, the number of equipment or space. The advantage is that, during the next class, other students will perform the experiment.

2. Pedagogical experiment

The introduction of IBSE method has been justified by pedagogical experiment with has been determined with parallel groups. The sample consisted of three classes with a total of 90 students from the third grade social-linguistic direction of the grammar school. Checking of the consistency group has been based on grade point average overall and achievement in physics. The control group (C) was first class. Topic Mathematical pendulum is treated classically, in our schools-the most widespread method of transmission, where the teacher talk and the students listen to the story (the transmission and reception of knowledge) and teaching tools are blackboard and chalk. [5] In the experimental group 1 (E1), the second section, the experimental factor was teaching at IBSE method implemented in the scenario. In the experimental group 2 (E2), the third section, experimental factor is teaching supported with demonstration and multimedia experiment [6-9]. At the end of the study final measurement of students in all three groups is done. Measuring instrument was a test.

The aim of this study was to determine whether the Inquirer teaching method increases the quantum of students' knowledge, on which the tasks are defined, was formulated zero (IBSE method does not affect the quantum of student learning groups are equal) and alternative (IBSE method increases the quantum of knowledge students - There are no statistically significant differences between groups) hypothesis; and then it was tested. For processing the results of research descriptive statistics and its parameters. To determine the statistical significance

of the test results between groups analysis of variance (ANOVA) was used; a as group and Tukey as individual test [10].

3. Results and Discussion

Descriptive statistics of the final test showed that the quantum of knowledge E1 was the largest, followed by E2 and C group. The values of the descriptive statistical parameters that indicate this fact are given in Table 1:

Group	AS	SD	SE	CV	Min	Max
Control	17.35	3.15	0.7823	18.16	12.00	26.00
E 1	24.75	2.68	0.6773	10.83	19.00	30.00
E 2	22.15	2.88	0.6686	13.00	17.00	28.00

A - mean, SD - standard deviation, SE - standard error of the mean, CV - coefficient of variation and (min, max) - interval of variation

Table 1. Descriptive statistical parameters of the final test

Analysis of the descriptive statistical parameters for the final test showed that the value of the points E1 was the largest, 24.75 points with a standard deviation of 2.68. The minimum number of points in group C: 17.35 ± 3.15 . The coefficient of variation was 18.16%, which is the highest value of this parameter and it is a consequence of the large interval of variation (14 points). Coefficients of variation of E1 and E2 amounted to 10.83% and 13.00%, and they are the lowest compared to all tested parameters, the data were homogeneous, and the intervals of variation in both groups totaled 11 points.

Based on the results of the final test, we can say that a high quantum of knowledge was in E1 and E2 in comparison to the C group of students. E1 (82.50%) and E2 (73.83%), there is the difference between in the quantum of knowledge. Higher quantum of knowledge E1 compared to E2 can be explained by the fact that it IBSE method was introduced.

Graphic knowledge in the% on the final test is shown in Figure 1:

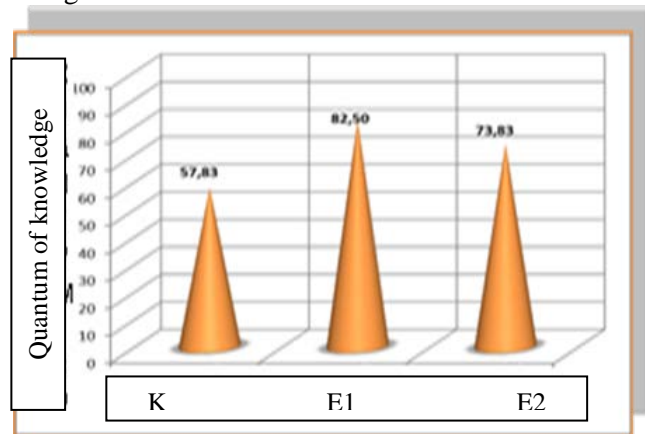


Figure 1. Quantum of knowledge of the students AS% of final test

The differences in the groups final test is given in Table 2:

Group	AS	E1	E 2	Control
E 1	17.35	/	1.60	6.55 *
E 2	24.75	/	/	5.30 *
Control	22,15	/	/	/

* P <0:01 - coefficient significance

Table 2. The differences

The significance of differences between the groups were determined by completely random plan. The calculated F value (23.42) implies the existence of a significant difference ($p \leq 0.01$) between the groups. The significance of differences between experimental groups was determined individually by Tukey test. This test found highly significant difference ($p \leq 0.01$) between K and E1 (6.55), and K and E2 groups (5,30). The assumption of equality of E1, E2 and K groups of students can not be accepted, which means that the work of the Inquirer method has an impact on the learning process of teaching contents and quantum of knowledge. Among the other groups in the experiment there was no significant differences ($p \geq 0.05$).

4. Conclusion

We can conclude from the analysis of the research results that the alternative hypothesis, IBSE method increases the quantum of the students knowledge there were statistically confirmed significant differences between the groups; it is confirmed that the application of IBSE method and even when the experiment was a central part of the topic - of the content, the quantum increases of the students' knowledge as such a method is effective, and we recommend to the teachers!

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