

EFFECTIVENESS OF TEACHING CHEMISTRY IN VARIED CLASSES IN UZBEKISTAN

Temirov Farrux

Independent Student of Bukhara State University

Abstract:

Modern educational methodology requires new approaches to develop students' knowledge and skills in a changing world. This article presents an experimental test on the teaching of chemistry in the 27th school of Bukhara. The experiment was conducted among students of the 10th and 11th grades based on two groups - experimental and control groups. The experimental group received training based on new teaching methods, and the control group received training based on traditional methods. The results of this experiment showed that new teaching methods are more effective than traditional methods in increasing students' knowledge level, motivation and interest in chemistry. The article emphasizes the importance of varied teaching methods in improving the quality of education and provides important directions for future educational strategies.

Keywords: variable classes, teaching chemistry, educational methodology, experimental test, Bukhara city, students' motivation, teaching methods, quality of education, modern approaches.

Introduction

Chemistry is one of the subjects that plays an important role in the educational process. This science allows students to gain in-depth knowledge about chemical processes in nature, the structure and properties of substances and their interactions. Modern educational methodology requires the use of new approaches to improving students' knowledge. For this purpose, a pilot test was conducted in the 27th school in the city of Bukhara on the in-depth teaching of chemistry in variable classes. This article is devoted to the methodology, results and analysis of this pilot test. In pedagogical experiments, statistical tests, including t-tests and Chi-square tests, are of primary importance in analyzing mean scores and relationships between variables. T-tests are often used in educational research to compare means between two groups. This statistical method helps to determine the effectiveness of the educational quality of the pedagogical group. For example, Sivrikova et al. (2022) found that T-Test and Chi-Square Tests are among the most frequently used statistical methods in research aimed at developing conflict competence in future teachers (Sivrikova et al., 2022). Chi-square tests are essential for understanding the independence, homogeneity of variance, and fit between observed and expected frequencies in pedagogical data. For example, Franke, Ho, and Christie (2012) emphasized the importance of correct interpretation of chi-square tests, emphasizing that they are important in providing statistical support for research findings (Franke, Ho, & Christie,



2012). A study by Opfer and Pedder (2011) found that teaching experiences affect changes in teacher knowledge and classroom practice, as well as system interactions such as teacher, school, and teaching activities. emphasizes the importance of understanding. This study suggests that a focus on methodological practices is needed to understand the interactions of all three systems.

By the order of the Minister of Public Education of the Republic of Uzbekistan No. 188 of June 22, 2021, the directions of variable curricula will increase from the new academic year.

In the 2019-2020 academic year:

- 1 in 7-8-9 grades;
- There were 12 variant study plans in 10-11 grades.

From the 2021-2022 academic year:

- in 7-8-9 grades - in 14 directions;
- In the 10th-11th grades - variable curricula are introduced in 15 areas.

According to the curriculum, chemistry is taught 2 hours a week for grades 7-11 at the school. Based on the variant curriculum, chemistry is taught for 6 hours in grades 10-11, according to the variant curriculum in the direction of chemistry and technology. , "Mathematics" is taught for 2 hours. Therefore, in the 10th-11th grades, 1 hour of the 2 hours allocated to the subject of "Mathematics" is taught "Algebra" and 1 hour of "Geometry". In the 10th-11th grades, 4 hours of "Biology" and 4 hours of "Chemistry" are taught.

Our research aims to determine the effectiveness of teaching chemistry in varied classrooms. it also focuses on the use of a variety of additional methodologies, not just based on variational teaching.

Methodology:

The experiment was conducted among 10th and 11th-grade students. The students were divided into two groups: the experimental group and the control group. Class 10-A (27 students) and class 11-A (30 students) were selected as an experimental group, their lessons were conducted based on new methods. On the other hand, class 10-B (22 students) and class 11-B (19 students) were designated as the control group, which were taught using traditional methods. During the experiment, students' level of knowledge, interests and motivation were observed. Pedagogical experience test results can be calculated in different ways based on world standards, these methods depend on the goals, design and methodology of the research. Below are some of the common methods we have selected for the experiment, statistical tests like t-test, and chi-square test were used to determine the differences between the experimental and control groups.

Results:

The students of the experimental group showed that they learned more than the traditional methods. They have developed an interest in chemistry and a desire to learn new topics. Compared to the students of the control group, the students of the experimental group recorded higher scores in the test results. In addition, students of the experimental group participated more actively in classes and showed a general interest in chemistry.

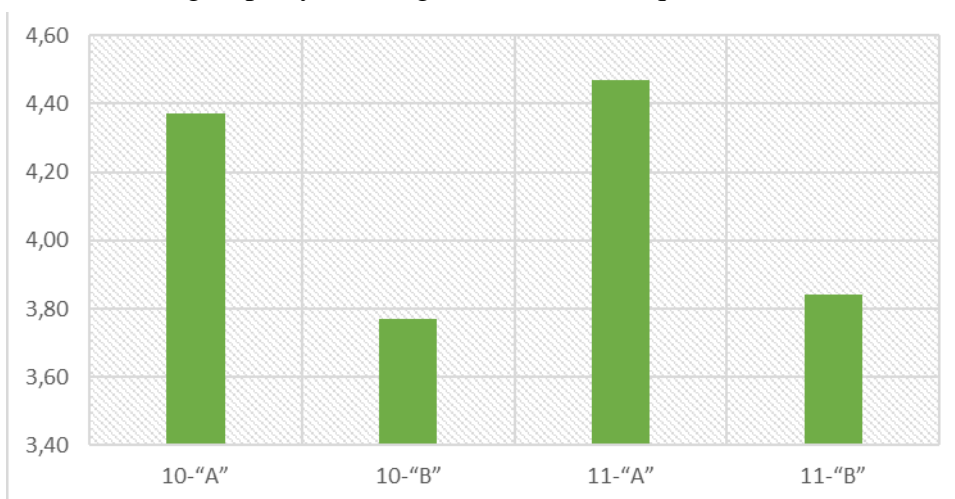


To calculate the mean for each group, add all the grade values in that group and then divide by the number of grades.

Table 1: mean values of experimental and control groups

Group	10-"A"	10-"B"	11-"A"	11-"B"
Group type	Experience	Control	Experience	Control
Total number of students	27	22	30	19
Average grades	4.37	3.77	4.47	3.84

The formula used to calculate the t-test is as follows. This formula calculates the difference between the means of two groups by dividing the sum of the squares of their standard errors



by the square root:

Here:

average values of two groups; x_1 and x_2

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

sample variances of two groups (square of standard deviation); S_1^2 and S_2^2

n_1 and n_2 are the number of observations in each group.

This formula is used to estimate the significance of the difference between the mean values of two independent samples. If the p-value is less than the specified level of significance (often taken as 0.05), it indicates that there is a statistically significant difference between the mean values of the two groups.

The results of the t-test on the grade differences of the experimental and control groups for the 10th grade are as follows:

Statistical value: 3.36

P-value: 0.0016

The results of the t-test on the grade differences of the experimental and control groups for the 11th grade are as follows:

Statistical value: 3.20

P-value: 0.0029

Since the P-value is less than 0.05, the difference in scores between the experimental and control groups for both classes is considered statistically significant. This indicates that the differences in the scores of the experimental and control groups are not considered to be due to chance and that there is a clear difference between them.

Grade category	10 "A" experiments	10 "B" control	11 "A" experiment	11 "B" control
Excellent (5)	12	2	16	3
good (4)	13	13	12	10

The following formula is used to calculate the chi-square test:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

X²- Chi-square statistic,

O-observed frequency (numbers in the table),

E-expected frequency (the average number that would fit into each category if there were no differences).

The results of the chi-square test show that:

Chi-square statistic:

10.01

P-value:

0.0185

The students of the control group also showed some improvement in their knowledge, but their results were lower than the results of the students of the experimental group. This proves the effectiveness of new teaching methods and shows the need for further improvement of teaching methodology.

Summary:

The experimental test conducted in the 27th school of Bukhara showed the effectiveness of teaching chemistry in variable classes compared to traditional methods. The students of the experimental group recorded higher results than the students of the control group, which confirmed that the new methods helped to increase the student's learning and interest in science. At the same time, continuous research is needed to further develop the teaching methodology and improve the quality of education. This experience once again emphasizes the importance of using innovative approaches in the educational process. Thus, it is shown that the new teaching methodology used in the varied classes had a positive effect on the student's grades in

chemistry and was an important factor in improving the quality of teaching. This gives reason to think that the methodology can be applied to other subjects and classes.

References:

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