Effectiveness of experimental work aimed at forming general labor skills in students based on gender equality and differences

Yusufzoda Yunus[1], *Mardon* Yarashov[1], and *O'g'iljon* Olloqova[1*]

[1] Bukhara State University, 200100 Bukhara City, Uzbekistan

Abstract. Student and Pearson methods, which perform statistical analysis that allows for the identification of indicators and objective evaluation. Today their spiritual potential is expanding. In the article, we introduce the research hypotheses of the second, third and final stages of the control and experimental class participants with the indicators of the first stage, using the χ^2 Pearson test, which is often used in statistics research. Thus, at the end of the experimental work, it was proved that the knowledge indicators of the respondent increased by 12.6% on average.

1 Introduction

Most advanced pedagogues of all times and nations have noted the importance of observing students and conducting purposeful experiments with them.

It is of great importance to train students of primary school age on the basis of gender equality and differences in the process of labor education. In the process of processing materials, we tried to monitor the changes in the activities of boys and girls, to observe their actions in working with various tools and in working situations, to control the implementation of labor operations in an appropriate manner. By observing the work of himself and his peers, the student tried to compare the design solutions, the finished product and the skills of finishing their details.

We tried not to leave out such indicators as processing and auxiliary operations, simplicity, convenience and ease of work methods, amount of time spent on work from the point of view of students. All this required students to think collectively and helped to accelerate their intellectual development [1].

Experiments carried out by elementary school students in labor lessons became the basis for the simultaneous movement of all analyzers in them, in particular, the movement apparatus of each student. This is the nature and quality of various materials (soft-hard; light-heavy; dense-porous; strong-thin; clear, white, colored, etc.) and also made it possible to answer questions about the resistance properties of each material in processing more clearly and more accurately [2].

Experiences gained by students during the use of various types of activities in work classes form the basis of their knowledge and skills in the field of technological operations.

* Corresponding author: o.m.olloqova@buxdu.uz

An important result of the students' activity in the labor lessons was their independent identification of new signs and characteristics of the studied objects and events, more accurate and systematized conclusions from lesson to lesson.

Attention was paid to the important result of the work done by the students, the connection with life, the practical application of the acquired knowledge and skills in the current educational work, in the preparation of various items.

Purposeful observation, experiments and the simplest laboratory works help to develop students' labor activity and encourage them to search for the best options for solving practical problems of product design, preparation and finishing. Students' learning activity in the process of educational work helps them to independently determine the conditions for successful completion of the task, to determine the cause of mistakes and to eliminate their consequences [3].

2 The main part

Students of junior school age are gradually moved from simple, short-term, sometimes momentary observations to pre-conditioned, organized and purposeful experiences. For example, the teacher can set the students the task of independently organizing and conducting a simple experiment to determine which of the yarns made of some type of fibers - plant, animal, artificial and mixed - is stronger. It is important for girls not only to think about the content and conditions of the experiment, to determine the order in which the yarns obtained are placed according to the degree of strength, but also to try to determine how important the properties of the yarns are for their use in various practical purposes [3].

Complicating observations and experiments in a certain consistency, gradually introducing the simplest laboratory work that requires different measurements into the educational process contributes to the mental development of students, the formation of polytechnic ideas about various production processes and events, labor materials and tools, product designs, adult labor, etc. will help [4].

Observations and experiments conducted to determine and compare the properties of different materials are of practical importance. Examples include paper, gauze, clay, plasticine, yarn, paper twine, and plastic film. The comparisons made in this case have an important polytechnic value and helped the students to better master the different properties and qualities of the materials.

It is desirable to repeat the same observations and experiences in different classes at different stages of labor education, in the study of different topics and sections of the program, to complicate and change the level of independence of work performance, to clarify the conclusions [4].

Demonstrations, observations and the simplest experiments often had to be carried out not separately, but along the way, during the simple educational work of students on the preparation of one or another object. It is necessary to organize children's work in such a way that they can make observations and experiments, use the skills they have acquired in this process and make sure that it helps them to achieve better results [5].

The retention of the content and results of observations and experiments in the memory of students depends on the conditions of their passage, the preparation of the work and, of course, the child's curiosity, his interest in observed events, processes and objects, and the ability to observe. When observations and experiments are carried out as a team, when students of the class and group are interested in the objects and organization of learning, their effectiveness increases.

Based on these criteria, we selected differentiated and integrated assignments and conducted observations in control and experimental classes. In control classes, classes were

organized on the basis of tasks selected within the framework of the current curriculum, and in experimental classes, work classes were organized based on differentiated tasks [6].

24 teachers and 900 primary school students took part in the final experimental work.

According to each of the above criteria, the general working skills of the students of the experimental and control groups were determined, and on the basis of these, conclusions were drawn that the proposed method is more effective than the traditional method [7].

We tried to express the results of the experiment in the following table.

In the following table, we summarize the results of the experimental work conducted on the basis of the general labor skills formed by taking into account gender equality and differences among primary school students.

Table 1. General employment skills developed in students taking into account gender equality and differences

Classes	Number of students	Number of students			
		"5"	"4"	"3"	"2"
Experience	445	127	225	73	20
Control	446	81	218	103	44

To calculate these indicators in percentages, we use the following formula. The mastery rate of each student is in percentage $K = \frac{J}{Q}100\%$ is found by the formula.

Here J-is the number of correct answers to the questions in the experiment. Q-is the total number of students.

Table 2. The number of correct answers to the questions in the experiment.

№	Classes / *Assessment*	Experience	Supervision
1.	"5"	$K_1 = \frac{127}{445}\cdot 100\% = 28,5\%$	$K_2 = \frac{81}{446}\cdot 100\% = 18,2\%$
2.	"4"	$K_1 = \frac{225}{445}\cdot 100\% = 50,6\%$	$K_2 = \frac{218}{446}\cdot 100\% = 48,8\%$
3.	"3"	$K_1 = \frac{73}{445}\cdot 100\% = 16,4\%$	$K_2 = \frac{103}{446}\cdot 100\% = 23,1\%$
4.	"2"	$K_1 = \frac{20}{445}\cdot 100\% = 4,5\%$	$K_2 = \frac{44}{446}\cdot 100\% = 9,9\%$

We will analyze the obtained data mathematically and statistically based on the Student-Fisher criterion.

If we take the results of the assessment in the experimental and control classes as selections 1 and 2, respectively, we have the following variation series [8].

Selection 1 Xi: “5” “4” “3” “2”
(experimental class) ni: 127; 225; 73; 20.
m=4452.
Selection 2 Yj “5” “4” “3” “2”
(control class) nj 81 218; 103; 44.
n=446.
Let's draw polygons corresponding to these selections:

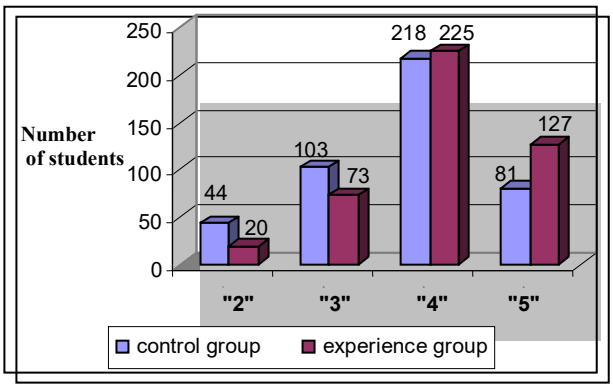


Fig. 1. Diagram of the level of development of general labor skills formed by students taking into account gender equality and differences.

From the graphs recorded in the polygon, it is understood that the sample modal values for the experimental and control classes are respectively M_T = *5 ва* $M_H = 4$, that is, the difference between them is sufficient, $M_T > M_H$ it is. These, in turn, are also the appropriate mean values for these samples $X > Y$ indicates in advance that the conditions are satisfied. Based on the results obtained in the experimental and control classes, we calculate the mathematical expectations based on the following formula:

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n=4} n_i x_i = \frac{1}{445}(127\cdot 5 + 225\cdot 4 + 73\cdot 3 + 20\cdot 2) =$$

$$= \frac{1}{445}(635 + 900 + 219 + 40) = \frac{1794}{445} = 4;$$

$$\overline{Y} = \frac{1}{n}\sum_{i=1}^{n=;4} n_i y_i = \frac{1}{446}(81\cdot 5 + 218\cdot 4 + 103\cdot 3 + 44\cdot 2) =$$

$$= \frac{1}{446}(405 + 872 + 309 + 88) = \frac{1674}{446} = 3,8.$$

Therefore, the average acquisition in the experimental class is greater than in the control class: $X > Y$.

Now we calculate the dispersion coefficients for both classes. For this purpose, we first calculate the sample variances:

$$D_m = \sum_{i=1}^{n=4} n_i (x_i - x)^2 / (n-1) = \frac{127(5-4)^2 + 225(4-4)^2 + 73(3-4)^2 + 20(2-4)^2}{444} =$$

$$= \frac{127 \cdot 1 + 225 \cdot 0 + 73 \cdot 1 + 20 \cdot 4}{444} = \frac{127 + 0 + 73 + 20}{444} = \frac{220}{444} \approx 0,5;$$

$$D_н = \sum_{i=1}^{n=4} n_i (y_i - y)^2 / (n-1) = \frac{81(5-3,8)^2 + 218(4-3,8)^2 + 103(3-3,8)^2 + 44(2-3,8)^2}{445} =$$

$$= \frac{81 \cdot 1,44 + 218 \cdot 0,04 + 73 \cdot 0,64 + 20 \cdot 3,24}{445} = \frac{116,64 + 8,72 + 46,72 + 64,8}{445} = \frac{236,88}{445} \approx 0,53.$$

From these results we find the mean squared deviations:

$$\tau_m = \sqrt{0,5} \approx 0,71 \qquad \tau_н = \sqrt{0,53} \approx 0,73$$

Based on these, we calculate the variation indicators for both classes:

$$\delta_m = \frac{\tau_m}{\overline{X}} = \frac{0,71}{4} \approx 0,18; \qquad \delta_н = \frac{\tau_н}{\overline{Y}} = \frac{0,53}{3,8} \approx 0,14.$$

If we take the significance level of the statistical sign as α= 0,05 then the critical point for statistics from the Laplace function table is $t_{кр}$

$$F\left(t_{кр}\right) = \frac{1-2\alpha}{2} = \frac{1-2 \cdot 0,05}{2} = \frac{0,9}{2} = 0,45$$

we determine from the equation: $t_{кр}$= 1,67. If we find reliable deviations from this estimate:

$$\Delta_m = t_\gamma \cdot \frac{D_m}{\sqrt{n}} = 1,67 \cdot \frac{0,5}{\sqrt{445}} = \frac{0,835}{21,1} \approx 0,04$$

equal to, and in the control group:

$$\Delta_к = t_\gamma \cdot \frac{D_к}{\sqrt{n}} = 1,67 \cdot \frac{0,53}{\sqrt{446}} = \frac{0,8851}{21,1} \approx 0,04$$

equal to. If we find a confidence interval for the test class from the results found:

$$\overline{X} - t_\gamma \cdot \frac{D_m}{\sqrt{n}} \le a_x \le \overline{X} + t_\gamma \cdot \frac{D_m}{\sqrt{n}}, \qquad 4 - 0,04 \le a_x \le 4 + 0,04;$$

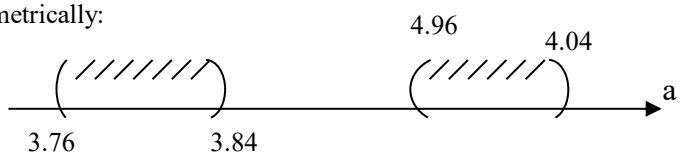
$$3,96 \le a_x \le 4,04$$

confidence interval for the control class:

$$\overline{Y} - t_\gamma \cdot \frac{D_n}{\sqrt{n}} \le a_y \le \overline{Y} + t_\gamma \cdot \frac{D_n}{\sqrt{n}},$$

$$3,8-0,04 \le a_y \le 3,8+0,04; \qquad 3,76 \le a_y \le 3,84.$$

Let's put it geometrically:



So, with a significance level of x=0.05, it can be said that the average grade in the experimental class is higher than the average grade in the control class.

Based on the above results, we calculate the quality indicators of experimental work.

We know $\overline{X}=4;\quad \overline{Y}=3,8;\ \Delta_m=0,04;\quad \Delta_и=0,04$ is equal to.

Quality indicators from this:

$$K_{usb}=\frac{(\overline{X}-\Delta_m)}{(\overline{Y}+\Delta_и)}=\frac{4-0,04}{3,8+0,04}=\frac{3,96}{3,84}=1,03>1;$$

$$K_{bdb}=(\overline{X}-\Delta_m)-(\overline{Y}-\Delta_и)=(4-0,04)-(3,8-0,04)=3,96-3,76=0,2>0.$$

From the obtained results, it can be seen that the criterion for evaluating the effectiveness of teaching is greater than one, and the criterion for evaluating the level of knowledge is greater than zero. It is known that the learning of the experimental class is higher than the learning of the students in the control class. So, it is known from the results of the experiment that the elementary school students achieved a good result on the basis of general labor skills, which were formed taking into account gender equality and differences [9].

3 Conclusion

Having collected the results related to the proof of the research concept, they were processed based on mathematical-statistical methods. All forms of experimental work were implemented in practice.

The results of the control work were analyzed quantitatively and qualitatively.

The physical capabilities of students will be expanded in the organization of technology classes taking into account gender equality and differences in students. They will have the opportunity to develop physically productively, and both boys and girls will develop general employment skills as well as social roles.

The results of the conducted experiments showed that as a result of organizing the educational process based on the gender equality and differences of students, general labor skills are systematically formed in them.

The results of the implemented experimental work, the obtained statistical developments allow to confirm the correctness of the research hypothesis.

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