DEVELOPMENT OF CREATIVE AND WORKING WITH INFORMATION COMPETENCES OF STUDENTS IN MATHEMATICS

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ABSTRACT

The following article deals with the process of developing students' basic competence to work with information in the lessons of Mathematics based on international experience, methodological recommendations are developed for students to acquire the skills of critical and creative thinking, independent work with information, systematic analysis and new ideas. The effectiveness of teaching Mathematics subjects on the basis of experimental method is based on this method.

Keywords: International experience, independent work with information, discovery, math lessons, information visualization, basic competencies, skills, experimental tests, mathematical and statistical methods.

INTRODUCTION

The Republic of Uzbekistan has identified priorities for systematic reform of higher education, and a number of reforms are being undertaken to upgrade the process of training highly-qualified professionals with modern knowledge, advanced social technologies with the use of advanced educational technologies. The gradual transition from an education oriented to theoretical knowledge to the formation of practical skills is based on international experience. As a result of the transition to such an education system students will acquire the skills of critical and creative thinking, independent processing and systematic analysis of information and the discovery of new ideas.

In the learning process, the lessons should be designed to facilitate the acquisition, processing, and imitation of information, as well as the development of new ideas, enhancing the competence of students to use their knowledge and skills in teaching and analyzing.

According to UNESCO decision, Informatization is a widespread use of tools to collect, store and transmit information. It provides for the systematization of existing knowledge and the formation of new knowledge and their application for current management, further improvement and development. Consequently, the strategic task of informatization is to globalize the intellectual activity through the use of new information technologies, dramatically improve the efficiency and quality of training creative thinkers who meet modern requirements [1].

"In the area of information of the world civilization, every member of society, in his daily activities, uses information continuously." In particular, students also acquire the necessary information in their educational activities.

"Information" (lat. Information - introducing, explaining) is a concept that has been used in philosophy since ancient times and has emerged as a new and broader central category in the recent years due to the development of cybernetics.

Information reveals the essence of everything, events and processes. Therefore, the effectiveness of education is determined by the use of assimilated information and acquired information [1].

MAIN PART

Key competencies are the ability of the learner to act independently in uncertain situations in solving problems that are relevant to the learner. Information competence - involves searching, sorting, reproducing, storing, effectively using the media sources, ensuring their safety, developing a media culture.

In Mathematics classes students face problems of converting information from one perspective to another, working with different content (scientific, logical, philosophical, and social). As a positive solution to these problems, we can:
- In Mathematics lessons we teach students to integrate data in the form of images, figures, and text (for example, to teach problem solving from numeric to schematic) to improve students' information competence development techniques;
- Methodically organize the process of developing competences for information processing;
- Effective use of information and communication technologies;
- Teaching students how to work with science-based information: receiving, processing, storing and sending from social media.
- The content of information learned in mathematics lessons: it is important to teach how to work with information in scientific, logical, philosophical, social context.

In the traditional lessons, depending on the purpose of the lesson, teachers lead students in a sequence of remembering, understanding, using, analyzing, synthesizing, evaluating (or re-evaluating) information that is needed during their learning or life activities. Students gather knowledge by understanding information, then they are asked to explain the information and apply it when possible [3,4,5].

That is, students are less involved in independent work. It faces a time constraint problem for analysis, synthesis and evaluation. In traditional education, new topics in math lessons are taught to students by giving them algorithmically and then by giving exercises to reinforce it. In the reinforcing lessons, knowledge about past topics is systematized [6].

Throughout the course of their lives, people are constantly engaged in the proper analysis of life problems and testing solutions. Not only do they learn how to do this, but they learn during life activities according to the analysis of problems throughout the life.

The analysis and synthesis of the results is an excellent level of information acquisition and promotes information competence. It is very powerful for students to remember their knowledge in the lessons they have learned. The rule of 'teaching students to think' makes passive students entrance students. They reduce the dependence on teachers and create independent students [7]. It gives students opportunities who can handle the complexities of adult life.
To fulfill them we should:

- Encourage students to think independently as much as possible: letting students find the ideas themselves, because they experience this process repeatedly throughout their lives. To remember facts, it is necessary to examine facts as well as context.
- Create a more memorable environment: If the teacher provides first-hand information, explains it, and applies it in practice to reinforce the concept, the students' understanding will remain at the level of "know" and "apply". They don't think at higher levels.

Normalizing the grades in assessment does not cause to students self-confidence. Accurate assessment of student knowledge helps to determine the level of academic success. Assessment should not only show the level of competence, but also serve as an incentive. While the accuracy of the assessment indicates that academic standards have been met, sometimes the use of exaggeration can serve as an incentive. The ability and speed of each student is different from the others. It is important to create a learning environment where students can self-assess according to the level of their cognitive abilities. It is well known that during the course of one's life, a person constantly evaluates information about his or her actions, events, social relations, and existing material possessions. On the basis of evaluation, their information is remembered, understood and used. Students need to understand themselves to build their knowledge. Understanding the importance of the information being investigated is of great importance. It attracts information, gives you directions of interest. Many learning materials are specific to the current topic, or for tests that determine if the program is being mastered, but are soon forgotten. Students rely more on knowledge, understanding, and voluntary perception, including active participation. It is necessary to organize the process of forming the basic competence of working with information in Mathematics lessons on the basis of such an approach to work with information during independent life activities (on the basis of analysis, synthesis, evaluation) and teaches using them as well (according to the understanding) [3.4.5].

The most important aspects of the competence to work with information in the organization of education based on the following approaches:
1. *Develop adaptability*. In order to achieve a complex view of competencies, they need to be taught that each problem has several solutions and a specific algorithm for achieving them, and selecting the appropriate algorithm. That is, algorithms are selected based on the scope and aspect of the problem. Depending on the direction of the process, analyzing and monitoring the progress of the case can guarantee effective results even in unexpected situations [2].
2. *Teaching for searching and exploring information.* The information and literature can be various for solving problems. However, more is needed to learn how to find reliable information and to evaluate whether it is reliable or not. It is not enough just to provide students with information; they should be able to discover that information for themselves. Students should explore and discover, and learn how to analyze these processes along with the process. The organization of the process of learning how to search and "discover" information relies on positive interactions (teacher-student, student-student relationships) [2].
3. *Providing new information constantly*. If the learning process is in the form of research, teachers should be provided with additional information to guide students in understanding. The only way to achieve the mastering of complex materials is by mastering the algorithmic construction of simple data. Because complexity is built on simplicity and they guide students in the right direction and the results are done by the students themselves. Comparative analysis of the best and most satisfactory samples gives them the information they need. It should be noted that they expect better results than samples. The learning process should never be passive. Revitalizing information reveals new ways to solve the problem and they help to develop new ideas [2].

4. *Creating the fundamental base of information of students.*
One of the important aspects of helping students master the learning materials is that, the student should be provided with basic knowledge. Students come to the lessons with lack of knowledge or sometimes lack of necessary information, but these can lead to further problems. Coordinating education with livelihoods in the development of information competence [2]:

Course name → important information → important questions (activating and enhancing student interest) → criteria → analysis → synthesis → evaluation → remembering → understanding the importance of the studied material → understanding (gathering the required information resources) → using (activating, engaging)

Mechanisms for carrying out experimental works
To carry out the tasks mentioned, a pilot study was organized and the experiment was conducted at Bukhara State University. Parallel groups with similar levels of development were selected and divided into experimental and control groups, respectively. During the control group lessons, the information work was carried out using a traditional approach: memorization, understanding, application, analysis, synthesis, evaluation (analyzing for evaluation). In the experimental group, the work with information was carried out on the basis of the proposed approach: data analysis, synthesis of information, evaluation and memorization of information, understanding and use of information.

The criteria for evaluating the lesson conducted in the control and experimental groups were the same and the following results were taken:

Table 1: Indicators of the formation of students' abilities and skills using pedagogical technologies in the subject "Mathematics".

The level of experiment and the study year	Higher education	Level of assimilation	In the beginning of experiment		In the of the experiment	
			In experimental group	In control group	In experimental group	In control group
2020 Study year	Bukhara State University	The highest (excellent)	8 (22%)	7 (20%)	14 (39%)	9 (26%)
		High (good)	12 (33%)	13(37%)	17 (47%)	16 (46%)
		Medium (satisfactory)	16 (45%)	15(43%)	5 (14%)	10 (28%)

Group students were considered to meet state educational standards. To determine the effectiveness of teaching Mathematics on the basis of experimental tests based on new pedagogical technologies, the students' final questions, the results of tests and generalization sessions were analyzed in terms of quality and quantity.

The analysis of experimental works used the methods of scientific research in pedagogy using mathematical and statistical methods.

The following table shows the dynamics (in both numbers and %) of students' knowledge dynamics in the process of teaching based on new pedagogical technologies.

In the beginning of the experiment: Experimental group $T_{quality}=\frac{8+12}{36} = 55\%$

Control group $T_{quality}=\frac{7+13}{35}=57\%$

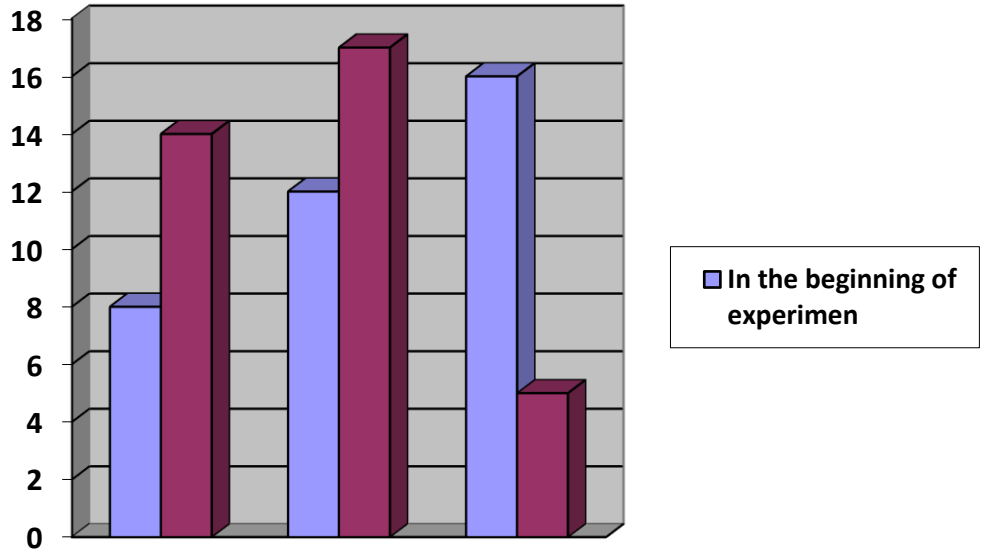
In the beginning of the experiment: Experimental group $T_{quality}=\frac{14+17}{36}=86\%$

Control group $T_{quality}=\frac{9+16}{35}=71\%$

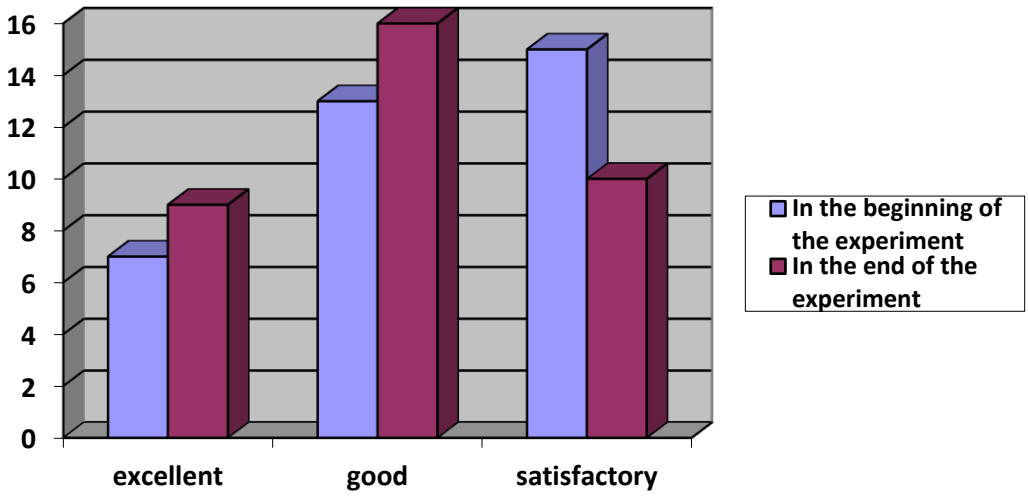
Table 2

The level of experiment and the study year	Higher education	Level of assimilation	In the beginning of experiment		In the of the experiment	
			In experimental group	In control group	In experimental group	In control group
2020 Study year	Bukhara State University	Study indicator	100%	100%	100%	100%
		Quality indicator	55%	57%	86%	71%
		The difference of quality indicator			+31%	+14%

Histogram of experimental group results



Histogram of control group results



CONCLUSION

Based on the comparison of information competence of the experimental group students, the conclusions were made that the difference in the competence of the students to work with the control groups was determined. The organization of the process of forming the basic competence of working with information in the experimental and mathematical lessons showed the increased level of information competence of students in the experimental groups compared to control groups.

If students can analyze, synthesize, retrieve the information they need based on the information, evaluate the data, and synthesize the conclusions by using the information, such as students' independent life activities, only then the knowledge will be based. Under this approach, students make hypotheses, like life activities, experiment with them, draw conclusions from them, and revise conclusions as needed.

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