

HUMANİTAR VƏ İCTİMAİ ELMLƏR
HUMANITIES AND SOCIAL SCIENCES

<https://doi.org/10.36719/2789-6919/39/9-14>

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**On the Activity of Students in Mathematics Lessons
the Effect of the Pygmalion Effect**

Abstract

The application of mathematical sciences has a great role in the development of society. Mathematical education is a necessary and important part of general education. Therefore, strengthening the mathematical preparation of students is considered the most important task facing secondary schools.

Mathematics is taught in a wide range of programs at every level of education in secondary schools. However, it is not perceived in the same way by all students. While some students find mathematics easy to understand, others find it very difficult. There are several reasons for this: poor mastery of mathematical concepts from primary classes, genetic influences, student's lack of independent work, concepts becoming more complex from class to class, age level, environment.

We must keep in mind that it is impossible to succeed in life without understanding mathematics. Therefore, it is necessary to look for the cause of difficulties and try to eliminate them. The purpose of the research is to study the impact of the Pygmalion effect on students' performance in mathematics lessons in secondary schools. Using the Pygmalion effect directs students with a poor understanding of mathematics to positive thinking and creates interest in learning mathematics. Many empirical studies also support the predictions of the Pygmalion effect, but it has been found that its effect sizes can vary from low to moderate.

As a result of the research, we concluded that applying the Pygmalion effect in teaching mathematics is one of the best ways to achieve success. The research will be useful for mathematics teachers and parents as well as a contribution to the relevant literature.

Keywords: *Pygmalion effect, mathematics, student, positive thinking*

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Riyaziyyat dərslərində şagirdlərin fəaliyyətinə piqmalion effektinin təsiri

Xülasə

Cəmiyyətin inkişafında riyazi elmlərin tətbiqinin böyük rolu vardır. Riyazi təhsil ümumi təhsilin zəruri və mühüm hissəsini təşkil edir. Buna görə də şagirdlərin riyazi hazırlığının gücləndirilməsi ümumtəhsil məktəbləri qarşısında duran ən mühüm vəzifə hesab olunur.

Riyaziyyat fənni ümumtəhsil məktəblərinin hər bir təhsil səviyyəsində geniş proqram üzrə tədris olunur. Lakin buna baxmayaraq, bütün şagirdlər tərəfindən eyni şəkildə qavranılmır. Bəzi şagirdlər üçün riyaziyyatı anlamaq asan olduğu halda, digərləri üçün çox çətinidir. Bunun bir neçə səbəbi

vardır: ibtidai siniflərdən riyazi anlayışların zəif mənimsənilməsi, genetik təsirlər, şagirdin müstəqil çalışmaması, anlayışların sinifdən-sinfə mürəkkəbləşməsi, yaş səviyyəsi, ətraf mühit.

Nəzərə almalıyıq ki, riyaziyyatı anlamadan həyatda uğur qazanmaq mümkün deyildir. Deməli, çətinliklərin səbəbini axtarmağa və onu aradan qaldırmağa çalışmaq lazımdır.

Tədqiqatın məqsədi ümumtəhsil məktəblərin riyaziyyat dərslərində şagirdlərin fəaliyyətinə Piqmalion effektininin təsirini öyrənməkdir. Piqmalion effektindən istifadə riyaziyyatı zəif anlayın şagirdləri pozitiv düşünməyə istiqamətləndirir, onlarda riyaziyyatı öyrənməyə maraq yaradır. Bir çox empirik tədqiqatlar da Piqmalion effekti ilə bağlı proqnozları dəstəkləyir, lakin müəyyən edilmişdir ki, onun təsir ölçüləri aşağı səviyyədə orta səviyyəyə qədər dəyişilə bilər.

Tədqiqat nəticəsində belə qənaətə gəldik ki, riyaziyyatın tədrisində Piqmalion effektini tətbiq etmək uğur qazanmaq üçün ən yaxşı yollardan biridir. Araşdırma müvafiq ədəbiyyata töhfə olmaqla yanaşı, riyaziyyat müəllimləri və valideynlər üçün faydalı olacaqdır.

Açar sözlər: Piqmalion effekti, riyaziyyat, şagird, pozitiv düşünmə

Introduction

The application of mathematical sciences has a great role in the development of society. It is known that the foundation of mathematical sciences is laid in general education schools and continued in later periods.

Mathematical education is a necessary and important part of general education. Therefore, strengthening the mathematical preparation of students is considered the most important task facing secondary schools. Mathematics training develops students' logical thinking, memory, attention, imagination, observation, will, independence and creative initiative.

In the learning process, students learn that the objects of mathematics are quantitative relationships with spatial forms of the real world, and mathematical concepts are taken from life. Starting from the first years of education, students develop the ability to move from concreteness to abstraction, thereby laying the foundation for the development of abstract thinking. Habits are formed such as making correct generalizations, drawing logical conclusions from a given proposal, and applying the results obtained from theoretical judgments to practice. Mathematics classes open up great opportunities for students to acquire qualities such as clarity of thought, justification of speech accuracy, and brevity. All these qualities arise and are formed if there is a positive psychological environment in mathematics classes.

Research

The subject of mathematics is taught in general schools at each educational level according to a wide program (Ministry of National Education of Azerbaijan, 2013). However, it is not perceived in the same way by all students. There are several reasons for this: poor assimilation of mathematical concepts from elementary grades, genetic influences, the student's lack of independent work, age level, environment, etc. On the other hand, the number of subjects taught in general education schools increases from grade to grade, and the choice of profession and preparations in this direction leads to a decrease in the number of students studying mathematics. Some students are not interested in learning mathematics at all.

It is impossible to succeed in life without understanding mathematics. So what to do? How to make students interested in mathematics?

Purpose and significance of the study

The purpose of the research is to study the effect of the Pygmalion effect on the performance of students in mathematics classes in secondary schools.

The Pygmalion effect was experimentally proven for the first time by the American psychologist Robert Rosenthal (Rosenthal and Jacobson, 1968). The Pygmalion effect is that high expectations lead to improved performance in a given area, while low expectations are a psychological phenomenon that causes worse (Mitchell and Daniels, 2003). The Pygmalion effect is a phenomenon in which a person who is sure of the integrity of any information involuntarily behaves in such a way that in the end that information finds its confirmation.

The most convincing evidence of the Pygmalion effect is an experiment conducted in 1968 by

psychologists Robert Rosenthal and Leanor Jacobson. Psychologists talk about interesting experiences about the power of communication in their book “Pygmalion in the Classroom”. Rosenthal first tests the IQ of elementary school students. Then, he gives the names of the students he randomly selected from among these children to their teachers, stating that those students have higher potential and talent than other students. In reality, they were no different from other students and were chosen at random. On intelligence tests conducted a year later, those “high-potential” students, Rosenthal says, did indeed show higher academic performance and even increased their IQ scores by 4 points. There was no noticeable change in other students (<https://www.tipii.edu.az/az/article/477-tahsilda-pygmalion-effekti>).

Rosenthal explained the reason for this as follows: Teachers were more interested in “high-potential students” and made them feel their feelings through words, facial expressions, and body language. Thus, this positive expectation of teachers towards students affected their consciousness, increased their motivation and ability to understand, and achievement was inevitable.

Research by Robert Rosenthal and Lenore Jacobson showed that if teachers were forced to expect high performance from children, children's performance would increase. Likewise, if teachers were forced to expect less from children, then children's performance would decline. Therefore, the influence of teachers on the activity of students also affects the results expected from them.

Research on the Pygmalion effect proves that it is very effective in management, parent-child relationships, and especially teacher-student relationships.

Method

The 10th graders of the general education school were selected to study the influence of the Pygmalion effect on the performance of students in mathematics lessons. In the training process, the Pygmalion effect was applied, a test was conducted, and a result was obtained based on the collected data. The research was conducted using a qualitative approach.

Example 1: The research was conducted in the 10th grade of secondary school No. 21 in Baku. I present to the readers an example of research conducted during one academic year. 22 students study in the class. The topic is “Solution of problems related to the theorem of cosines”. Purpose “3.1.1. Solves triangles using the theorems of sines and cosines” is the achievement of learning outcomes related to the realization of the content standard. After the explanation of the theorem of cosines, we perform the research task together. Then I ask the students to individually solve a problem from the learning tasks section. The time for solving the issue is determined.

Problem 1: BT is bisector in $\triangle ABC$.

If $AB = 4$, $BC = 8$, $AC = 9$, then the quotient of BT find its length by following the given steps (Kahramanova, et. al., 2022).

1. Find the length of segments AT and TC .
2. Find $\cos \angle A$ from $\triangle ABC$.
3. Find BT from $\triangle ABT$ (Figure 1).

Data Analysis

After the time given for solving the problem, I check the students' answers. Six students refused to solve the problem, eight students answered incorrectly, four students partially correct, and four students solved it correctly (Table 1).

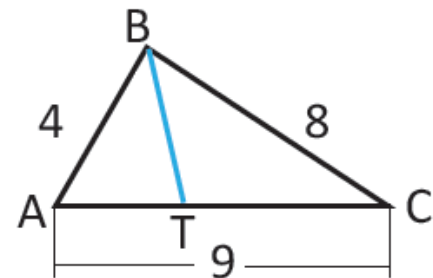


Figure 1.

Table 1.

Criteria Participants	There is no solution	Wrong answer	Partially correct answer	Correct answer	Total
Number of students in numbers	6	8	4	4	22
Number of students in percentage	27%	37%	18%	18%	100%

I suggest students who did not solve the problem correctly to solve it again. But they refuse to solve the problem. Why don't you want to solve it? - the answers to the question were as follows:

- It is a very difficult issue;
- I can't solve a geometry problem;
- I haven't solved such a problem, so I can't solve this either;
- I don't understand math, etc.

The reason is very simple - most students in math problem-solving classes think negatively.

“You are stronger than everyone else”, “you can solve this task”, “if you repeat the theoretical material, you will solve it easily”, “I believe you can”, “this is a task you can do”, “solve it together with your friends”, “draw a picture of the problem, you will be able to solve it”, “write as much as you can”, “don't hesitate to express your thoughts”, etc. I guide the students to think positively by using expressions like.

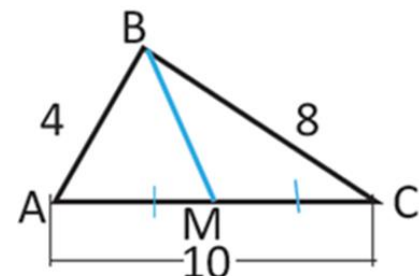


Figure 2.

After having a conversation with the students that could create positive thinking, the students who did not solve the problem correctly decided to solve the work again. Students who solved the problem correctly were given a new task. The time has been determined. The students tried to solve the problem with great enthusiasm. Some students used the textbook, and some consulted with their friends. The effect of the Pygmalion effect was manifested. The results were significantly different from before: the number of correct solvers increased by 2, the number of partial solvers increased by thirteen, the number of incorrect solvers increased by three, and there were no refusers (Table 2).

Table 2.

Criteria Participants	There is no solution	Wrong answer	Partially correct answer	Correct answer	Total
Number of students in numbers	0	3	13	6	22
Number of students in percentage	0%	14%	59%	27%	100%

Example 2: Students wanted to test themselves with new work. After having a conversation with the students that can create positive thinking, they decided to solve the work in group form. Groups of students with weak, medium, and strong mathematical understanding were organized. The groups were presented with the second task on the worksheets. 5 minutes time was determined for solving the work.

Problem 2: BM is the median in $\triangle ABC$. If $AB = 4$, $BC = 8$, $AC = 10$, find the length of the median BM (Figure 2). (Kahramanova et. al., 2022).

I observe the work of the groups from the moment the work is solved. Students politely listen to each other, students who are able to solve the work help those who feel the need, and students who have difficulty solving the work make notes in their notebooks, repeat the theoretical material, and

try to understand something. Group members tried to solve the task cooperatively. When the time is up, each group happily presents the worksheets with the complete solution to the task. The joy on the faces of the students was a reflection of their activity.

Results

The Pygmalion effect had an effect on the students' activity. Every student was happy as if they had succeeded. It was known that not everyone solved the given task correctly, but every student had a share in solving the task.

Considering that there are students in the groups who solve the task freely, solve it with help and cannot solve it, I came to the conclusion that the solution of the task is obtained from the positive emotions of these three types of students.

It is necessary to identify all the didactic opportunities that can create positive thinking in students in solving mathematical problems and take them into account in the teaching process. But we will think positively, hear positively, and solve correctly, only in this case it is possible to create cognitive activity in students and develop thinking operations.

Psychological service is one of the organic components of the modern education system. Its application should ensure timely discovery of children's intellectual capabilities, personality-oriented potentials, natural capabilities, abilities, interests, and inclinations, and maximum development through training and education processes.

In order for the active cognitive position of students to remain at the appropriate level, it is necessary for teachers to be compassionate towards each student, treat them with respect, have an individual attitude, and feel the environment in the classroom with special sensitivity. Trusting the student, treating him with respect, and refusing to evaluate his answers badly will create a sense of self-confidence, respect, and trust in each student. So, using the Pygmalion effect plays a big role in creating interest in learning mathematics among students.

Conclusion

Observations show that positive thinking in mathematics teaching is very important for completing the given task. On the one hand, this creates motivation within the student, at this moment the brain becomes active, the effect of brain power helps to overcome difficulties. On the other hand, the student does not hesitate to freely express what he knows, looks for solutions together with his peers, thinks independently, analyzes, predicts, judges, compares and tries to get the right result. Positive thinking creates a dependency and connection between the student and mathematical work. The student does not give up on the task until it is completed. He thinks that even the most difficult task is a task that he can perform, he gains confidence. Solving the task becomes the goal.

The student becomes courageous, decisive and thus has creative power. When he thinks that he got the result according to his power, then it makes him more happy. He dreams and makes his dreams come true. The positive energy of such students has a positive effect on others.

It is possible to develop the thinking of not only strong students, but also weak students by creating a sense of self-confidence in students in solving tasks that are difficult to understand. Therefore, it is appropriate for teachers to use the Pygmalion effect in mathematics lessons.

The human brain is an organ that accepts what we tell it without question. It will try to do whatever we put on it. Therefore, in the teaching of each subject, especially in mathematics lessons, we must train the students' brains to positive thinking. Students' interests and inclinations should be taken into account, and we should create conditions for them to succeed. Thus, applying the Pygmalion effect in teaching mathematics is one of the best ways to succeed.

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Received: 07.09.2024

Submitted for review: 23.09.2024

Approved: 08.11.2024

Published: 30.11.2024