

THE ROLE OF DEMONSTRATIONS IN THE TEACHING AND LEARNING OF PHYSICS IN PRIMARY SCHOOLS IN KOSOVO

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Abstract

This study aims to analyze the role of demonstrations in the teaching and learning of physics in elementary schools. Focusing on a constructivist approach to teaching theory, this study aims to show how well-prepared demonstrations can help increase students' interest in physics, improve their understanding of difficult physical concepts, and enhance their problem-solving skills.

The methodology of the study is based on a quantitative analysis and assessments of a small sample of students in primary schools, using surveys and short interviews conducted by physics teachers. This study involves a methodology in action, with the design of the experiment carried out in the elementary school "Fazli Grajçefci" in the Municipality of Mitrovica, with the participation of students from two sixth-grade classes. The pre-test and post-test method was employed in an experimental class of 20 students, where teaching instructions were based on demonstrations from the physics subject. Meanwhile, another class of 22 students learned through traditional teaching methods. The study utilized various techniques and instruments for analysis, including the pre-test, observation of students during the learning process, a checklist, and the post-test.

The results of the study showed that students who had completed physics demonstrations had more interest and motivation to learn, better understood difficult concepts, and were better prepared for laboratory exercises.

In conclusion, this study suggests that the use of demonstrations in teaching physics in elementary schools can be a powerful tool for improving the teaching and learning of this subject. Furthermore, this approach can be applied to other scientific disciplines and can help enhance students' ability to understand and solve complex problems in natural sciences.

Key words: *Teaching, learning, demonstrations, physics, primary schools.*

ROLI I DEMONSTRIMEVE NË MËSIMDHËNIEN DHE NXËNIE E FIZIKËS NË SHKOLLAT FILLORE NË KOSOVË

Abstrakt

Ky studim synon të analizojë rolin e demonstrimeve në mësimdhënien dhe mësimnxënien e fizikës në shkollat fillore. Duke u fokusuar në një qasje konstruktiviste ndaj teorisë së mësimdhënies, ky studim synon të tregojë se si demonstrimet e përgatitura mirë mund të ndihmojnë në rritjen e interesit të studentëve për fizikën, përmirësimin e të kuptuarit të koncepteve të vështira fizike dhe rritjen e aftësive të tyre për zgjidhjen e problemeve.

Metodologjia e këtij studimi bazohet në një analizë sasiore dhe cilësore të një kampioni të vogël nxënësish në shkollat fillore, nëpërmjet anketave dhe intervistave të shkurtra të kryera nga mësimdhënësit e fizikës. Ky hulumtim përfshin metodologjinë e hulumtimit në veprim, me dizajn pothuajse eksperimental, dhe është realizuar në shkollën fillore „Fazli Grajçefci” në Komunën e Mitrovicës, nga e cila morën pjesë nxënës të dy klasave të gjashta. Metoda para dhe pas testit u përdor në klasën eksperimentale ku morën pjesë 20 nxënës, ku udhëzimet e mësimin bazoheshin në demonstrime nga lënda e fizikës, ndërsa në, në një klasë tjetër me një grup nxënësish prej 22 që shërbenin si grup kontrolli, mësimi realizohej duke zbatuar metodat tradicionale të mësimdhënies.

Në përgjithësi, teknikat dhe instrumentet e hulumtimit përfshinin: paratestin, vëzhgimin e nxënësve gjatë procesit mësimor, listën kontrolluese dhe posttestin.

Rezultatet e studimit treguan se studentët që kishin përfunduar demonstrimet e fizikës kishin më shumë interes dhe motivim për të mësuar, kuptonin më mirë konceptet e vështira dhe ishin më të përgatitur për ushtrime laboratorike.

Si përfundim, ky studim sugjeron se përdorimi i demonstrimeve në mësimdhënien e fizikës në shkollat fillore mund të jetë një mjet i fuqishëm për përmirësimin e mësimdhënies dhe të nxënësve të kësaj lënde. Për më tepër, kjo qasje mund të zbatohet në disiplina të tjera shkencore dhe mund të ndihmojë në rritjen e aftësisë së studentëve për të kuptuar dhe zgjidhur probleme komplekse në shkencat natyrore.

Fjalët kyçe: Mësimdhënia, të nxënësve, demonstrimet, fizika, shkollat fillore

Introduction

Physics is one of the most important subjects in elementary school, as it gives students a deep understanding of their world and helps them understand how things around them work. In this paper, we have discussed and explored the importance of demonstrations in teaching and learning physics in elementary.

Based on the findings of the Pisa 2022 test, Kosovo receives 357

points, placing it in 77th place out of 80 participating countries in the science category. This is a lower decrease of 6 points than in 2018, so the change of the traditional education system is essential to improve the results of students through the development of their creative and critical skills in natural sciences, therefore continuous efforts should be made in improving and acquiring new teaching methods, replacing more and more traditional methods every day.

Teachers in Kosovo schools should apply in their teaching new and different teaching techniques and methods, such as project-based learning, experiment-based learning, demonstrations to actively involve students in the process of learning by putting them at the center (Ramadani & Pejchinovska-Stojkovic, 2023).

Demonstrations in teaching and learning physics are an important tool in elementary because they allow students to see how different physical concepts and ideas work in a clear and understandable way, helping them prepare to understand and solve various physical problems. The use of demonstrations can help students understand different physics concepts more clearly and easily. For example, a demonstration during a physics lesson can explain how gravity works or how velocity changes depending on force. These demonstrations can help students understand different physics concepts more deeply and remember information better.

In addition, demonstrations can help develop students' practical skills and prepare them for labs and other practical work in the field of physics. These demonstrations can help develop the skills needed to measure and analyze different physical data, as well as make conclusions based on that data. Overall, demonstrations are an important tool in teaching and learning physics in elementary and middle schools. They help students understand different physics concepts more clearly and deeply, while also helping them develop the practical skills necessary to work in the field of physics in the future.

In various studies and theories about the role of demonstrations in teaching and learning physics, many authors have emphasized that the integration of demonstrations in teaching creates a learning environment where students develop in-depth analytical skills by expressing a deeper understanding of concepts. scientific and brings a fundamental change in their participation and engagement in learning.

The subject of physics is represented in the curricular field of natural sciences in the Core Curriculum of lower secondary education in the Republic of Kosovo, which offers students the opportunity to develop their

understanding of the concepts, theories and basic laws of the development of nature (MASHT, 2017). The most important objective in natural science research is the construction of a method that can help students in understanding scientific and alternative concepts. In a study Natural sciences are a collection of knowledge that includes facts, concepts, principles and theories, and that can be called both science and product (Laksana, 2017).

In the lessons of the subject of physics, there are many teaching tasks, the meaning of which requires the organization of more consecutive observations, because that is the only way to understand the phenomenon in a more complex form (Musai B., 2008). In this section, a general description of the "field of study" has been provided and the studied topic has been placed within it. The role of demonstrations in teaching and learning physics in elementary schools is an important topic in the field of school education. This topic focuses on the use of demonstrations as an effective tool to help students understand important concepts and ideas in physics.

There are several theories and models related to the role of demonstrations in teaching and learning physics in elementary schools. Cognitive theory, for example, suggests that students better understand and remember information if they see it in a visual way. For this reason, the use of demonstrations in class can help students understand concepts and build a better relationship between theory and practice.

Methodology

Methods, procedures, and instruments for the research

The instruments that were used in this research for data collection are the following: pre-test, checklist and post-test that were used for both classes. The pretest was carried out in both classes with the same questions, to determine the level of knowledge of the students before applying the teaching based on demonstrations. The pre-test and post-test questions were the same for both classes, to check the prior knowledge the students poses (pre-test) and to evaluate the knowledge they have gained after the exposure to demonstrations (post-test).

Through the checklist, notes were taken on the activity and abilities of the students for solving problems, their motivation and cooperation in the administration of the experiments. While the post-test was carried out after the administration of the demonstrations, and allowed the researcher to answers the questions and prove hypothesis of this study.

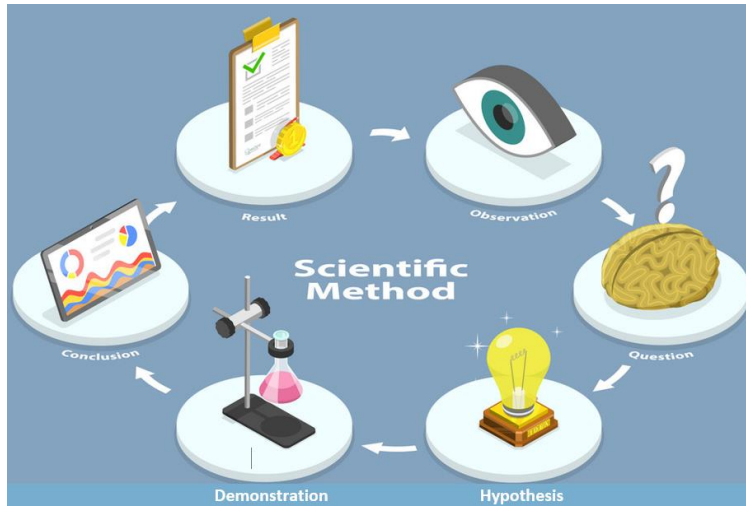


Figure 1. The research implementation plan

The figure (figure 1.) shows the activities that were used in both classes, in control and in experimental class. In the control class we presented the traditional teaching activities, while in the experimental class we presented teaching activities of the experimental (demonstration) method.

In experimental class contemporary techniques have been used (experiments, demonstrations) that affected the learning of students, while control class implied only the traditional teaching technique. In the experimental class, through the teaching of every lesson, an experiment was developed with purpose to understand which method used there is showing higher results in the students' learning.

Purpose

The purpose of this research is to analyze the role of demonstrations in the teaching and learning of physics in elementary schools. For this purpose, we evaluated how demonstrations can influence students' motivation and understanding in teaching physics in primary schools. Also, during this research, we have examined the benefits and challenges of using demonstrations in teaching physics in primary schools.

The importance of research

This research is important because the subject of physics is a subject that has an impact on the level of education and development of students, where the application of demonstrations can affect the change in the

way of teaching and learning of this subject.

The results of this research can help elementary school physics teachers choose the most effective ways of using demonstrations in their teaching, and can help increase students' motivation and understanding of this subject.

Research questions

Does the use of demonstrations in physics teaching affect the increase of students' interest and motivation to learn physics?

What are the effects of using demonstrations on increasing student performance in physics exams compared to traditional teaching?

Research hypothesis

H-1: The application of demonstrations in the teaching of physics in primary schools will influence the increase of students' interest and motivation to learn physics.

H-2: The application of demonstrations in elementary school physics teaching will increase students' performance in physics exams compared to traditional teaching.

Results and discussion

From this research, we have achieved significant results in the students' learning performance and their interest of learning physics when they used demonstration-based teaching. Also, this research has influenced teachers to use demonstrations method and modern techniques that will facilitate the teaching of natural sciences in general and the subject of physics in particular. From the indicated results of this research, it is noted that the positive results that the students have benefited from the implementation of physics lessons with modern experimental methods, compared to the students of the control class.

In addition, findings from this research enabled us to understand featured skills of the students in solving experimental tasks which are related to their thinking skills, the creativity they have in giving new ideas and how they approach solving the problem. The role of demonstrations in the teaching and learning of physics in primary schools is of particular importance for the students, since with their help, students learn faster and easier, thus making the subject of physics more pleasant to the students.

Comparison of the results of the pre-tests of the control and experimental classes

In order to better understand the differences of teaching based on demonstrations compared to traditional teaching, through the relevant figures, we have presented the evaluation of students with grades. We provided these data for both the pre-test and the post-test. Below are presented the results from the answers of the students, from the control class and the experimental class.

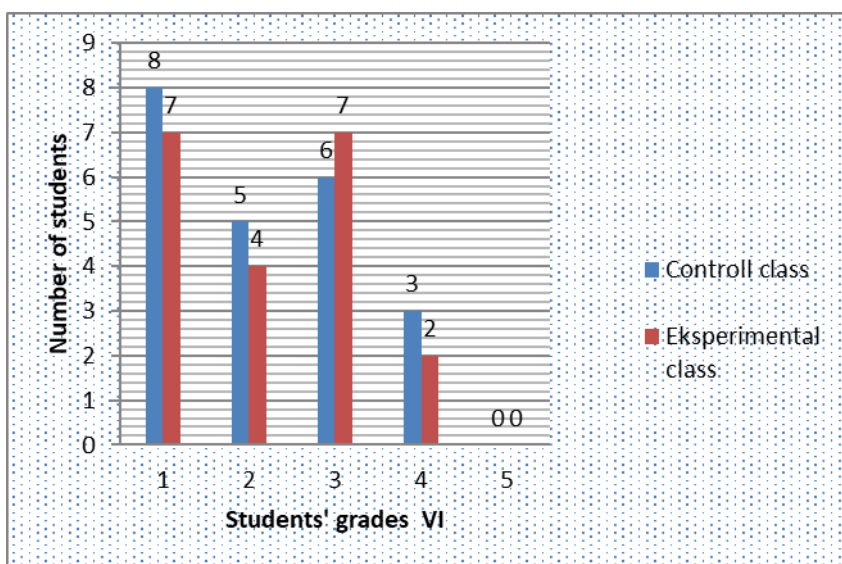


Figure 1. Comparison of the results in the pre-test between control class and experimental class

From the graph, it could be noticed that the control class, in the pretest of the learning units developed before the research, showed slightly higher results than the experimental class. So, the control class had slightly higher prior knowledge.

Comparison of post-tests results of control and experimental classes

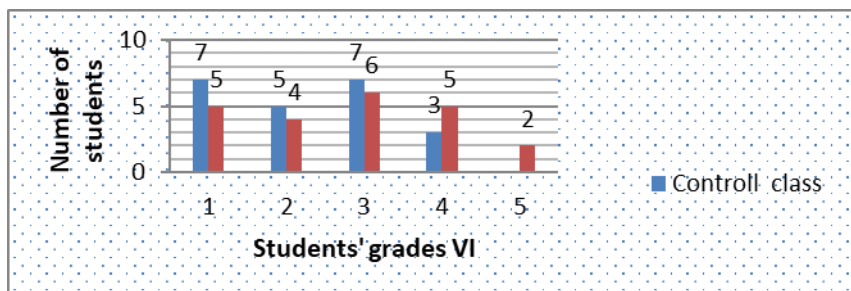


Figure 2. Comparison of results in post-test between control class and experimental class

In the graph, are presented the results of the students with the grades of the post-test from the teaching units realized after the research (intervention) was carried out. The learning units in the control class were taught through traditional teaching, while in the experimental class with teaching based on demonstrations.

From the results of the post-test, it could be noted a difference between the control class and the experimental class. The experimental class, in this case, has better results than the control class. It should not be forgotten that the control class, in the pre-test, showed slightly higher results.

The followed obtained results, in the experimental classroom, are believed to be indicated from the use of demonstrations -based teaching. From the data in Figure 2 it is noticed that the experimental class shows better results if we compare with the pre-test results. As seen here, the result is much higher. In this context, even when compared with the results with the control class, they are perceived as much higher.

These results are also supported by the results of the different studies in this field. In the study, regarding the levels of success achieved by the experimental group, the group that learned with experimental teaching methods, and the control group, which learned with traditional approach, a significant statistical difference is noticed in favor of the experimental group.

This is an indication of the fact that teaching developed with demonstrations, experiments contributed to student success more than teaching with the actual (traditional) curriculum, as it is stated in the contemporary findings regarding this problem (Pejchinovska, M., Kamchevska, B., 2016).

Results and Discussion

The aim of this paper was to identify the impact of demonstrations-based teaching on the learning of the subject physics at the school level. Quasi-experimental method was used in the realization of this research. Based on the methodology procedures offered by this method, the study implied an experimental class, in which demonstrations-based teaching was developed, and a control class in which traditional teaching methods were developed.

Through the use of pre-tests and post-tests, has been identified that demonstrations-based teaching promotes better results among students in the experimental classroom.

From the findings of the study, it is noted that the results of the post-test in the experimental class were better than in the control class. These positive results are believed to be related to the use of the demonstration. In this regard, it appears that the experimental class was more successful than the control class.

Therefore, it could be understood that the teaching based on demonstrations has positively influenced the results in teaching and learning physics in primary schools. The results of this study are also supported by the results of other researchers. According to the study of the authors Baert, Beunens, & Dekeyser (2002), teaching based on experiments, demonstrations influences students to learn with higher satisfaction and more easily. They asserted that teaching based on experiments, demonstrations can provide students with learning in the learning environment (Dekeyser, 2002).

Recommendations

One of the key issues related to the quality of education in Kosovo is the provision of effective services for a genuine education and the professionalization of teachers at all levels of the education system. In order to achieve a good quality of teaching, conditions must be created for teacher monitoring and evaluation. But, in addition, the Ministry and the MED should be ready to provide these teachers with opportunities for better learning.

- Teachers should want the profession of teacher more than anything else in the world. This profession needs a lot of dedication. Regardless of the difficult conditions in which Kosovo's teachers work, we must always love the profession. To create the best conditions for student learning, we will create a safe future for them. This would be the biggest and most divine

work for teachers and teachers in general. • It is necessary to draft annual school plans. Through them, the planning of all activities that will be carried out to achieve the objectives of the school is ensured.

They contain in themselves the vision of the directorate and its collective. Annual plans discipline school work. They serve as a prerequisite for success.

- Must always be a source of information to the service of the students •
- Have the best possible relationship with the student
- Must seek out the most up-to-date and practical methodology
- Contemporary teacher creates the conditions under any circumstance in order for the student to be as successful in physical education as possible.
- The role of experiment in the teaching and learning of physical matter is very large and indispensable and for this we can say that physical matter is impossible to imagine without experiments

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