



## Physics Toys Used for Efficient Learning in Physics

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### Abstract

*The aim of this study is to increase interest and motivation of the students by giving daily life examples and using different toys in physics courses. These instruments will increase the amount of student participation and help teachers to attain learning outcomes especially for these who have insufficient prerequisite knowledge. In this search, a student-centered approach is structured and developed for different topics from K9 to K12 levels in Physics course; such as Pressure, Buoyancy, Force, Balance, Bernoulli Principle, Angular Momentum, Optics, Center of Gravity. First, we use an inquiry-based learning method not only to reanimate any kind of old information known by students but also to try to measure students' current status on a subject as well as trying to fill the gaps and help them to sustain a healthy bridge between students' old and new knowledge about each subject. Next, we prepared a power point presentation to overcome the shortcomings of the subject. After that, practical work was done to provide learning by doing and experiencing. Students made physics toys related with each subject and designed beforehand by the teacher, to practice their theoretical knowledge in laboratory. At the beginning of practice, students were divided into groups of five and a sheet was given to each group. Each group made physics toys step by step and wrote the results on the sheets. And they compared each other's notes and their results. In the end, it was seen that the teaching method was very successful. Students did not only participated in the learning process but also enjoyed the classroom activities. They were highly motivated for the course and attained desired cognitive objectives.*

### 1. Introduction

*"A theory in education acquires scientific character if it can establish self-correction processes and value itself at the light of its own practices." [1]*

Excellence in high school physics depends on many things: the teacher, course content, and availability of apparatus for laboratory experiments, a clear philosophy and workable plan for meeting students' needs, serious dedication to learning goals. The laboratory was been given a distinctive and significant role in teaching physics and if knowledge is based on experiments would be more permanent and also there are more benefits in learning from using activities in laboratory. "Theory and research suggest that meaningful learning is possible in laboratory activities if all students are provided with opportunities to manipulate equipment and materials while working cooperatively with peers in an environment in which they are free to pursue solutions to problems that interest them"[2]

The classroom of a qualified physics teacher is an active learning community where students: work in groups conducting meaningful experimental investigations; build and test scientific explanations; engage in thought provoking activities; and conduct inter-group discussions and evaluation of each other's arguments. In such a climate students are actively engaged in discussions and collaboration. Research on the efficacy of different perspectives to laboratory teaching and ongoing discussion of the relative merits of various perspectives is vital to the improvement of laboratory teaching. We have designed a new perspective for experimental physics teaching which Physics Toys are. Students made physics toys related with each subject and designed beforehand by the teacher, to practice their theoretical knowledge in laboratory.

### 2. Material and Methods:

Our method creates a tight connection between the science course and student's personal interests, lives, social issues and other additional school subjects. In the study, "Buoyancy, Force, Balance, Bernoulli Principle, Angular Momentum, Optics" learner-center design has been developed for creating a wider perspective to the students' point of view. In the beginning of the study, using question-answer method to determine pre-knowledge of students has been assessed. Before starting activity, students were divided into groups and a sheet was given to each group. They made physics toys according to their subjects step by step and wrote the results on the sheets. Those toys are design for making bridge, force, electric boat, batteryless flashlights, gyroscope, plastic bottle



submarine. At the end, it was seen that the teaching method was very successful since the students investigated the real-life conditions by designing the toys for specific purpose areas.

### **3. Conclusion**

Assessment and evaluation process had done in two steps. First step of this process consisted of some given questions to the students during the activity, and for the second step students assessed by the “end of the unit” examination. In both of these steps, the results showed that the learning process of the students affected positively by the style of the teaching procedure. During this period it is observed that this style of teaching and checking students pre-knowledge before starting the study helped students to have less trouble with the course and helped them to make up their deficiencies. It is also observed, activities which are done with physics toys that having its base to a part real-life helped students to understand the cause and effect relation and actually learn after the process. The results that are evaluated at the end of the study show that students reached the necessary gain.

### **4. Results and Discussion**

Cognitive learning theory emphasizes the importance of learning something new by relating it to real life and things that are already meaningful and familiar [4]. Teachers should not forget that their own motivation to learn science is likely not shared by many of their students. Student's motivation is more likely activated instrumentally, by connecting science to things that are already familiar and important to them.

### **References**

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