DIY Wind tunnel. From Simple Tools to Inspirative Physics Education.

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Abstract. The present didactic strategy generates in students a relationship between a topic of their interest such as aviation and the physical concepts treated in the field of aerodynamics, specifically Bernoulli's law. Intellectual skills such as asking questions, formulating and contrasting hypotheses will be stimulated in students, which will help in the learning process. The project method encourages young people to make observations, asking questions, collecting, analyzing and interpreting data, and also explaining results. The youth conducted experiments using a wind tunnel, reaching conclusions that allowed them to explain how the wing profile affects the lift force in an airplane.

Introduction

Youths are curious about the world and ask many questions, looking for answers. At the same time, the school reality, requiring rules and principles of learning, often discourages children from learning about the world through experimenting and inquiry. Experiments are known for their motivating and engaging character. Simultaneously, due to the broad accessibility to the internet and the abundance of extracurricular activities for children from a young age, the presentation of simple experiments loses its motivational efficacy in later stages of education, as they are already familiar to them. As a consequence, the need to explore more intriguing and sophisticated experiments becomes imperative. Regrettably, the cost of such experiments is often exorbitant, placing them beyond the means of educational institutions. Therefore, authors constructed a DIY wind tunnel to increase the attractiveness of workshops at the Aviation Education Center. Methodology: wind tunnel, experimental techniques and test models.

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Wind tunnel is a device, by artificially producing airflow relative to a stationary body that measures aerodynamic force and pressure distribution to simulate with actual conditions. By using items for everyday use, e.g. drinking straws, combined with some technological devices, such as computer fans, wind flow processes can be shown in an effective way. In the current study, a wind tunnel was designed, constructed and its performance was tested.

We started the project with a review of available information about wind tunnels. There are two main types of wind tunnels: closed and open. We made an open tunnel, which is more like a pipe open at both ends. The wind tunnel in this design is equipped with a fan that draws air into the tunnel, flows around the model, and then releases it at the other end. As air flows around the wing model, it simulates flight. The model is movable.

An example of DIY wind tunnel shows that some of the physical processes can be presented for youths as a main target, but also for kids and older people in an engaging way. By adding an appropriate explanation of what is happening inside the box, the role of theory of physics is also mentioned.

What will be presented

The poster will show our original wind tunnel and how it can be used to explain Bernoulli's law, used, among others, on a plane. We will show you the workshops where it is used. We will also mention the stages of design, construction and testing of the wind tunnel and the tested wing profiles. Also, the focus will be made on the feedback collected from participants of this experiment, which was shown to 230 students in age 7-14 and, and how enjoyable it is to show some of the physics laws in a practical way.