

A TWO-PHASED CONCEPTUAL TEST TO HELP REVEAL THE MISCONCEPTIONS ABOUT THE TOPIC OF “WORK”

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1. INTRODUCTION

The learning of basic scientific concepts and principles lies at the heart of science education research. Humans learn, classify and connect basic concepts from childhood (Ecevit and Şimşek, 2017). One of the goals of science education is to enable students to meaningfully learn concepts in various fields of science. Students who learn these concepts meaningfully can use them in their lives when the need arises. As basic scientific concepts are the foundations of more advanced topics in science, it is crucial to teach these concepts accurately and meaningfully during primary and secondary school for satisfactory science education (Ausubel, 1968; cited in: Hırça, 2008). Most of the information taught in natural sciences is closely related to our daily lives. Students need to learn concepts meaningfully in order to grasp events and phenomena more readily. This is only possible through putting what is learned into practice.

Concepts are the first associations that shape in the brain when a being or object is mentioned. This means that concepts originate in the mind and are abstract thought units, and only then do they go on to facilitate our real lives. It is therefore possible to state that concepts form in the human mind as a result of our experiences with events, beings and objects. Naturally, the more experiences with a being or event, the more comprehensive and accurate ideas or images about it

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cognitive to affective level. Students encounter the concept of “work” among the physics topics in their high school education. The concept is one that they have already encountered in the past in their daily lives. However, in physics courses, both the term and its meaning change. For example, the daily life statement “I’m doing work at home” is wrong in physics. In physics, the only valid statement is that of “work performed by force”. For instance, let us imagine a person who exerts muscle force on a wall all day. Regardless of how exhausted the person may feel, if the wall has not moved, no work has been done according to physics. It will not be easy for students to attach a new meaning to the concept of “work” that they have already used in other contexts for decades. The meaning they have attributed to this word for all these years has already taken root in their minds. If the concept of “work” is open to misconceptions, then extra time is needed at high schools and universities after the teaching of this concept. In this extra time, tests may be used to reveal misconceptions, which may then be eliminated with further techniques.

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