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THE EXAMPLES OF PHYSICS CONCEPTS FORMATION BY THE USE OF KWL STRATEGY

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ABSTRACT: The goal of teaching should be to assist the students in creating a full understanding of a concept. A student who has formed a concept, knows more than just the definition of a term. Concept formation is deep conceptual learning rather than superficial knowledge of a vocabulary word. The goal of every learning strategy is to enable concept formation. The KWL strategy is initially developed as an instructional learning strategy that is used to guide students through a text; therefore it is rarely applied in teaching physics and science in general. The KWL strategy consists of: (1) accessing previous knowledge, (2) determining what one wants to know and (3) recalling what is learned. This strategy is designed in a form of a KWL chart with three columns as an organizing instrument: (K) *What I **K**now*, (W) *What I **W**ant to know* and (L) *What I **L**earned*? The KWL strategy improves comprehension and helps students in concept formation. It can be very useful in teaching and learning physics, especially when the content should be learned from text. Instruction about implementation of KWL strategy in physics classes and example of its use for formation physics concept *force* is given in this paper.

Keywords: Concept formation, KWL strategy, learning strategy, physics

INTRODUCTION

Lately number of students has inadequate reading and study habits (Taslidere & Eryilmaz, 2012), they are uninterested to study physics and have difficulties in understanding it (Hewitt 1990). Students rely upon teachers for constant support instead of being independent learners. Those problems are reflected on the students' physics achievements.

Physics Concepts Formation

Concept formation is process by which a person learns to sort specific experiences into general rules or classes. A concept is a rule that may be applied to decide if a particular object falls into a certain class. Conceptual classification should be distinguished from discrimination learning. In discrimination learning, objects are classified on the basis of directly perceived properties such as physical size or shape. The emphasis on concrete physical features in discrimination learning can be contrasted with the more abstract nature of concept formation.

Physics is a natural science based on experiments, measurements and mathematical analysis with the purpose of finding quantitative physical laws for everything in nature (from the nanoworld of the microcosmos to the planets, solar systems and galaxies that occupy the macrocosmos). It attempts to quantify reality through a precise application of observation coupled with logic and reason. In order to make use of such discipline there is certain foundational information that one must have first, in order to build upon it. Those are basic physics concepts. Concept formation is very important in physics teaching, especially in primary school. According to curriculum in sixth grade of primary school student are become familiar with concept force and different examples of forces. In seventh grade of primary school concepts of mass, inertia, force, equilibrium and

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acceleration are discussed; these concepts are combined with the Newton's laws of dynamic to provide a convenient means of analyzing an object or system of objects at rest or in motion.

Know-Want-Learn Strategy

The Know-Want-Learn (KWL) reading strategy is an instructional learning strategy. It is an active learning strategy (Bryan, 1998; Jared & Jared, 1997; Ogle, 2009) which supports student-centered learning (Draper, 2002). The KWL is applicable in different school subjects (Brozo & Simpson, 1991). It consists of three basic stages: accessing previous knowledge, determining what one wants to know and recalling what is learned (Blachowicz & Ogle, 2008).
The KWL strategy is realized in a form of a KWL chart. It helps students to adopt given concepts and also to activate prior knowledge and assess what they have learned (Martorella et al., 2005). KWL chart consists of three columns (Figure 1). The KWL strategy is suitable to be used by a teacher working together with all students in classroom and can easily be transferred into a method for students' independent study (Tok, 2013).

Topic: _____ Before you begin learning list details in the first two columns, after completing it fill in the last column.		
*What I **K**now*	*What I **W**ant to know*	*What I **L**earned*

Figure 1 KWL chart

When KWL charts are implemented for school learning, first students brainstorm about what they already know about a topic and write their responses in the first column of the chart (K). Then student brainstorm what they would like to know about a topic and write their responses in the second column of the chart (W). Next step is learning activities and reading; after what students return to the chart and fill in what they have learned in the third column of the chart (L), with special attention on information that is related to what they wanted to know.

The use of KWL strategy makes learning and remembering easier (Gammill, 2006) and encourages more complete understanding of a topic since students research a specific question that they are interested in (Jared & Jared, 1997). Accordingly, it can be good learning strategy for acquiring physics contents and it helps in physics concepts formation.

THE EXAMPLE OF "FORCE" CONCEPT FORMATION BY THE USE OF KWL STRATEGY

When teaching about Force, teacher can introduce students with that concept and lead them to remember of examples what they already know. Then teacher encourages students to write their one questions – what would they want to learn. After learning students write what did they learn. The whole chart is written on board while all students participated in the discussion. The example of KWL strategy for Force is given at Figure 2.

Topic: _____**Force**_____ Before you begin learning list details in the first two columns, after completing it fill in the last column.		
*What I **K**now*	*What I **W**ant to know*	*What I **L**earned*
Gravity attracts objects. Magnetic force can both, attract and repel objects. Magnetic force does not act on every object. Every object in motion will stop because of friction. Motion is somehow related with	What is force? Why magnetic force does not act on every object? Why different objects do not stop after the same distances? Why friction force is weak when we are on ice? Is object in motion because some	A force is a push or pull upon an object resulting from the object's interaction with another object. A force is a vector quantity. Whenever there is an interaction between two objects, there is a force upon each of the objects. There are contact forces and forces resulting from action-at-a-distance.

force.	force is acting on it? Why friction stops objects? Is objects velocity related with force acting upon it?	Force changes the motion of an object. About gravity, magnetic force, electric force, friction…

Figure 2 KWL chart for concept Force

This is example of the use of KWL chart in formation concept force in sixth grade. As it can be seen in given example, problem with the use of KWL strategy can be that students are interested in knowledge that according to curriculum should be realized in later education. That does not have to be a problem, students can be allowed to choose to learn more and they can be instructed to find some of the answers in later education.

CONCLUSION

Instruction about implementation of KWL strategy in physics classes and examples of its use for formation physics concepts in the field of dynamics are given in this paper. It can be very useful to implement KWL strategy in school practice, since it is good learning strategy but in order to successfully implement described strategy, it is necessary to provide adequate resources and professional development for teachers.

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