

Electric Current – the Basic Knowledge and Skills for Pupils of the Secondary Lower Classes

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Abstract

Knowledge and skills of lower classes of secondary school pupils are given as a result of investigation. The map of linkages between different concepts from the field of electric current was constructed. The competencies of pupils were deconcepted on the basis of the constructed map.

1 Introduction

The Concepts Map of Electric Current is oriented graph made up from near concepts. These concepts are from the part of electric current and pupils gradually learn concepts during physics lesson on primary school or on the lower classes at secondary schools. Single concepts are arranged in this graph according to logic linkages that exist among them. These linkages are directed by the syllabus and the theme plans of physics too. The learning of electricity goes through physics curriculum of 6th, 8th and 9th classes of primary schools (or 1st, 3rd and 4th classes of eight-years secondary schools) from the age of 12 to 15.

2 Construction of Concept Map

We comprised all of these concepts into one graph in spite of considerable complicity from lesson structure. We diversified particular concepts by colours by course of fact when the pupils firstly learn the concept. And so we marked new concepts of 6th class (when the pupils learn the concepts “electric charge”, “electric current” and electric circuit theory) by green colour and new concepts of 8th class (mostly from domain of effect of electric field, where is putting the accent on conducting of electric current in metals, conversion and transport the electric energy) by yellow colour. We marked by red colour new concepts of 9th class (except alternating-current electric quantities also mechanisms of conducting of electric current in various materials).

When we look at this graph as a complex we can simply take notice of the fact that sub-structures were created from this structure in the course of this orientation of arrows. It is about the following domains: Conditions of rise of electric current (electric field in electric circuit and closed electric circuit), electric current as a quantity, conventional current and its

conducting in metals, liquids, gases and in semiconductors.

Drawn linkages that are creating among selected concepts on the base of transmission in common approachable textbooks but are still not ideal. It is good to mention mainly two domains that are in the Concept Map: Problem of conducting of electric current in gases is succession of implementation of competent concepts is not applicable select. At first the pupils learn to know lighting and spark discharge in 6th class. And then in 9th class they get to know about reasons of their rise, propriety and mechanisms of conducting by the medium of electrons and cations, they meanwhile get to know about in 8th class.

Secondly, we would like to refer the problem related with concepts “electric work” and “electric energy”, what pupils often change or sometimes even identify (the perhaps reason is because of predicated to these quantities the same units – joule in calculations). Likewise pupils have problems with discerning of quantities “input power” (P_0) and „electric power“ (P). We think it should be suitable notice more convenient examples from real life in order to pupils can diversify these concepts one another better and learn them more deeply.

Otherwise we suppose that actual teaching structure. This oriented graph is constructed by the way in order to pupils can learn rightly all these concepts during learning physics. At the same time they can make the relations among these concepts which there exist. Teaching/learning process is realised on this teaching structure that was constructed on the base of valid syllabuses and also on the base of theme plans of subject physics.

3 Knowledge and skills and computer aided education

New competencies are used in learning/teaching physics with computers especially in part of electric current. There are possible applications, common activities as: calculating, solving simple equations, numerical results – tools – calculators or software – such as Excel. The values from life, e.g. 230 V, 60 W, 1.5 V, 4.5 V are better use in solving tasks and problems.

Skills in part of electric current are practical for every day life – there are: Construction – Projection. Both operations – construction of simple connection from the scheme and projection of scheme from connection support logical thinking.

Concept Map

