

Exploring Students' Alternative Conception in Vector Components

Authors : Umporn Wutchana

Abstract : An open ended problem and unstructured interview had been used to explore students' conceptual and procedural understanding of vector components. The open ended problem had been designed based on research instrument used in previous physics education research. Without physical context, we asked students to find out magnitude and draw graphical form of vector components. The open ended problem was given to 211 first year students of faculty of science during the third (summer) semester in 2014 academic year. The students spent approximately 15 minutes of their second time of the General Physics I course to complete the open ended problem after they had failed. Consequently, their responses were classified based on the similarity of errors performed in the responses. Then, an unstructured interview was conducted. 7 students were randomly selected and asked to reason and explain their answers. The study results showed that 53% of 211 students provided correct numerical magnitude of vector components while 10.9% of them confused and punctuated the magnitude of vectors in x- with y-components. Others 20.4% provided just symbols and the last 15.6% gave no answer. When asking to draw graphical form of vector components, only 10% of 211 students made corrections. A majority of them produced errors and revealed alternative conceptions. 46.5% drew longer and/or shorter magnitude of vector components. 43.1% drew vectors in different forms or wrote down other symbols. Results from the unstructured interview indicated that some students just memorized the method to get numerical magnitude of x- and y-components. About graphical form of component vectors, some students thought that the length of component vectors should be shorter than those of the given one. So then, it could be combined to be equal length of the given vectors while others thought that component vectors should have the same length as the given vectors. It was likely to be that many students did not develop a strong foundation of understanding in vector components but just learn by memorizing its solution or the way to compute its magnitude and attribute little meaning to such concept.

Keywords : graphical vectors, vectors, vector components, misconceptions, alternative conceptions

Conference Title : ICPE 2016 : International Conference on Physics Education

Conference Location : Singapore, Singapore

Conference Dates : September 08-09, 2016