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Students' Alternative Conception in Vector Components with and without Physical Context

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2 open ended problems designed based on research instruments used in physics education research had been used to explore students' conceptual and procedural understanding of vector components. With and without physical context, we asked students to find out magnitude and graphical form of vector components. The problems were given to 211 first year students of faculty of science during the third semester in 2014 academic year. The students spent approximately 15 minutes of their General Physics I course to complete the open ended problems. Consequently, their responses were classified based on the similarity of errors performed in the responses. The study results showed that without physical context, 53% of the students provided correct numerical magnitude of vector components while 10.9% of them punctuated the magnitude of vectors in x- with y-component. Others 20.4% provided just symbols and there was no answer of the last 15.6%. When asking to draw graphical form of vector components, only 10% of the students made corrections. A majority of them produced errors and revealed alternative conceptions. 46.5% drew longer and/or shorter vector components. 43.1% drew vectors in different form or wrote down other symbols. With physical context, only 6.6% of the students made corrections in numerical magnitude while 6.2% drew longer and/or shorter vector components. Almost all of them drew other force vectors in any axis instead. It indicated that many students did not develop a strong foundation of understanding in vector components and could not apply those concepts to such problems with physical context.

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