A STUDY OF GRADE ELEVEN STUDENTS' REPRESENTATIONS OF ELECTRICITY THROUGH MODEL-BASED INQUIRY

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Generally, students find learning electricity topics difficult. Students struggle to construct their own model of learning because many of the interactions are invisible, it is an abstract and very complicated concept. Multi-representations are used as tools to help students construct representations to connect their understanding of the concept, rather than memorizing definitions and presenting what they have learned. We are presenting research that aimed to study grade 11 students' ability to construct representations of electricity through model-based inquiry. The action research was implemented in this study with two action research loops to improve students' representations. The first Loop consisted of Ohm's law, electric resistivity, conductivity, and resistor connection. The second loop consisted of electrical energy and potential difference, electrical energy, electric power, and battery connection. The representations of students were collected after loop one and loop two of the implementation. The students' representations were interpreted and grouped into five levels based on Kozma and Russell (1997) consisting of 1) Representation as Depiction 2) Early Symbolic Skills 3) Syntactic Use of Formal Representations 4) Semantic Use of Formal Representations 5) Reflective Rhetorical Use of Representations. The grouping of students' representation was according to the propriety of each answer using scoring criteria based on Jaber and Boujaoude (2012), and Wang (2007), consisting of fair, good, and very good.

The results showed that students' representations of electricity in loop one were as follows: 53.125% of students' representations were fair and 46.875% were good at level II on Ohm's law; 37.5% of students' representations were fair, 9.375% were good and 53.125% were very good at level II on electric resistivity and electric conductivity; 59.375% of students' representations were fair, 6.25% were good and 34.375% were very good at level II on resistor connection. The results showed that students' representations of electricity in loop two were as follows:46.875% of students' representations were fair, 31.25% were good and 21.875% were very good at level III on electrical energy and potential difference; 53.125% of students' representations were fair, 25% were good at level III and 21.875% were very good at level III on electrical energy and electric power; 53.125% of students' representations were fair, 15.625% were good at level III and 31.25% were very good at level IV on battery connection. The results show that students' representations were improved by model-based inquiry. Students' representations were improved from loop 1 to loop 2 of the action research.

We concluded that model-based inquiry is an alternative way that helps physics teachers to reduce learning difficulty. Teachers should design activities to facilitate students to express and transfer representation coherently and correctly.

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