

**THE DEVELOPMENT OF
CONCEPTUAL UNDERSTANDING
AND
PROBLEM-SOLVING SKILLS
IN
THE DOMAIN OF ELECTRIC CIRCUIT
AMONG PMR HIGH-ACHIEVERS**



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Project Leader

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ABSTRACT

Modeling is the essence of scientific thinking.....

Parallel and series electric circuits are introduced to students for the first time through the topic of Electricity in PMR Science at Form Three. This study was anchored on the premise of constructivism and designed to investigate the effect of instruction of the topic of electricity at the PMR level on the formation of useful mental models among high-achiever students for problem-solving using simple electric circuits of the parallel type as a context. The research approach employed was a students survey to collect data from 148 students (75 male; 73 female).

Among the major findings are:

- Most high-achiever students do not possess accurate models of simple electric circuits as presented implicitly in PMR science textbooks;
- Most high-achiever students display poor procedural understanding for solving simple problems concerning electric circuits and have no in-depth conceptual understanding in terms of practical knowledge of current, voltage, resistance, and circuit connections;
- A majority of the high-achiever students encounter difficulty in discerning parallel connection in combined circuit that is drawn in a non-conventional format and in connecting correctly a circuit of the parallel type; and

- On the parameter of gender, a t-test for equality of mean scores shows that there is no significant difference between the gender at the 5% significance level for circuit recognition, understanding of the operational knowledge of current, voltage, circuit connecting skills, and computational skills. However, significant different between gender is found at operational knowledge of resistance with male outperformed female.

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