REMOTE LEARNING ON DC CIRCUIT ANALYSIS BY USING THE SETS OF VIDEO DEMONSTRATIONS AND PhET SIMULATIONS FOR PREPARING READINESS OF PRE-SERVICE TEACHERS

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The COVID-19 pandemic has spread around the world, it has not only severely affected global economic growth but also education. Online learning activities were developed and integrated in blended courses. We are presenting a study, where teaching and learning sequences were designed on: electric current; resistance; series and parallel circuit connection; and electrical power in DC circuits. These were proceeded by video demonstrations and PhET simulations based on guided inquiry activities. The sample consisted of 32 fourth-year teacher students enrolled in a science teaching for secondary school course. The goal of this study was to enhance students' performance on a DC circuit analysis task while also improving their readiness for emergency remote learning of the designed online learning activity sets.

To assess the students' performance, we developed and administered pre- and post-tests using the "Determining and Interpreting Resistive Electric Circuit Conceptual Test", which consists of 28 questions. The questions were selected from standard physics textbooks. They were divided into 6 categories: 1) electrical power, 2) series circuit, 3) parallel circuit, 4) complex circuit, 5) EMF of batteries in circuit and 6) closed circuit, opened circuit and short circuit. The six-point rating scale self-assessment (0 to 5) was administered to survey the confidence level of students in their answers.

The results of students' performance were analyzed by average normalized gains (<g>). The <g> value of this group was 0.51. The highest <g> value of 0.82 was in series circuit, whereas the lowest <g> value of 0.18 was in closed circuit, opened circuit, short circuit. The <g> of the other 4 topics were in the medium gain regime. The overall confidence level of students was increased from 2.15 to 3.77. Moreover, students' reasoning to their answer showed that about 60% of the students could analyze the current, the resistance, and the power in the DC circuits. The results indicated that the designed activities could help improve students' analysis performance and boost students', pre-service teachers', readiness and confidence for online learning.

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