

Virtual lab-Based Scientific Investigation Assisted by PhET Interactive Simulations to Improve Students' Learning and innovation skills

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ABSTRACT

The aims of this study were (1) to produce a natural science learning design with PhET-assisted virtual lab-based scientific investigation that is feasible in enhancing learning and innovation skills; (2) analyzing the practicality of science learning designs with PhET-assisted virtual lab-based scientific investigation; and (3) analyze the effect of applying science learning with PhET-assisted virtual lab-based scientific investigation on improving students' learning and innovation skills, especially communication and collaboration skills.

The research method that will be used is development research with a 4-D model which consists of 4 main stages, namely: Define, Design, Develop, and Disseminate. The research instruments that will be used are assessment sheets (product validation) of material experts, media experts, teacher response questionnaires, student response questionnaires, communication skills observation sheets, and collaboration skills observation sheets. Data on the feasibility of models and learning tools were analyzed descriptively qualitatively and quantitatively while the data on the effect of their application were analyzed statistically inferentially. To see the significant difference in the effect of using the learning design, an independent sample t-test was used.

The main results to be achieved are (1) a science learning design has been developed with a virtual lab-based scientific investigation assisted by PhET Interactive Simulations which is declared "very feasible" for use in improving communication and collaboration skills, (2) a science learning design with a virtual lab-based scientific investigation assisted by PhET Interactive Simulations was declared "very practical" to be applied in science learning, (3) there was an effect of applying science learning with virtual lab-based scientific investigation assisted by PhET on communication and collaboration skills.

Kata Kunci: *Virtual lab, scientific investigation, PhET Interactive Simulations, Learning and innovation skills*