

# **Development of E-Science Teaching Materials NOS within Inquiry Approach and its Effect on 21st century skills**

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## **ABSTRACT**

The objectives of this study are to: (1) produce science-based electronic teaching materials (e-teaching materials) with an Nature Of Science (NOS) within inquiry approach that are appropriate according to experts and teachers; (2) produce prototypes of science teaching materials with an Nature Of Science (NOS) within inquiry approach; (3) produce Subject Specific Pedagogic (SSP) for science learning with an Nature Of Science (NOS) within inquiry approach; (4) examine the effectiveness of e-science teaching materials with an Nature Of Science (NOS) within inquiry approach in developing 21st century skills of junior high school students. This study is a follow-up to the results of preliminary research on inquiry profiles and literacy of junior high school students which showed that most of the categories were quite good (on a scale of 3).

The preparation of learning tools will be carried out through Research and Development (R & D) following the 4-D model (Define, Design, Develop, and Disseminate). Learning tools that will be developed include e-science teaching materials in the form of modules or Student Activity Sheets. The subject matter that will be selected includes material in the Competency Standards that is relevant to the inquiry approach as the context of its implications. Product validation of e-science teaching materials was carried out through internal reviews, external reviews, limited trials using an experimental research approach, and continued with dissemination as a wider trial. Data on the quality of the learning tools developed were collected using a review sheet. Data on the teacher's perspective on understanding NOS, learning experiences with inquiry, and 21st century skills were collected through a questionnaire. Data on the quality of e-teaching materials were collected using expert and teacher validation questionnaires. Data on the effectiveness of learning tools for the development of 21st century skills were collected by means of tests and observations and questionnaires. The teacher's perspective data, the results of the validation of learning tools, and the results of observations were analyzed descriptively, while the test results data regarding the effectiveness of the application of e-science teaching materials to students' 21st century skills were analyzed inferentially.

The results showed that most of the science teachers still did not understand that the main purpose of learning science, the understanding of NoS that science teachers had, there were still some mistakes, and the experience of teaching 21st century skills still needed to be optimized. Based on this need analysis, electronic teaching materials with an inquiry approach containing NoS were developed in the form of as many as LKPDs, namely the Energy LKPD and its Changes and the Additive Substance LKPD. The two LKPDs were considered suitable for use in junior high school science learning by experts and teachers, with some suggestions as material for product revision. Furthermore, based on the test results, it was found that the use of electronic teaching materials with an Nature Of Science (NOS) within inquiry approach greatly influences 21st century skills, and causes a significant difference between before and after learning using e-teaching materials with NoS-charged inquiry approach.

*Kata Kunci: e-learning material, 21 century skills, NoS within inquiry approach*