

## **E-MARS, Thinking skills, STEM, Etnosains, IPA**

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### **ABSTRACT**

Thinking Skills are skills that are needed in the 21st century. Thinking skills are essential skills so that a person can develop and contribute effectively to become part of society. Education, including science learning, plays an important role in equipping students to have thinking skills. However, there is still a gap between research and policy and what actually happens in practice. Learning that takes place in schools is still not optimal in teaching students to learn to think, especially during this pandemic era due to limited learning time. Whereas learning should emphasize finding and applying knowledge effectively in everyday life and not just memorizing. In addition, in recent decades science learning has emphasized STEM (Science, Technology, Engineering, and Mathematics) education and has prioritized STEM as an educational reform. However, the implementation in Indonesian science education is still not due to the lack of teacher readiness. Therefore, it is important to develop teaching materials that can support the implementation of STEM-based science learning. It is important to do research on E-MARS: STEM-based Ethnoscience Electronic Module to develop students' critical thinking skills in the VUCA era (Volatility, Uncertainty, Complexity, Ambiguity). So far, there has been no research related to STEM-based ethnoscience e-module. In fact, in Indonesia there are many ethnoscience that are not yet known by the wider community. Where with STEM-based ethnoscience students can learn science related to the culture of society by using technology.

The research design uses Research and Development with a 4D model from Campbell. The subjects of this study were 7th and 8th grade junior high school students at Yogyakarta Middle School. The research data was collected using e-module feasibility validation questionnaires, critical thinking skills tests, and student response questionnaires. Product feasibility data and student responses were analyzed descriptively quantitatively and qualitatively, while the data resulting from thinking skills were analyzed descriptively quantitatively and inferentially using a paired t-test. The targeted outputs are in the form of: publications in Scopus indexed international journals, and proceedings of international seminars, copyrights in the form of e-modules. The targeted TKT is 2.

The results showed that the product in the form of an electronic module based on STEM integrated with ethnoscience was deemed feasible by the expert. This product is also effective for critical thinking as indicated by a significance value (p value)  $<0.05$  from the results of the t test which means that there is a significant difference in students' critical thinking skills between before and after learning with EMARS.

*Kata Kunci: E-MARS, Thinking skills, STEM, Ethnoscience, Natural Science*