

# **Research Oriented Collaborative Inquiry Learning Environmentally Friendly Polymer Electronic Module to Improve Students' Critical Thinking and Communication Skills**

**by Prof. Dr. Eli Rohaeti, M.Si., Prof. Dr. Jumadi, M.Pd., Adilah Afikah, S.Pd.**

## **ABSTRACT**

The research conducted aims to; (1) develop electronic modules that are arranged based on the stages of the Research-Oriented Collaborative Inquiry Learning (REORCILEA) model in influencing critical thinking skills and communication skills, (2) test the feasibility, practicality, and legibility of the developed electronic modules, (3) determine skill profiles students' critical thinking and communication skills, and (4) testing the effectiveness of using REORCILEA-based electronic modules to improve student competence including critical thinking skills and communication skills. This type of research is development research with the ADDIE model. Research procedures include Analysis, Design, Develop, Implementation, and Dissemination. The research procedure was carried out in this first year up to the Design stage. Data collection techniques in the first year included non-test techniques (interviews, documentation, observation, and questionnaires). Data collection instruments include interview sheets and questionnaires for students and lecturers.

Based on the results of the analysis stage research, namely literature studies and initial needs analysis of 16 lecturers and 12 students from different tertiary institutions related to lecturer analysis, student analysis, and curriculum analysis, the result was that polymer chemistry courses were important in supporting students' abilities in the world of work. Its application is very much found in everyday life. There are no practicum activities in polymer chemistry courses because, in general, polymer chemistry courses are elective courses. Students study using textbook teaching materials, polymer chemistry books, and journals, but there are no independent learning resources that students can use in learning. The learning model used has yet to connect conceptual knowledge and practice. Lecturers still measure critical thinking skills based on student exam results rather than on direct activities during learning. In contrast, communication skills have not been measured much because they are limited to assessing student presentation activities. Based on the Semester Learning Plan (RPS) obtained during the curriculum analysis, it was found that the materials to be included in the developed Electronic Module were biodegradation, environmentally friendly polyurethane, antibacterial cellulose, polyester, cotton, and animal skins.

The results of the design phase research are designing REORCILEA-based eco-friendly polymer electronic modules and designing instruments for assessing students' critical thinking and communication skills. The module component blueprints include study guides, activity objectives, material summaries, activities, feedback, tests, and references. It was found that the instrument design for assessing students' critical thinking skills consisted of 5 dimensions, ten aspects, and 16 indicators, the instrument for assessing oral communication skills consisted of 4 dimensions, 11 aspects and 24 indicators. The instrument for assessing written communication skills consisted of 3 dimensions, seven aspects and 16 indicators. The REORCILEA-based eco-friendly polymer electronic module is in the development stage. The instrument for critical thinking and communication skills is in the validation stage by expert judgment. The second-year research has target results in the form of critical thinking ability assessment instruments and communication skills instruments tested for validity and reliability. The electronic module based on REORCILEA has been tested for feasibility, practicality, and limited-scale trials have been carried out.

**Kata Kunci:** *electronic modules, eco-friendly polymers, REORCILEA, critical thinking skills, communication skills*