

### **1. Title:**

## **PROCESS-ORIENTED GUIDED INQUIRY LEARNING (POGIL)-BASED LABORATORY MODULE IN HUMAN ANATOMY: THE FUTURE OF SCIENCE INSTRUCTION**

### **2. Research Overview:**

International assessment results such as TIMSS and PISA were one of the main reasons behind the Philippine government's decision to review and update the curriculum. These results imply the lack in comprehension and analytical skills of the learners not just in math, but also in science and other core subjects. Several research studies suggest that limited hands-on exposure and laboratory skills affect the overall development of students. This research, however, is focused on addressing the research gap of limited science laboratory module incorporating process oriented guided inquiry learning (POGIL).

### **3. Purpose of Study:**

In an effective science instruction, laboratory-based learning is one integral aspect of experiential learning. Laboratory modules specifically bridge the gap between theoretical knowledge and practical applications, particularly in Human Anatomy. However, despite their importance, there remains a research gap in the availability and implementation. The absence of laboratory modules may impact the students' ability to develop essential scientific and problem-solving skills, and conceptual understanding.

This research aimed to address the gap by developing a laboratory module in Human Anatomy utilizing the Process-Oriented Guided Inquiry Learning (POGIL) approach. POGIL is an instructional strategy which gives students the opportunity to collaborate and learn through inquiry-based learning. In this study, the students were encouraged to engage actively in structured activities, to think critically, and to solve problems through teamwork and analytical skills. The integration of POGIL in laboratory modules offered a structured yet student-centered approach that enhances students' scientific comprehension and experiential learning particularly in anatomical concepts.

#### **4. Research Methods:**

To gain comprehensive insights into the development and effectiveness of the POGIL-based laboratory module, the study employed a triangulation convergent parallel mixed method design with the embedded modified three-group Solomon Experimental design. This approach allowed for the evaluation of both the instructional impact and potential pretest sensitization effects. In the first approach, participants were strategically divided into three distinct groups to capture multiple quantitative and qualitative perspectives: biology experts, who provided content validation and pedagogical alignment; science teachers, who assessed instructional feasibility and classroom applicability; and students, who served as end-users to evaluate engagement, comprehension, and learning outcomes. These participants also provide qualitative feedback which was used to emphasize the quantitative results. In the second approach, the researcher used the Modified Solomon Three-Group Pretest-Posttest Design. These three-group design consist of one Experimental group and two Control groups. The Experimental Group and Control Group 1 were given pretests while the Experimental Group and Control Group 2 were subjected to the treatment. Then after the term, all of the groups were given post-tests. This design provided the most appropriate control of the threats to internal validity since quasi-experimental designs do not include randomizations of subjects (Fraenkel et al., 2023).

Lastly, the triangulation approach, quantitative survey results, qualitative open-ended interview results and the experimentation ensured a holistic understanding of the module's design, implementation, and educational value across key stakeholder categories.

#### **5. Results and Discussion:**

The analysis of pre-test and post-test scores from the experimentation revealed statistically significant differences among the Experimental Group and the two Control Groups, with results favoring the Experimental Group ( $p < .001$ ). This suggests that the implementation of the POGIL-based laboratory module had a substantial positive effect on learners' academic performance. Quantitative and qualitative feedback from biology

experts and science teachers further supported the module's effectiveness, while also offering constructive recommendations for improvement. Key suggestions included enhancing the clarity and appeal of visuals and illustrations, as well as integrating more real-world applications to strengthen contextual relevance. Despite these recommendations, all respondent groups—experts, teachers, and students—consistently recognized the module as a valuable and effective instructional tool that promotes active learning and conceptual understanding in science education.

**6. Keywords:**

Process-Oriented Guided Inquiry Learning (POGIL), Laboratory Module, POGIL-Based Laboratory Module, Inquiry-based learning, Process-Skills