



Students' Performance and Cognitive Skills in Chemistry Through Case-Based Learning Approach

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ABSTRACT

Objective: This study investigated the effects of a case-based learning (CBL) approach on academic performance and cognitive skills among Grade 9 students. Specifically, it aimed to determine the level of students' academic performance in Chemistry as exposed to CBL and non-CBL; assess students' level of cognitive skills; ascertain significant differences in students' cognitive skills; find out the difference in the student's academic performance and determine the significant difference on students' level of knowledge retention. **Method:** The study employed a quasi-experimental research design using two comparable group classes. A validated teacher-made questionnaire was used to determine students' academic performance. The Gibson Cognitive Skill questionnaire was used to measure cognitive skills. **Results:** It was found that students in both groups had better academic performance in the post-test than in the pre-test. Students exposed to CBL performed better and scored higher than those under non-CBL. Meanwhile, students exposed to CBL had high cognitive skills, while those exposed to non-CBL had moderate cognitive skills. There was a significant difference in students' cognitive skills between CBL and non-CBL groups. Moreover, a significant difference existed in students' academic performance in the post-test and retention test between the two groups. **Novelty:** Recognizing the positive effect of case-based learning on students' performance, science teachers may consider integrating CBL as a practical alternative pedagogical approach to address the problem of lack of retention of science concepts.

INTRODUCTION

Science education aims to help students grasp ideas and improve their capacity to apply them to new situations. Educators must give learners the information and abilities to tackle complicated problems and think critically. However, this aim was impeded due to a lack of understanding and cognitive skills, which have an inevitable role in the student's academic performance. This problem is persistent in the Philippines, the low performance of Filipino students in science is evident in the National Achievement Test (NAT), Trends in International Mathematics and Science Study (TIMSS), and even the recent Programme for International Student Assessment (PISA) results. In PISA 2022, the country obtained an average scientific literacy score of 356 points, significantly lower than the standard score of the Organization of Economic Co-operation and Development (OECD), 485 points (OECD, 2023). The scientific literacy of the Philippines needs to catch up to that of the ASEAN countries that participated. This is quite alarming to note about studies on academic performance. Teaching approaches should be developed and applied to meaningful and retentive learning (Andarino, 2019).

A previous study found that Filipino students have relatively low scores on cognitive skills assessments in chemistry (Hasanah & Shimizu, 2020). According to Shi

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