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ABSTRACT

This study attempted to determine the effectiveness of practicals in enhancing conceptual understanding about cellular respiration in relation to the functioning of six body systems and enhancing inquiry skills.

The study was quasi-experimental in research design and involved forty First Year 1-A and 1-D BEED students enrolled in Natural Science 102 during the Second Semester of AY, 2000-2001 at West Visayas State University in Iloilo City.

A pre-and post-instruction conceptions test, inquiry skills test, concept maps and interviews served as sources of data for the study. Ten case students from the experimental and control groups, respectively, were also selected for qualitative aspect of the study.

The intervention consisted of seven practicals that dealt with cellular respiration, the functioning of six body systems in relation to cellular respiration and the changes that occur during vigorous activity or emergency. Students also analyzed the practicals requiring the use of eight inquiry skills, namely, identifying the problem, formulating hypothesis, designing a procedure to test the hypothesis, interpreting data, recording data in a form that facilities correct interpretation, seeing patterns and relationships in a set of data, judging adequacy of data and inferring. They also answered questions in relation to the procedure in the practical to enhance their conceptual understanding.

To determine their conceptual understanding and inquiry skills, students gave reasons or explanations for their answers in the multiple-choice questions of the conceptions test on the topic covered in the practicals. They also made pre- and post-instruction concept maps and were interviewed on the same topic. To determine their inquiry skills, students were asked to answer a researcher-made inquiry skills test. Factors that influenced their conceptual understanding, and inquiry skills were also determined.

The control group was taught using the traditional lecture method. For the enhancement of their inquiry skills, they analyzed articles on completed experiments, one of which was discussed in class.

Findings show that students who performed the practicals were able to learn more scientific concepts than those taught using the traditional lecture method. However, the difference was not statistically significant.

The two groups share similar alternative conceptions which they brought with them to school, and instructional methods used in both groups was not effective in changing several

alternative conceptions. The bases and types of reasons of most students in both groups were precausal, macroscopic and incomplete, suggesting rote learning (Chin *et al.,* 2000, p. 110). A few students in the experimental group were also able to relate more concepts and integrate them as shown in the number of correct propositions and cross-links in their concept maps.

Students in the experimental group also performed better in the use of inquiry skills than the control group. The difference in their mean scores was significant. They improved greatly in their performance in the use of inquiry skills from pre- to post-test, specifically, in identifying the problem, formulating hypotheses and seeing patterns or relationships in the data. The difference was statistically significant for identifying the problem and seeing patterns or relationships in the data, and nearly so for formulating a hypothesis.

The factors that facilitated the enhancement of students' conceptual understanding in the experimental group were the demonstration with or without dissection and collaborative learning. The inhibiting factor was a lack of background knowledge about the topic. For the inquiry skills, the factors that enhanced their skills were the practicals and exposure to experiments in high school. Those with limited exposure tended to base their answers on a single, obvious factor and disregard relevant data.

This study provided evidence that practicals are effective in enhancing students' inquiry skills. It also identified tenacious alternative conceptions on cellular respiration in relation to the functioning of six body systems that urgently need to be addressed using conceptual change strategies. Lastly, it produced instructional materials (the practicals) which teachers can utilize in their natural science classes or use as a guide for developing their own practicals.