

# ENTREPRENEURSHIP-BASED BIOLOGY TEACHING AND LEARNING: STUDENTS' ACADEMIC ACHIEVEMENT AND MOTIVATION

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## INTRODUCTION

Entrepreneurship is defined as an individual's ability to turn ideas into action and is therefore a key competence that needs to be developed in young people. It is about growth, creativity and innovation. Innovative entrepreneurs contribute to a nation's economic growth. They begin companies; they reorganize companies in need of changing; they innovate within larger organizations. Education has taken an essential role in shaping attitudes, skills and culture. Entrepreneurship education provides a mixture of experiential learning, skills building and mindset shift. Integration of entrepreneurship education through practice could be a strategic move towards preparing students not only to live better lives but also to make meaningful contribution to their community. Integration of entrepreneurship in biology lessons could help deepen students' understanding of science concepts and improve their motivation to learn while acquiring entrepreneurial skills that could lead to gainful employment. Studying motivation can provide vital information on its influence on the development of students' critical thinking, conceptual understanding and mindset. This study aims to investigate the effects of integrating entrepreneurship in teaching biology on the students' academic achievement and motivation to learn.

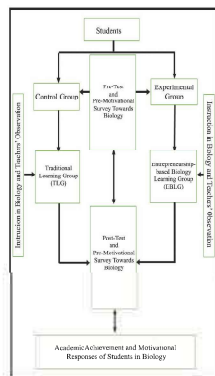


Figure 1. Research Paradigm

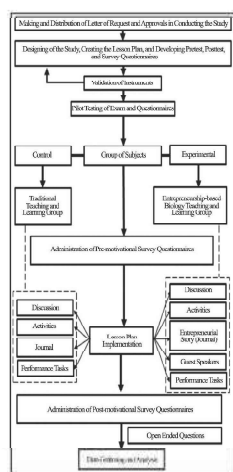


Figure 2. Experimental Procedure

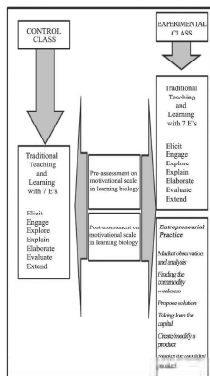


Figure 3. Comparison of learning activities between TLG and EBLG groups

## METHODOLOGY

Figure 1 shows the research paradigm. Pretest and pre-survey were administered prior to the implementation of the experiment. Both groups were given similar readings, instruction and learning activities in biology. Teacher observation was done to ensure that the prescribed learning objectives and outcomes were attained and to objectively assess the effect of entrepreneurship integration in the instruction delivery. After the intervention, posttest and post-survey were administered to collect data on students' academic achievement and motivation to learn. Figure 2 illustrates the detailed experimental procedure using a flow diagram. Figure 3 shows the similarities and differences and similarities in the two groups, TLG and EBLG. Both groups were given the same reading materials, classroom lectures and learning activities, with their lesson plans following the 7E's teaching and learning method by Eisenkraft (2003). The Entrepreneurship-based Biology Learning Group, however, experienced entrepreneurial practice throughout the study.

## RESULTS AND DISCUSSION

Figure 4 shows that the academic performance of the students improved after exposure to traditional instruction delivery, with their scores shifting from developing in the pretest to approaching proficiency in the posttest. Based on paired t-test analysis, the difference in pretest and posttest mean scores is statistically significant.

Figure 5 shows that there is a remarkable improvement in the EBLG's test scores after exposure to entrepreneurial practice. While the scores of most of the students in the group were in the proficient level, some obtained very high scores that fall in the range of advanced proficiency level. Paired samples t-test analysis proved that the difference in the pretest and posttest scores is statistically significant. This suggests that the integration of entrepreneurship in biology may have contributed to the improvement in academic performance. Independent t-test analysis also revealed a statistically significant difference in the posttest scores of the EBL and TL groups. The EBLG has higher mean score of 30.55 compared to 23.19 of the TLG.

Figure 6 shows how the motivational level of the TLG shifted from high in the pre-survey to very high in the post-survey. Figure 7 shows a similar increase in motivational scores of the EBLG in the post-survey. This suggests that the integration of entrepreneurship in biology remarkably improved the students' motivation to learn. The EBLG had a higher mean score (4.26) than the TLG (3.95), which suggests that the group that was exposed to entrepreneurial practice were more motivated to learn biology than those exposed to traditional learning.

The relationship of academic achievement to the students' motivation in learning biology is presented in the scatter plot in Figure 8. The computed correlation was 0.455 and described as positive and moderate. This result is consistent with other studies (Tuan et al. 2005) that reported moderately strong ( $r = 0.41$ ) and statistically significant correlation between motivational factors and students' science achievement scores.

## CONCLUSION

The integration of entrepreneurship in biology lessons can enhance students' conceptual understanding and motivation towards the subject matter. Moreover, the statistically significant differences in the achievement and motivational gain scores in favor of the entrepreneurship-based biology learning imply that the integration of entrepreneurship can improve students' scientific knowledge and motivation while developing their entrepreneurial skills.

### ACADEMIC ACHIEVEMENT

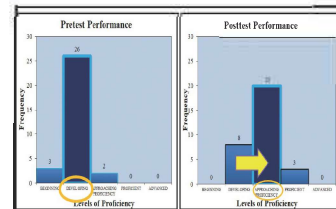


Figure 4. Bar graphs showing the pretest and posttest performances of the Traditional Learning Group

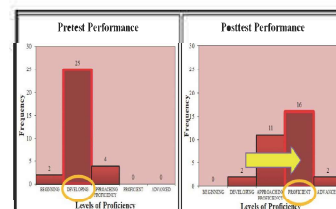


Figure 5. Bar graphs showing the pretest and posttest performances of the Entrepreneurship-based Biology Learning Group

### MOTIVATION TOWARDS BIOLOGY

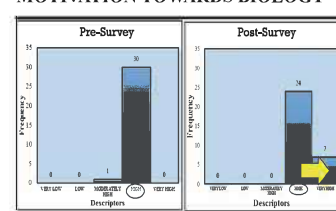


Figure 6. Bar graphs showing the pre motivational and post motivational survey results of the Traditional Learning Group

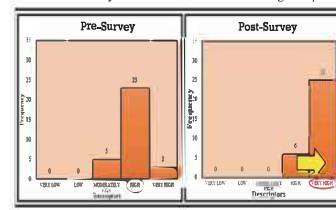


Figure 7. Bar graphs showing the pre motivational and post motivational survey results of the Entrepreneurship-based Biology Learning Group

### CORRELATION

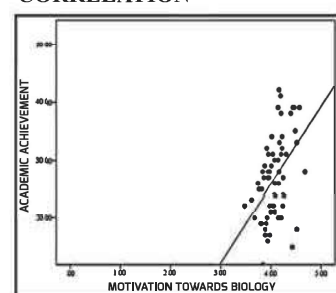


Figure 8. Scatter plot showing the academic achievement and Motivation towards biology correlation at +0.455

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