

Problem-based Learning

A Study on its Impact on Learners' Motivation, Strategy Use, Learning Processes and Academic Achievement

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KEY IMPLICATIONS

- Problem posing, prior knowledge and sufficient scaffolding are important to help students engage deeply in their problem-based learning (PBL) process.
- PBL facilitates collaborative learning compared to didactic traditional classroom.
- Deep learning and scaffolding are important in enhancing student engagement in an inquiry-based learning environment in secondary school.

BACKGROUND

PBL is an innovative pedagogical approach whereby real-life problems are the focal points for learning and students exercise autonomy for their learning (Chua, Tan, & Liu, 2016a). This study aims to examine the impact of the PBL intervention on learners' motivation, learning strategy use, PBL processes, and academic achievement in a secondary school learning context. The findings from the research are relevant to the Ministry of Education's (MOE) call for authentic learning within schools. PBL inquiring approach to learning is also in line with MOE's vision of "Thinking Schools, Learning Nation" (TSLN).

FOCUS OF STUDY

The main purpose of the research sought to understand if PBL has a positive impact on students' motivation and develop their strategy use. In addition, it provides insights from the students' perspectives on the factors in PBL that facilitate students' motivation, cognition and academic achievement.

KEY FINDINGS

2×2 Analysis of Variance (ANOVA) with repeated-measures showed that:

- Significant main effect of time (before vs after) for application and decision making, collaborative learning and deep learning. That is, post-intervention scores on each of these dimensions were higher than pre-intervention scores.
- Significant main effect of treatment for collaborative learning. That is, students in the experimental group scored higher than those in the control group on this dimension.
- Significant interaction effect (time x treatment) for scaffolding scores. That is, for the control group, post-intervention scores were higher than preintervention scores. However, this difference was not observed in the experimental group.

Regression analysis results showed that:

- Deep learning was a significant positive predictor of self-efficacy after controlling for gender, group and pre-intervention scores.
- Scaffolding and deep learning were significant positive predictors of interest.
- For task importance and usefulness, scaffolding was a positive significant predictor and deep learning was a marginally significant predictor, whereas, surface learning was a significant negative predictor.

An examination of the qualitative data showed that students perceived PBL as an opportunity to collaborate, engage in deep learning and problem-solving and provide context for their learning through real-world applications (Chua, Tan, & Liu, 2016b). Nonetheless, it was not without its pitfalls such as the lack of prior knowledge and sufficient scaffolding, high demands on time and effort, etc.

SIGNIFICANCE OF FINDINGS

1. The study showed the importance of deep learning and scaffolding in enhancing student engagement in an inquiry-based learning environment in secondary school.
2. PBL also facilitated collaborative learning compared to didactic traditional classroom. Students were able to engage in multiple perspectives, learn better and develop social skills in the process of collaboration.

3. Problem posing was important to trigger learning in students. Teachers needed to craft problems that were relatable to students and had real-life applications.
4. Providing students with some prior knowledge and sufficient scaffolding throughout the whole process was also required to help students engaged in deeper learning which would help them develop higher levels of self-efficacy.

PARTICIPANTS

This study involved five teachers as well as 470 students, recruited across 4 secondary schools in Singapore.

RESEARCH DESIGN

The study is a quasi-experimental research design examining the extent to which a PBL intervention affects the motivational orientations, strategy use, learning processes and academic performance of learners.

REFERENCES

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