



Investigating Relationships between Undergraduate Students' Flow Experience, Academic Procrastination Behavior, and Calculus Course Achievement

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ABSTRACT

Purpose: Calculus is generally offered as a freshman year course and is a prerequisite for some advanced STEM (Science, Technology, Engineering and Mathematics) related courses in some of the undergraduate programs. However, students experience difficulties in Calculus courses leading to lower levels of achievement. Thus, there is a need for examining the factors which may be related to students' achievement in Calculus courses. According to relevant literature, procrastination behaviors can diminish students' achievement.

Additionally, flow emerges as an important factor which may be related to students' achievement and procrastination but these relationships have not been studied in the context of Calculus course. The purpose of this study was twofold: Firstly, undergraduate students' academic procrastination was examined in relation to dimensions of flow experiences (i.e. challenge-skill balance, merging of action and awareness, clear goals, concentration on the task at hand, loss of self-consciousness, transformation of time, autotelic experience) in Calculus I course. Secondly, undergraduate students' academic achievement in Calculus I course was explored in relation to their academic procrastination and dimensions of flow experiences. **Research Methods:** A total of 117 undergraduate students (54% female and 46% male, $M_{age}=23.00$) from various departments participated in an online survey. **Findings:** Multiple regression analysis showed that among flow experience dimensions, concentration on the task at hand was negatively related to procrastination. In addition, two-step hierarchical regression analysis indicated that procrastination predicted achievement negatively in the first step. On the other hand, in the second step, only challenge-skills balance dimension of flow experiences predicted achievement positively. **Implications for Research and Practice:** In Calculus courses, "concentration on the task at hand" and "challenge-skill balance" dimensions of flow emerge as important variables in students' procrastination and achievement, respectively. If students are given tasks which foster their focus, their procrastination behavior can be diminished. In addition, if they are given tasks which are appropriate to their level and skills, their academic achievement can be predicted higher. In this context, in Calculus courses, there should be real life applications which are related to students' own interest and skills. STEM related activities can be a part of Calculus lessons. Inter-disciplinary studies can foster both their interest, so their concentration and their skills. Therefore, their academic achievement can be higher.

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