Examining Self-efficacy and Achievement in an Educational Research Course

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Abstract

This study examined the level and pattern of self-efficacy and achievement and the extent to which self-efficacy and achievement changed over the course. Sixty-four 3rd-year undergraduate students from the Faculty of Education in central area of Bangkok, Thailand, who were registered in a compulsory educational research course (31 women and 33 men) participated. A 14-item questionnaire assessed students’ self-efficacy at three time points separated by two-month intervals. Mid-term and final tests assessed students’ achievement. The results showed that most students in the study scored highly on self-efficacy and achievement (42.188%). Students with high self-efficacy tended to perform well academically. Self-efficacy and achievement improved during the course, with average scores of 3.496 and 74.547 respectively. The improvement was statistically confirmed by a repeated-measures ANOVA and dependent t-test, respectively.

1. Introduction

Academic success is influenced by various sources. In this study, I investigate the possible influence of achievement-related self-efficacy, developed during an educational research course, in undergraduate students. The
education research course is a requirement for student teachers in Thailand and is aligned with the professional standard for Thai teachers. This course provides students with fundamental knowledge that is applicable, for example, meaning of research, type of research, research process, research instrument, instrumental reliability and validity, and writing a research proposal and report. Therefore, students learn new content in the course that requires prior knowledge such as statistics, measurement, and evaluation. Some students who are not math majors experience difficulty in learning and applying the concept to the research. However, previous studies have suggested focusing on students’ self-efficacy to enhance their achievements.

This research aims to:
• examine the level and pattern of self-efficacy and achievement and
• explain how and to what extent self-efficacy and achievement change over the course.

1.1. Self-efficacy

Self-efficacy has received the attention of researchers in the field. Students with high self-efficacy are generally less anxious, more confident, and perform better. Bandura (1977a; 1981; 1982b, cited in Bandura 1993) stated that self-efficacy is the judgment of an individual’s capability in performing activities, working, and learning. In these activities, people who have high self-efficacy tend to perform better, are not afraid to meet new challenges, work easily with others, suffer less stress, and so on.

Studies in education have investigated self-efficacy in 2 aspects: general and domain-specific self-efficacy. General self-efficacy is commonly used in research to study the perceived self-efficacy of individuals such as students or teachers. As a typical goal of education, self-efficacy is expected to lead students to achieve. Teachers, who arguably play the most important role in students’ learning, should therefore have effective strategies that assist students in learning about their own capacities. Margolis and McCabe (2006) suggested the following teaching strategies: mastery experience, vicarious experience, verbal persuasion, and emotional state. They developed these strategies as a practical solution for teachers to improve the motivation of students who struggle with learning. These strategies would help students to believe more in themselves and motivate them to engage in learning activities. As important as it is for students, self-efficacy is also critical for teachers; Hoy (2003) stated that the level of self-efficacy in a teacher would reflect on his/her teaching and interaction with students. Teachers who have high self-efficacy are more likely to accept new ideas, listen to students’ voices and opinion, except challenges, and are able to adjust their teaching easily in case of unreliable circumstances.

However, some researchers have suggested that the relationship between self-efficacy and performance is mediated by domain-specific self-efficacy. These researchers focused on specific domain such as self-efficacy in statistics, self-efficacy in mathematics, or self-efficacy in science. Based on previous research, self-efficacy is predicted to be negatively related to anxiety and positively related to attitude toward subjects, such as motivation and self-concept, and is hypothesized to affect long-term achievement (Parker et al., 2014; Williams, 2014).

In sum, self-efficacy is an important factor at the heart of teaching and learning. Students with high self-efficacy would be able to perform well in school. Teachers with high self-efficacy would be able to perform well at work.

2. Method

2.1. Sample

The study involved 3rd-year undergraduate students from a university in central area of Bangkok, Thailand, who were enrolled in an educational research course. Sixty-four undergraduates participated in the study voluntarily and received no extra credit for the course.
2.2. Questionnaire on self-efficacy

A self-evaluation questionnaire adapted from a self-efficacy scale originally used to assess students’ perception in statistics (Finney and Schraw, 2003) was administered. The questionnaire consisted of 14 items in Thai that were aligned with the course content. Responses were given on a 6-point rating scale ranging from 1 ("no confidence at all") to 5 ("complete confidence"). Cronbach’s $\alpha$ (a measure of reliability) ranged from 0.776 to 0.94.

2.3. Achievement

The students’ scores from the regular course examination, mid-term, and final, were used to assess the achievement gained during the course. The tests consisted of 60 multiple-choice items. The reliabilities obtained (KR20) were 0.879 and 0.835.

2.4. Data analysis

Data analysis was conducted using SPSS for describing the data and testing the research hypothesis. The statistical tests employed were descriptive analysis, repeated-measures analysis of variance (RM-ANOVA), and dependent t-test.

3. Results

3.1. Descriptive statistics

The students’ self-efficacy levels, ranging from 1.000–6.000, were assessed three times during the course, separated by 2-month intervals. The average level of self-efficacy (SEF) ranged from 2.119 to 4.738 (SD = 0.546). Achievement, which ranged from 15.000 to 54.000, was assessed twice. Total achievement ranged from 40.00 to 104.00 (SD = 16.610). Responses were assumed to be normally distributed with skewness ranging from -0.768 to 0.639 and kurtosis values ranging from -1.034 to 1.232 (Table 1).

A comparison of the level of self-efficacy at Time 1 and Time 3 revealed that the students’ self-efficacy had improved by almost 2 times over the course. Furthermore, the students’ final exam scores were higher than their mid-term scores. Total achievement, which combines the test scores from the mid-term and final exam, was 74.547 out of 120 (62.122%).

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
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<tbody>
<tr>
<td>SEF1</td>
<td>1.000</td>
<td>3.143</td>
<td>1.834</td>
<td>0.444</td>
<td>0.639</td>
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<td>4.704</td>
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<td>1.232</td>
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<td>SEF</td>
<td>2.119</td>
<td>4.738</td>
<td>3.496</td>
<td>0.546</td>
<td>-0.456</td>
<td>0.266</td>
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<tr>
<td>Mid</td>
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<td>50.000</td>
<td>35.281</td>
<td>9.454</td>
<td>-0.488</td>
<td>-0.782</td>
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<tr>
<td>Final</td>
<td>25.000</td>
<td>54.000</td>
<td>39.266</td>
<td>7.949</td>
<td>-0.168</td>
<td>-1.034</td>
</tr>
<tr>
<td>Total score</td>
<td>40.000</td>
<td>104.000</td>
<td>74.547</td>
<td>16.610</td>
<td>-0.367</td>
<td>-0.921</td>
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</tbody>
</table>

Note: SEF1-3 = self-efficacy from time 1 to time 3; SEF = average self-efficacy; Mid = mid-term score; Final = final score; Total = total test score
3.2. Pattern of self-efficacy and achievement

According to level of self-efficacy and achievement, the mean criteria were employed in order to divide students into four groups or quadrants (see Fig 1):

- Group 1 (Q1) represents students with high self-efficacy and high achievement,
- Group 2 (Q2) represents students with low self-efficacy but high achievement,
- Group 3 (Q3) represents students with low self-efficacy and low achievement, and
- Group 4 (Q4) represents students with high self-efficacy but low achievement.

Most students had both high self-efficacy and high achievement (Q1, 42.188%), followed by students who had low self-efficacy and neither high nor low achievement (Q2, 20.313%; Q3, 20.313%), and lastly students with high self-efficacy but low achievement (Q4, 17.188%), respectively.

The results implied that students with high self-efficacy were more likely to perform well in class, and that more evidence is required regarding the performance of students with low self-efficacy.

![Fig 1. Scatter plot of self-efficacy and achievement](image)

3.3. Changes in students’ self-efficacy and achievement

The data analysis indicated the changed from repeated measures of self-efficacy and achievement, respectively. The results from the RM-ANOVA provide statistical evidence of individual progress in self-efficacy (see Table 2 and Fig 2) while the dependent t-test did so for achievement (see Table 3).

According to the RM-ANOVA, Mauhly’s test, which was used to validate the result of the RM-ANOVA, obtained highly significant results, $W = .754, \chi^2(2) = 17.50, p < .001$, suggesting that the observed matrix did not have approximately equal variances or covariances. This suggests that using an uncorrected RM-ANOVA would likely result in a Type I error, leading to an incorrect rejection of the null hypothesis. The Greenhouse-Geisser and Huynh-Feldt epsilon correction were also used. The results indicated a significant change in the level of self-efficacy with time, $F(2, 27772.234) = 572.324, p < .05$.

The results of the dependent t-test showed that mean achievement differed between mid-term score ($M = 35.281, SD = 9.454$) and final score ($M = 39.267, SD = 7.949$) at the .05 level of significance ($t = .821, df = 63, n = 64, p <$
.05, 95% CI: 2.634–5.335, r = .821). On average, the final score was approximately 8.984 points higher than the mid-term score.

Table 2 Repeated-measures analysis of variance for self-efficacy

<table>
<thead>
<tr>
<th>Effect</th>
<th>MS</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Greenhouse-Geisser</th>
<th>Huynh Feldt</th>
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<tbody>
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<td>572.324</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
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</table>

In sum, the improvements in self-efficacy and achievement were confirmed statistically. The students’ self-efficacy had improved over the course, especially from Time 1 to Time 2. In addition, the students’ final examination scores were higher than their mid-term scores.

4. Conclusion

This study explored the level of self-efficacy and achievement in an undergraduate course. Overall, most students have above-average self-efficacy and achievement. Students with high self-efficacy tended to do well in this course. Positive changes on both self-efficacy and achievement were also confirmed. Investigating the association between self-efficacy and achievement would be the next step.

References


