Chapter 12

Students' Self–Efficacy in Learning Science:
Predicting Their Success in Science

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ABSTRACT

This study predicts students' self-efficacy in learning science of their success in science. To this end, the study was designed in the predictive correlation research model. The study group consists of 340 Turkish students. Science Self-Efficacy Belief Scale for Secondary School Students was used as a data collection tool in the study. Moreover, students' end-of-semester grade point averages in science were accepted as their science success scores. Pearson correlation and regression analysis were utilised in data analysis. At the end of the study, it was determined that there is a positive, intermediate relationship between students' success in science and their self-efficacy in learning science. Their self-efficacy in learning science is a significant predictor of success in science.

INTRODUCTION

The education environment plays a vital role in students developing a positive attitude toward learning because education environments enable students to increase their interest and motivation towards a class. This recalls that education environments should be designed according to students' interests and needs. Moreover, self-efficacy, which is one of the most critical aspects that motivate students, should not

be disregarded (Ferrell et al., 2016; Zusho & Pintrich, 2003) because self-efficacy is known to play a significant role in students' success in addition to supplying them with interest and motivation in different conditions. In this sense, self-efficacy can be defined as students' beliefs regarding their capacity to realise an action necessary to achieve their target performance (Bandura, 1986). As the first person to put forth self-efficacy as part of social learning theory, Bandura (1977) argues that students can shape their actions by organising them. Self-efficacy is the will for students to display the behaviors necessary to reach a target successfully. There are various definitions of self-efficacy in the literature. For instance, Tschannen-Moren and Woolfolk (2001) define it as the individual's expectation of success in a new situation. Açıkgöz (1996), on the other hand, describes it as the confidence individuals have in their performance in specific tasks. Leithwood (2007) argues that one's self-efficacy is not their natural ability and adds that it is their belief in their power. As can be seen in these definitions, the consensus is that individuals direct their behaviors according to their beliefs and that self-efficacy is not a perceived or observed ability. In this respect, self-efficacy can be considered individuals' internal belief about what they can do by their powers because self-efficacy puts forth an individual's capacity to do (Brown et al., 2016).

Source and Effects of Self-Efficacy

Bandura (1995) contends that the four primary sources of self-efficacy are mastery experience, vicarious experience, social persuasion, and physiological and emotional state. It is argued that mastery experience is the most effective of these four sources (Bandura, 1997; Brown et al., 2016; Usher & Pajares, 2009) because it is believed that students experience what they gained from what they achieved or from the mistakes they made contributes to the formation of a strong belief in efficacy (Yurdakul & Bostancı, 2016). Vicarious experience, on the other hand, denotes the student's construction of self-efficacy based on his peers' experiences through his observation of his environment. Social persuasion is said to be effective in increasing self-efficacy. The person giving advice (teacher, parent, or peer) is reliable and informed about the subject affects the process. Finally, a psychological and emotional state means that a student in a positive state of mind will have an increased self-efficacy. In contrast, the student in a negative state of mind will have a decreased self-efficacy.

Consequently, it is argued that students' self-efficacy and the knowledge they obtain from these four essential sources affect their success and behavior (Toy & Duru, 2016). In this respect, it can be claimed that students' self-efficacy affects their thoughts and emotional reactions since self-efficacy is defined as the level of confidence students have to realise specific actions. In other words, it is believed that students with firm self-efficacy are more likely to overcome the process of dealing with

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