The effectiveness of educational package based on cognitive components of critical thinking, problem-solving, and metacognition on students' self-efficacy and academic vitality

Khalil Hoseinkhani1, Masoud Ghasemi2*, Masoud Hejazi3

1. PhD Student in Educational Psychology, Department of Psychology, Central Tehran Branch, Islamic Azad University, Tehran, Iran
2. Assistant Professor, Department of Psychology, Central Tehran Branch, Islamic Azad University, Tehran, Iran
3. Assistant Professor, Department of Psychology, Zanjan Branch, Islamic Azad University, Zanjan, Iran

Abstract

Introduction: Academic self-efficacy and vitality play an essential role in coping with challenging academic situations in the school environment. This study aimed to investigate the effectiveness of an educational package based on the cognitive components of critical thinking, problem-solving, and metacognition on students' self-efficacy and academic vitality.

Methods: The present study was quasi-experimental with a pretest-posttest design with a control group. The statistical population included all first-grade female students in the secondary school of Zanjan in the academic year of 2019-2020, from which 40 students were selected by the multi-stage cluster sampling method. The research instruments included the Jenks and Morgan Academic Self-Efficacy Scale, the Dehghanizadeh and Hossein Chari Academic Vitality Questionnaire, and the Psychological Thinking, Problem Solving, and Metacognition Psychological Package. The final form of the educating package was developed in 17 sessions of 90 minutes in two sessions per week for the experimental group students, but no education was considered for the control group. Data were analyzed using the analysis of covariance in SPSS-24 software.

Results: The results of covariance analysis showed that the Psychological Thinking, Problem Solving, and Metacognition Package significantly affects students' self-efficacy and academic vitality (P<0.05). So that, the mean scores of self-efficacy and academic vitality of the experimental group compared to the control group increased significantly.

Conclusion: Considering this study's results and the effect of the educational package of cognitive components on students' self-efficacy and academic vitality, it is suggested that in order to increase this two essential variables in students, considere both students and school counselors and parents.

Keywords
- Critical thinking
- Problem solving
- Metacognition
- Self-efficacy
- Academic vitality

Citation: Hoseinkhani Kh, Ghasemi M, Hejazi M. The effectiveness of educational package based on cognitive components of critical thinking, problem-solving, and metacognition on students' self-efficacy and academic vitality. Advances in Cognitive Sciences. 2022;23(4):48-60.

do.org/10.30514/icss.23.4.48

Extended Abstract

Introduction

Today, a significant part of the challenges of adolescence are academic challenges. Academic Vitality is one of the abilities and talents making people adapt to threats, obstacles, difficulties, and pressures in the field of education. Also, one of the factors affecting students' capacity to deal with these challenges is academic self-efficacy. Academic self-efficacy and vitality play an essential role in coping with challenging academic situations in the...
school environment. Students who use metacognitive strategies, critical thinking, and problem-solving in their academic activities are more motivated to continue their education and achieve academic success and are likely to have higher academic vitality and self-efficacy. The studies indicate the educational package’s effectiveness based on cognitive components on the educational variables. For example, Orujlu and Hemmati Maslak Pak showed in a study that critical thinking skills play a role in increasing students’ academic self-efficacy. Also, Soltani Banavandi and Askarizadeh, in a study, implied the role of critical thinking skills in increasing students’ academic vitality. In addition, Mehzoonzadeh Bushehri, in a study, showed that problem-solving skills by finding new ideas and solutions to the problem lead to increased vitality and academic self-efficacy in students. This study aimed to investigate the effectiveness of an educational package based on the cognitive components of critical thinking, problem-solving, and metacognition on students’ self-efficacy and academic vitality.

Methods
The present study was a semi-experimental pre-test-post-test with the control group. The statistical population included all first-grade female students in the secondary school of Zanjani in the academic year of 2019-2020. Since in a quasi-experimental study, a sample size of at least 15 people in each group is recommended, in the present study, a sample of 40 people was selected to prevent a possible drop in subjects. The sampling method of the present study was a multi-stage cluster. Thus, from education districts one and two of Zanjani city, district one, from the mentioned district, one school, and the selected school four classes and 12 people from each class were randomly selected. Then, considering the criteria for entering the study, the subjects were randomly assigned to the experimental and control groups (20 people in each group). The criteria for entering the research included The first-grade female students were in high school, had a low score of vitality and academic self-efficacy, a commitment to attend all treatment sessions, informed consent to participate in the research, knowledge about the research goals. Furthermore, exclusion criteria included severe neurological disorders or the presence of psychotic symptoms, previous participation in the program, the same intervention and absence of more than three sessions, Failure to do homework. After the random assignment of the subjects in the experimental group and the control group, psychological thinking, problem-solving, and metacognition psychological package were performed on the experimental group during 17 sessions of 90 minutes in two sessions per week, but no training was considered for the control group. Data were collected using Jenks and Morgan Academic Self-Efficacy Scale, the Dehghanizadeh and Hossein Chari Academic Vitality Questionnaire, and the Psychological Thinking, Problem-Solving, and Metacognition Psychological Package. Data were analyzed by covariance analysis and SPSS-24 software.

Results
The mean and standard deviation of the age of the subjects in the experimental and control groups were 15.52±1.08; 15.74±1.12, respectively. The results show that the mean Self-Efficacy and Academic Vitality scores before and after the intervention have been changed. In order to investigate the effectiveness of an educational package based on the cognitive components of critical thinking, problem-solving, and metacognition on students' self-efficacy and academic vitality, a multivariate analysis of covariance was used. First, the normality of data distribution was checked and confirmed using Kolmogorov-Smirnov statistical test (P<0.05). The homogeneity of variances distribution was checked and confirmed using
Levin test academic self-efficacy (F=1.787, P=0.195) and academic vitality (F=1.05, P=0.314). Therefore, the assumptions of the statistical test of multivariate analysis of covariance are established, and this test can be used to analyze the data. The results of multivariate analysis of covariance (MANOVA) statistical tests in experimental and control groups show that these groups have a significant difference in at least one of the dependent variables (P<0.0001). The univariate analysis of covariance statistical test (ANOVA) was used to determine this difference. The results of univariate analysis of variance showed that the group had a significant effect on post-test scores of self-efficacy and academic vitality (P<0.0001).

In other words, the rate of self-efficacy and academic vitality in people who participated in a training package based on an educational package based on the cognitive components of critical thinking, problem-solving, and metacognition increased significantly compared to the control group. According to Eta squares, 65 Percent and 56 Percent of the variance of self-efficacy and academic vitality is caused by a training package based on an educational package based on the cognitive components of critical thinking, problem-solving, and metacognition.

**Conclusion**

Considering the results of this study and the effect of the educational package of cognitive components on students' self-efficacy and academic vitality, it is suggested that they be attracted to the curriculum by preparing curricula appropriate to students' cognitive and metacognitive requirements. It is suggested that due to the effect of this training in increasing students’ self-efficacy and academic vitality, the results of research conducted in this field be used in practice in counseling centers and medical centers so that in these centers, workshops, and courses Educational Cognitive components should be considered for school counselors and parents. It is also recommended to modify traditional evaluation methods with a metacognitive approach in the school education system. Considering one of the limitations of this study, since the subjects of this study were limited to the first-grade female students in the secondary school of Zanjan, the generalization of the results to other groups should be made with caution. Also, only a questionnaire was used to measure the variables in the present study. Part of the results may be due to the subjects’ sensitivity to the test questions, test performance, and set norms, so it is suggested that other data collection methods such as interviews be used in future research.

**Ethical Considerations**

**Compliance with ethical guidelines**

The participants signed the informed consent form and had the right to leave the study during any process of conducting this research. This research meets guidelines for ethical conduct and report of research.

**Authors’ contributions**

Conceptualization, validation, review and editing: Masoud Ghasemi; Research analysis, references, data processing: Masoud Hejazi; Writing and drafting a manuscript: Khalil Hosseinkhani. All authors reviewed and approved the final version of the manuscript.

**Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sector.

**Acknowledgments**

This research was extracted from the PhD dissertation of the first author, in the Department of Psychology, faculty of psychology, Tehran Branch, Islamic Azad University, Tehran, Iran. In the end, the authors are grateful to all...
participants conducting this research and those who contribute to the implementation of the research.  

Conflict of interest  
The authors declared no Conflict of Interest