

Statistical Verification of Effects of Science Academic Performance on Emotional Expressiveness

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Abstract

Since the statistical significance levels of each F value (2.90 and 3.55) for positive expressiveness (PE) and negative expressiveness (NE) are all $p < .01$, it is found that there is a significant difference of PE and NE by science score. But, since the significant value of F value (1.725) for impulse strength (IS) is .095 ($p > .05$), it can be seen that there is no significant difference in IS by science score. The higher the science score, the larger the PE values and the lower the NE values. However, even if the science score increases, the IS values do not show a trend in a certain direction.

Keywords: Impulse Strength, Negative Expressiveness, Positive Expressiveness, Science Score.

1. Introduction

Lee and Lee studied the effect of self-efficacy on academic achievement through mediation of academic emotion^[1]. Park and Kim found that there was a difference in academic achievement of chemistry depending on students' learning preference type and question type^[2]. Koh, Doh and Kang investigated the effects of concept mapping strategy in general chemistry classes on pre-teachers' achievement, concept understanding, science anxiety, and science teaching efficacy^[3]. Yoo, Yoon, and Hong analyzed the effects on science achievement through science class using small-scale chemistry^[4]. Kang, Go, and Koh studied the effects of cooperative learning on achievement levels and compensation delivery methods^[5]. Hong and Kim found that inquiry experiment learning was more successful than theory-based learning^[6]. Moon, Kim, Lee, and Kim analyzed the effects of question generation strategy and feedback on science achievement, self-efficacy, and instruction^[7]. Kou and Ko found that there was a difference in academic achievement according to learners' anxiety, anger, fear, and activity level^[8].

As mentioned above, most studies have so far studied the effects of many variables such as self-efficacy, learning type, concept mapping strategy, anxiety, etc. on academic achievement. In other words, many researchers have explored only the variables to improve academic achievement, and it seems that little attention has been paid to how academic achievement affects emotional expressiveness.

Therefore, this study aims to investigate how the academic achievement of science affects emotional expressiveness. This is because academic achievement will in any way affect positive emotional expression, negative emotional expression, and impulse intensity, respectively. These emotional expressiveness of individuals does not only have a great influence on life quality and social relations of human beings, but also affect the peace and happiness of each family. So it is important to confirm whether the academic achievement is causal in relation to each emotional expression performance.

2. Experimental Section

2.1. Subjects

Subjects in this study were 205 students in Mokpo Y-middle school during the second semester of 2017.

2.2. Measures

In the seventeen week of class, students completed a questionnaire that included PE, NE, and IS in sub-vari-

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ables of emotional expressiveness made by Gross and John^[9]. Each positive expressiveness, negative expressiveness, and impulse strength was consisted of 4, 6, and 6 items measured on a 5-point Likert scale. Herein, average score in science 63.2. In this paper, effects of science academic performance on emotional expressiveness were analyzed using multivariate analysis of SPSS 20 program. The students' science scores were roughly classified as 9 ratings by Stanine scale.

3. Results and Discussion

Table 1 presents the results of the multivariate tests for the influence of science scores on emotional expressiveness. Since the statistical significance levels of the F values of each statistic are all $p < .01$, it can be seen

that there is a significant difference in the mean emotional expressiveness by the science score.

Table 2 shows the results of verifying difference of each PE, NE, and IS according to science score. Since statistical significance level of PE and NE are all $p < .01$, it can be seen that there is a significant difference of PE and NE by science score. However, since the significant value of the F value (1.725) of IS is $.095$ ($p > .05$), it can be seen that there is no significant difference in IS by science score.

As shown in Fig. 1, the values of each PE, NE, and IS of the academic achievement in science is as follows. The higher the science score, the larger the PE values and the lower the NE values. However, even if the science score increases, the IS values do not show a trend in a certain direction.

Table 1. Multivariate tests of effects of science score on emotional expressiveness

	Effect	Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's trace	.978	2812.039 ^b	3.000	194.000	.000
	Wilks' lambda	.022	2812.039 ^b	3.000	194.000	.000
	Hotelling's trace	43.485	2812.039 ^b	3.000	194.000	.000
	Roy's largest root	43.485	2812.039 ^b	3.000	194.000	.000
Science score	Pillai's trace	.256	2.288	24.000	588.000	.000
	Wilks' lambda	.762	2.309	24.000	563.260	.000
	Hotelling's trace	.290	2.325	24.000	578.000	.000
	Roy's largest root	.176	4.316 ^c	8.000	196.000	.000

a. Design: Intercept + Stanine score of science

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 2. Multivariate analysis of effects of science score on emotional expressiveness

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Science score	PE	10.856 ^a	8	1.357	2.895	.005
	NE	5.244 ^b	8	.656	3.551	.001
	IS	6.365 ^c	8	.796	1.725	.095
Error	PE	91.872	196	.469		
	NE	36.185	196	.185		
	IS	90.390	196	.461		
Total	PE	2504.938	205			
	NE	1560.278	205			
	IS	1837.278	205			

a. R squared=.106, b. R squared=.127, c. R squared=.066.

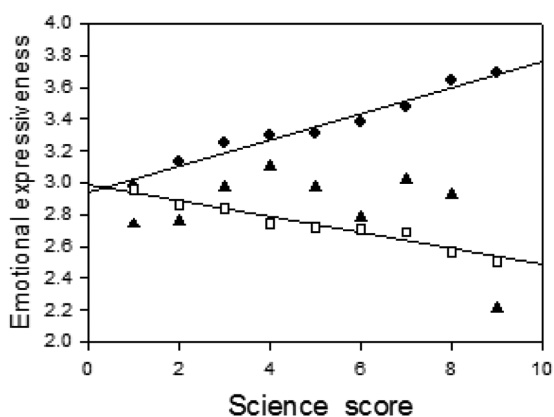


Fig. 1. Effects of science score on emotional expressiveness (■) PE; (□) NE; (▲) IS.

4. Conclusion

The higher the academic achievement in science, the more positive emotional expressiveness is shown. And the lower the academic achievement, the more negative emotional expressiveness is shown.

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