Supplementary Analysis to Student achievement emotions: examining the role of frequent online assessment by Kaitlin Riegel and Tanya Evans

The assumptions of the two-way ANOVA were determined through analysis of the residuals. Outliers were assessed by inspection of boxplots. In cases where there were outliers, there was no reason to believe they were not legitimate responses, so they were retained in the analysis. Normality was assessed by the Shapiro-Wilk test and, in cases where this failed, by visual inspection of the QQ-plot and residuals plot to determine whether normality was a reasonable assumption. Due to the robustness of the ANOVA to mild deviations from normality, we conducted the analysis in cases of slight skewness. Equality of variance was assessed by Levene’s test. For the groups that did not satisfy equality of variance by Levene’s test, plots of residuals by predicted values were used to determine if equality of variance was a reasonable assumption.

*A summary of the participating students in the study*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Prior Achievement\* | |  |  |  |
| Gender | Very High | High | Medium | Low | **Total** |
| Female | 8 | 18 | 4 | 6 | 36 |
| Male | 10 | 21 | 11 | 13 | 55 |
| **Total** | 18 | 39 | 15 | 19 | 91 |

*Note.* Measured by grade in prerequisite course. Very High = [90, 100], High = [80, 90), Medium = [70, 80), Low = [50, 70)

We ran a two-way ANOVA with variables prior achievement and gender on the difference between emotions reported in each assessment. The interaction between prior achievement and gender was not statistically significant and analysis of the main effects showed prior achievement and gender were not significant for any emotion.

Additionally, we ran a two-way ANOVA with variables prior achievement and gender on emotions reported in each assessment. In both assessments, the interaction between prior achievement and gender was not statistically significant for any emotions.

For test-related hopelessness, the main effect of prior achievement was found to be statistically significant, F(3, 83) = 3.428, *p* < .05, partial η2 = .110. The unweighted marginal means of test-related hopelessness for very high, high, medium, and low achieving students were 1.96 ± .196, 1.93 ± .133, 2.56 ± .241, and 2.55 ± .204. For test-related shame, the main effect of prior achievement was found to be statistically significant, F(3, 83) = 2.952, *p* < .05, partial η2 = .096. The unweighted marginal means of test-related hopelessness for very high, high, medium, and low achieving students were 2.26 ± .197, 2.08 ± .133, 2.67 ± .242, and 2.71 ± .205. We did not find pairwise significance using Bonferroni-adjusted *p*-values, which could be due to the conservative nature of the test.

The main effect of prior achievement was found to be statistically significant for quiz-related anxiety (F(3, 83) = 3.750, *p* < .05, partial η2 = .119), hopelessness (F(3, 83) = 3.925, *p* < .05, partial η2 = .124), and shame (F(3, 83) = 5.339, *p* < .005, partial η2 = .162).

The unweighted marginal means of quiz-related anxiety for very high, high, medium, and low achieving students were 2.36 ± .193, 2.11 ± .131, 2.90 ± .238, and 2.67 ± .201. High-achieving students were found to report significantly less quiz-related anxiety than medium-achieving students (95% CI, 0.06 to 1.53, *p* < .05).

The unweighted marginal means of quiz-related hopelessness for very high, high, medium, and low achieving students were 1.71 ± .180, 1.66 ± .122, 2.35 ± .222, and 2.21 ± .188, respectively. High-achieving students were found to report significantly less quiz-related hopelessness than medium-achieving students (95% CI, 0.01 to 1.38, *p* < .05).

The unweighted marginal means of quiz-related shame for very high, high, medium, and low achieving students were 2.06 ± .167, 1.73 ± .113, 2.53 ± .206, and 2.35 ± .174, respectively. High-achieving students were found to report significantly less quiz-related shame than medium-achieving students (95% CI, 0.16 to 1.43, *p* < .01) and low-achieving students (95% CI, 0.05 to 1.17, p < .05).

The main effect of gender was found to be statistically significant for quiz-related anxiety (F(1, 83) = 6.840, *p* < .05, partial η2 = .076) and quiz-related shame (F(1, 83) = 6.219, *p* < .05, partial η2 = .070). The unweighted marginal means of quiz-related anxiety for females and males were 2.76 ± .158 and 2.25 ± .115, respectively. The unweighted marginal means of quiz-related shame for females and males were 2.38 ± .136 and 1.96 ± .099, respectively. Overall, males were found to report lower quiz-related anxiety (95% CI, 0.12 to 0.90, *p* < .05) and quiz-related shame (95% CI, 0.09 to 0.76, *p* < .05) than females.