Example 4a: Factorial ANOVA Results with Significant Interaction

A 2 X 3 ANOVA was conducted on grade point average improvement with respect to differences in note-taking methods and gender. An alpha level of .05 was utilized for this study. Males and females were normally distributed. Note-taking method was also normally distributed for method 1, method 2, and the control group. Variances were homogeneous, *FLevene* (5, 54) = .575, *p* = .719.

There was a statistically significant interaction between gender and note-taking method, *F*(2, 54) = 10.543, *p* < .001 (see Figure 1). In order to evaluate the interaction, simple effects were analyzed. There was no statistically significant difference in grade point average improvement for males across note-taking methods *F*(2, 54) = 2.50, *p* = .092. A small to moderate effect size was noted, *f* = .23 (95% CI [0, .54]). There was a statistically significant difference in grade point average improvement for females across note-taking methods *F*(2, 54) = 25.86, *p* < .001. A large effect size was noted, *f* = .93 (95% CI [.62, 1.26]), indicating a strong degree of practical significance and stable finding. In order to investigate the differences in note-taking method among females, a Tukey post hoc analysis was conducted. Method 2 was statistically significantly higher than both the control group (*p* < .001) and Method 1 (*p* < .001) (see table 2). Large effect sizes were noted between method 2 and method 1, *d* = 2.59 and method 2 and control, *d* = 2.94. A moderate effect size was noted between method 1 and method 2, *d* = .36. Given the sample size of *n* = 60, statistical significance would be detected only for large effect sizes, *η2* > .14.

Figure 1.

*Interaction Effect for Gender by Note-taking* 

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| --- | --- | --- | --- | --- | --- |
| Table 1 |  |  |  |  |  |
| *Change in GPA Across Gender and Note-Taking Method* |
| Gender | Note-Taking methods | Mean | SD | *n* |  |
| Men | Method 1 | 0.34 | 0.23 | 10 |  |
|  | Method 2 | 0.31 | 0.19 | 10 |  |
|  | Control | 0.17 | 0.15 | 10 |  |
| Women | Method 1 | 0.17 | 0.18 | 10 |  |
|  | Method 2 | 0.64 | 0.18 | 10 |  |
|   | Control | 0.11 | 0.15 | 10 |   |

| **Post Hoc Comparisons - gender ✻ method**  |
| --- |
|  |  | **Mean Difference**  | **SE**  | **t**  | **p tukey**  |
|   Women, Method 1 |  | Women, Method, 2  |  | -0.470  |  | 0.081  |  | -5.789  |  | < .001  |  |
|    |  | Women, Control  |  | 0.065  |  | 0.081  |  | 0.801  |  | 0.966  |  |
|    Women, Method 2 |  | Women, Control  |  | 0.535  |  | 0.081  |  | 6.589  |  | < .001  |  |
|  |
| Note.  P-value adjusted for comparing a family of 6  |