

Milestone 2 Topic: Evaluating Effect of Study Strategies on Learning

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We are investigating the effect of several learning strategies and learning parameters on test performance. We will be using quiz, video, and reading materials from a curriculum from the Department of Motor Vehicles in New York, and evaluating participants on a content-related quiz to see how study strategies and learning parameters affect quiz score.

Our hypothesis is that the strategies and parameters that allow for more practice or experience will yield higher test scores than the 'low/off' level counterparts. We will refer to these parameters as 'High factor settings'

H₀: There is no effect of study strategy or learning parameter on test scores.

H₁: The high factor settings will show an increase in test scores.

Our statistical framing of scientific hypotheses is representative because we are blocking UW Madison students across different locations(on and off campus); therefore accounting for the potential nuisance factor of student location, but is not a factor that we are interested in. On the other hand, our hypothesis is an approximation because we aren't blocking for other variables such as IQ level or ethnicity. These factors could result in larger error variance, hence worse estimate of effects.

Due to Covid-19, it is more challenging to collect data. Moreover, we realize that it is important to choose a proper response variable that makes the outcome look authoritative. We eventually decided to narrow our learning methods down to the following: video vs. reading, study time: 5 min. vs. 10 min., the testing time: 5 min. vs. 10 min., and amount of practice: practice pre-test vs. no practice pre-test. We will

investigate the influence these have on participants' testing scores. With the 4 two-level factors, we set on-campus and off-campus experimenters as the blocking variables. We will invite our friends to do this experiment and have found corresponding quizzes, videos and readings from publicly available DMV materials online which we will use. For now, we are considering doing an unreplicated 2^k factorial design.

We will analyze the data by looking for the presence of main effects and interactions between our factors. An unreplicated 2^k factorial ANOVA will be performed to evaluate the hypothesis that there is no effect of study strategy or learning parameter on test scores. Moreover, 95% confidence interval (2.4.2) will be used to show associated confidence level that the true parameter is in the proposed range. Normality will be checked using the normal probability plot (2.4), and diagnostics will be performed to evaluate the validity of our models.