

TABLE 39.1. COMMON STATISTICAL ANALYSIS PROCEDURES USED IN EDUCATIONAL TECHNOLOGY RESEARCH

Analysis	Type of Data	Features	Example	Test of Causal Effects?
<i>t</i> test (independent samples)	Independent variable = nominal Dependent = one interval-ratio measure	Testing the difference between 2 treatment group means	Does the cooperative-treatment group surpass the individual-treatment group?	Yes
<i>t</i> test (dependent samples)	Independent variable = nominal (repeated measure) Dependent = one interval-ratio measure	Testing the difference between 2 treatment means for a <i>given group</i>	Will subjects change their attitudes toward drugs, from pretest to posttest, following a film on drug effects?	Yes
Analysis of variance (ANOVA)	Independent variable = nominal Dependent = one interval-ratio measure	Testing the difference between 2 or more treatment means. If ANOVA is significant, follow-up comparisons of means are performed.	Will there be differences in learning between three groups that receive advance organizers, objectives, or neither?	Yes
Multivariate analysis of variance (MANOVA)	Independent variable = nominal Dependent = two or more interval-ratio measures	Testing the difference between 2 or more treatment group means on 2 or more learning measures. Controls type I error rate across the measure. If MANOVA is significant, an ANOVA on each individual measure is performed.	Will there be differences between 3 feedback strategies on problem solving and knowledge learning?	Yes
Analysis of covariance (ANCOVA) or multivariate analysis of covariance (MANCOVA)	Independent variable = nominal Dependent = one or more interval-ratio measures Covariate = one or more interval-ratio measures	Replicates ANOVA or MANOVA but employs an additional variable to control for treatment group differences in aptitude and/or to reduce error variance in the dependent variable(s).	Will there be differences in concept learning between learner-control, program-control, and advisement strategies, with differences in prior knowledge controlled?	Yes
Pearson <i>r</i>	Two interval-ratio measures	Tests relationship between the two variables	Is anxiety related to test performance?	No
Multiple linear regression	Independent variable = two or more interval-ratio measures Dependent = one interval-ratio measure	Tests relationship between set of predictors (independent) variables and an outcome variable. Shows the relative contribution of each predictor in accounting for variability in the outcome variable.	How well do experience, age, gender, and grade-point average predict time spent in completing a task?	No
Discriminant analysis	Nominal variable (groups) and 2 or more interval-ratio variables	Tests relationship between a set of predictor variables and subjects' membership in particular groups.	Do students who favor learning from print materials vs. computers vs. television differ with regard to ability, age, and motivation?	No
chi-square test of independence	Two nominal variables	Tests relationship between two nominal variables.	Is there a relationship between gender (males vs. females) and attitudes toward the instruction (liked, no opinion, disliked)?	No