

Inferential Statistics

Statistics	Design	# of Groups	Null Hypo.	Test Stat.
(1) One-Sample z Test	X O	1	$H_0 : \mu = c$	z
(2) One-Sample t Test	X O	1	$H_0 : \mu = c$	t
(3) Independent t Test	X ₁ O X ₂ O	2	$H_0 : \mu_1 = \mu_2$	t
(4) Dependent t Test	O ₁ X O ₂ or X ₁ O Matched X ₂ O	1 2	$H_0 : \mu_1 = \mu_2$	t
(5) One-Way ANOVA	X ₁ O X ₂ O X ₃ O	2+	$H_0 : \mu_1 = \mu_2 = \dots = \mu_k$	F
(6) Factorial ANOVA	Multiple IV	2+	H_0 :No Main Effects H_0 :No Interaction(s)	F

(7) ANCOVA	O ₁ X ₁ O ₂ O ₁ X ₂ O ₂	2+	On Posttests $H_0 : \mu_{1(adj)} = \mu_{2(adj)}$ F
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(8) Repeated Measures ANOVA	O ₁ X ₁ O ₂ or O ₁ X ₁ O ₂ O ₁ X ₂ O ₂	1+	$H_0 : \mu_1 = \mu_2$ etc. F
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(9) Multivariate Analyses: For the procedures above, when there are multiple dependent variables, a multivariate analogue can be used (i.e., Hotelling's T², MANOVA, MANCOVA).

(10) Correlation	Relationship between 2 variables $H_0 : \rho = 0$
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(11) Regression	Relationship between 2+ variables.
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(12) Chi-Square Test	Used when data are in nominal form. χ^2 $H_0 : \pi_1 = \dots = \pi_k$
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O → Observation, X → Treatment

(1) A principal in Pine Elementary School would like to know whether or not her students' IQ scores are higher than the norm group. The norm group has a mean of 100 and a standard deviation of 15. She samples 20 students randomly from her school and asked the school psychologist to administer the IQ test.

(2) A researcher learned that fourth graders watch TV 15 hours a week in the United States. She would like to know whether or not fourth graders who are in the gifted program watch more or less TV than the national average. She distributed a survey to parents of the students who are in the gifted program.

(3) A researcher is interested in two different approaches to teaching statistics to graduate students in education. One is to teach the class through lectures only. The other is to teach the class through discussions only. Students were randomly assigned to one of the two groups. At the end of the semester, each group took the same final exam, and the mean scores of two groups were compared.

(4) A teacher is interested in whether her six graders' attitude toward the Third World will change following a four-week Third World education course. To assess the impact of the program, the teacher measures the students' attitude before and after course.

(5) A fifth grade teacher at Maple Elementary School was interested in three different approaches to writing comments on essay assignments. Students were assigned randomly to one of three groups. Each group received comments in a different approach on their biweekly essay assignments. At the end of the grading period the teacher asked her colleague to rate the students' essay performances.

(6) A fifth grade teacher at Elm Elementary School decided to replicate the above study but decided to consider an additional

variable. The teacher believed that students' writing skills were affected by whether they chose the topics to write about or whether they were assigned essay topics. After a 10-week period the teacher asked a colleague to evaluate the essays of the students in his class.

(7) A counselor was interested in testing whether individualized counseling sessions were an effective treatment in reducing truancy among chronically truant middle school students. A group of chronic truants were identified on the basis of their previous attendance records. From this pool of participants, subjects were randomly assigned to one of three groups: counseling 3hrs/wk, counseling 1 hr/wk, and no counseling. After a 5-week treatment period, data were collected on the number of days absent without an excuse over an additional 10-week period. The number of absences without an excuse for 10 weeks prior to the introduction of the treatment was also recorded for each subject.

(8) The counselor above wants to find out if the treatment effect would last beyond the current grade. In the following year after the treatment, she checked the attendance records for the individuals who participated in the study.

(9) A doctoral student is interested in studying the attitude differences between high- and low-achieving students who receive different kinds of teacher feedback following performance on tests. Four types of teacher feedback are designed for the study, and there are eight attitudes such as attitude toward teacher, toward the subject studies, toward learning, and so on.

(10) A psychologist is interested in the relationship between phonemic awareness and reading decoding for preschoolers.

(11) A psychologist is interested in finding the variables that would predict the reading fluency at the third grade. He chose phonemic

awareness and rapid naming measures for preschool students as predictor variables.

(12) A college administrator is interested in the number of freshman, sophomore, junior, and senior students who attend the counseling center, or in other words, the relationship between year in college and use of counseling services. The researcher selects a random sample of 50 students from each category and records the number of students in each category who attend the counseling center.