

## Chapter 2—The Scientific Approach in Education

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### MULTIPLE CHOICE

1. The main difference between the experimental and ex post facto methods of research is the
- a. time span of study.
  - b. setting of the research.
  - c. manipulation of the independent variable.
  - d. statistical design of the study.

ANS: C                      PTS: 1                      OBJ: WWW

2. In which one of the following types of studies is classification of variables as absolutely independent or dependent *not* possible?
- a. Experimental research
  - b. Correlational research
  - c. Longitudinal research
  - d. Ex post facto

ANS: B                      PTS: 1

3. Which of the following represents an operational definition of intelligence?
- a. The ability to solve problems
  - b. The ability to adapt to new situations
  - c. The scores made on the Stanford-Binet test
  - d. The knowledge that one has acquired through life experiences

ANS: C                      PTS: 1                      OBJ: WWW

Exhibit 2-1: Based on the title of the following research studies, classify each according to the research method employed in the study.

4. Refer to Exhibit 2-1. The effect of sociometric grouping upon learning in a second grade classroom.
- a. survey
  - b. historical
  - c. ex post facto
  - d. experimental
  - e. qualitative

ANS: D                      PTS: 1

5. Refer to Exhibit 2-1. Origins of the terms "major" and "minor" in American higher education.
- a. survey
  - b. historical
  - c. ex post facto
  - d. experimental
  - e. qualitative

ANS: B                      PTS: 1

6. Refer to Exhibit 2-1. The relationship between social class and academic achievement.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: C                    PTS: 1

7. Refer to Exhibit 2-1. Effect of questioning techniques on student's learning.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: D                    PTS: 1

8. Refer to Exhibit 2-1. Role and career problems of the Chicago public school teacher.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: A                    PTS: 1

9. Refer to Exhibit 2-1. Effect of parental divorce on the school achievement of children.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: C                    PTS: 1

10. Refer to Exhibit 2-1. An observational study of drug consumption in a natural setting.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: E                    PTS: 1

11. Refer to Exhibit 2-1. Walter White and Atlanta NAACP's fight for equal schools 1916-1917.
- survey
  - historical
  - ex post facto
  - experimental
  - qualitative

ANS: B                    PTS: 1

12. Which one of the following terms is *not* a construct?

- a. Anxiety
- b. Intelligence
- c. Reading score
- d. Achievement motivation
- e. Arithmetic readiness

ANS: C                      PTS: 1                      OBJ: WWW

13. Which of the following is a categorical variable?

- a. Achievement motivation
- b. Scholastic aptitude
- c. National origin
- d. Social maturity

ANS: C                      PTS: 1

14. Which one of the following is a continuous variable?

- a. Problem-solving ability
- b. Scholastic aptitude
- c. Verbal reasoning
- d. a and b
- e. a, b, and c

ANS: E                      PTS: 1                      OBJ: WWW

15. A study investigated the effect of kindergarten experience on the amount of anxiety shown by first graders in the classroom. In this study the dependent variable was

- a. anxiety.
- b. grade level.
- c. kindergarten experience.
- d. school success.

ANS: A                      PTS: 1

16. Study A investigated the effect of intelligence on the speed of completion of a problem-solving task. Study B investigated the effect of an early stimulating environment on the intelligence of children. The variable intelligence is the

- a. independent variable in Study A and the dependent variable in Study B.
- b. dependent variable in Study A and the independent variable in Study B.
- c. independent variable in both Study A and Study B.
- d. dependent variable in both Study A and Study B.

ANS: A                      PTS: 1

Exhibit 2-2: Examine the following list of research titles, then determine whether the *italicized* part of each title is an independent variable, a dependent variable, or a variable but impossible to determine whether independent or dependent.

17. Refer to Exhibit 2-2. The relationship between *teacher expectation* and the achievement of students

- a. an independent variable.
- b. a dependent variable.
- c. a variable but impossible to determine whether a or b.

ANS: A                      PTS: 1

18. Refer to Exhibit 2-2. The effect of the use of instructional technology on *college algebra achievement*.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: B                    PTS: 1

19. Refer to Exhibit 2-2. The relationship between *social maturity* and popularity among peers in high school.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: C                    PTS: 1

20. Refer to Exhibit 2-2. The effect of computer-assisted instruction on the *reading achievement* of elementary school students.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: B                    PTS: 1

21. Refer to Exhibit 2-2. Relationship of locus of control and *self-esteem* and academic achievement.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: C                    PTS: 1

22. Refer to Exhibit 2-2. The effect of *social reinforcement* on shaping children's judgments.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: A                    PTS: 1

23. Refer to Exhibit 2-2. The effects of mastery and aptitude on *learning and retention*.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: B                    PTS: 1

24. Refer to Exhibit 2-2. The influence of *advance organizers* on learning the subsequently presented materials.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: A                    PTS: 1

25. Refer to Exhibit 2-2. The relationship between *study methods* and academic performance.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: A                      PTS: 1

26. Refer to Exhibit 2-2. The effect of teacher approval on students' *attentive behavior*.
- an independent variable.
  - a dependent variable.
  - a variable but impossible to determine whether a or b.

ANS: B                      PTS: 1

27. A study has been designed to investigate the effect of homogeneous grouping on the school performance and self-concept of elementary school children. In this study
- homogeneous grouping and self-concept are the independent variables.
  - homogeneous grouping and elementary school level are the independent variables.
  - school performance and self-concept are the dependent variables.
  - homogeneous grouping is the only independent variable and school performance is the only dependent variable.

ANS: C                      PTS: 1

28. The effect of wait time on verbal behavior of kindergarten children was investigated. In this study the dependent variable was
- wait time.
  - verbal behavior
  - kindergarten experience.
  - kindergarten children.

ANS: B                      PTS: 1                      OBJ: WWW

29. Which one of the following is a categorical variable?
- Achievement
  - Learning
  - Gender
  - Scholastic aptitude

ANS: C                      PTS: 1

30. An educator has designed a study in which ways of improving students' self-esteem is being investigated. This study is an example of
- basic research.
  - applied research.
  - phenomenologic research.
  - causal research.

ANS: B                      PTS: 1                      OBJ: WWW

31. Operational definitions are used in research in order to
- enrich the scientific language.
  - bridge the gap between theory and observation.
  - increase the probability that experiments will succeed.
  - convey the general nature of the phenomenon being investigated.
  - make educational research more easily understood by laymen.

ANS: B                      PTS: 1



39. The main difference between a true- and a quasi-experiment is whether the independent variable can be
- a. operationalized.
  - b. measured.
  - c. analyzed.
  - d. randomized.

ANS: D                      PTS: 1

Exhibit 2-4: Choose the research methodology that would be most appropriate for investigating each of the following research questions.

40. Refer to Exhibit 2-4. Do students who are exposed to multimedia technology in a high school physics class exhibit greater mastery of the subject than do those students who are not exposed?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: C                      PTS: 1

41. Refer to Exhibit 2-4. Do students who score well on a foreign language placement test also perform well in the language class?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: B                      PTS: 1

42. Refer to Exhibit 2-4. How were young women educated in the South in the mid-nineteenth century?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: D                      PTS: 1

43. Refer to Exhibit 2-4. What is the effect of residing in a one-parent home versus a two-parent home on a child's academic achievement?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: A                      PTS: 1

44. Refer to Exhibit 2-4. How do graduating seniors from Central State University assess the quality of their undergraduate education?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: E                      PTS: 1

45. Refer to Exhibit 2-4. Does extending wait-time between teacher questions and calling students' names influence students' achievement of high-level cognitive objectives?
- a. Ex post facto
  - b. Correlational
  - c. Experimental
  - d. Historical
  - e. Survey

ANS: C                      PTS: 1

46. For which of the following questions would qualitative methodology be most appropriate?
- a. How do taxpayers in the community feel about the Released-Time Religious Education Program for the elementary schools' fourth graders?
  - b. What is the effect of increased parental involvement on achievement in the elementary school?
  - c. How is the policy of inclusion working in the elementary schools of the community?
  - d. Is there a relationship between scores on a non-cognitive questionnaire and students' academic achievement?

ANS: C                      PTS: 1

Exhibit 2-5: Indicate whether the following characteristics are most typical of qualitative research or quantitative research.

47. Refer to Exhibit 2-5. Uses statistics to analyze the data.
- a. qualitative
  - b. quantitative

ANS: B                      PTS: 1

48. Refer to Exhibit 2-5. Requires subjective observation.
- a. qualitative
  - b. quantitative

ANS: A                      PTS: 1

49. Refer to Exhibit 2-5. Emphasizes the context of the inquiry.
- a. qualitative
  - b. quantitative

ANS: A                      PTS: 1

50. Refer to Exhibit 2-5. Emphasizes hypothesis-testing.
- a. qualitative
  - b. quantitative

ANS: B                      PTS: 1



51. Which of the following represents the usual sequence of steps in the quantitative research process?
- Reviewing the literature; formulating a problem; defining the variables operationally; developing measuring instruments; gathering data.
  - Stating the hypothesis; reviewing the literature; stating operational definitions of the variables; developing measuring instruments; gathering data.
  - Stating a problem; reviewing the literature; stating a hypothesis; constructing operational definitions of variables; developing measuring instruments; gathering data.
  - Reviewing the literature; identifying the variables; stating a problem; gathering data.

ANS: C                   PTS: 1

52. A researcher who wants to investigate the claim that drinking moderate amounts of red wine will promote a healthy heart would most likely use the \_\_\_\_ method.
- survey
  - ex post facto
  - experimental
  - quasi-experimental
  - correlational

ANS: B                   PTS: 1

Exhibit 2-6: A researcher carried out an experiment with her freshman psychology students to answer the question: "Does college students' rate of learning a series of cognitive tasks differ in regard to gender and type of motivation (intrinsic or extrinsic)?"

53. Refer to Exhibit 2-6. What is the population?
- gender
  - type of motivation
  - college students
  - rate of learning task
  - freshman psychology students

ANS: C                   PTS: 1

54. Refer to Exhibit 2-6. What is the manipulated independent variable?
- gender
  - type of motivation
  - college students
  - rate of learning task
  - freshman psychology students

ANS: B                   PTS: 1

55. Refer to Exhibit 2-6. What is the dependent variable?
- gender
  - type of motivation
  - college students
  - rate of learning task
  - freshman psychology students

ANS: D                   PTS: 1

56. Study A investigated the effect of level of anxiety on students' speed of learning nonsense syllables. Study B investigated the effect of students' intelligence on their level of anxiety. The variable anxiety is the
- dependent variable in Study A, and the independent variable in Study B.
  - independent variable in Study A, and the dependent variable in Study B.
  - independent variable in both Study A and Study B.
  - dependent variable in both Study A and Study B.

ANS: B                    PTS: 1

57. Which of the following illustrates an operational definition?
- Creativity defined as ratings of drawing by three professors of art education
  - Achievement defined as scores obtained on the Iowa Test of Basic Skills
  - Creativity defined as divergent thinking
  - Math anxiety defined as scores on a math anxiety scale
  - a, b, and d

ANS: E                    PTS: 1

58. A teacher designed a study to investigate the effect of using computer exercises to teach second grade math concepts. This research could be described as
- basic, experimental, and qualitative.
  - applied, experimental, and quantitative.
  - basic, nonexperimental, and quantitative.
  - applied, nonexperimental, and qualitative.

ANS: B                    PTS: 1                    OBJ: WWW

59. Experimental research, in contrast with nonexperimental research, focuses on
- cause-and-effect relationships.
  - descriptions of phenomena.
  - prediction of phenomena.
  - naturalistic inquiry into relationships.

ANS: A                    PTS: 1

60. Which of the following best describes the meaning of a construct?
- Provable assumption
  - Verifiable proposition
  - Testable theorem
  - Unobservable trait
  - Abstract hypothesis

ANS: D                    PTS: 1

61. A fundamental difference between quantitative and qualitative research is that
- qualitative studies focus more on numeric descriptions.
  - qualitative studies emphasize pre-determined operational definitions.
  - qualitative studies are value-free.
  - qualitative studies are flexible and naturalistic.

ANS: D                    PTS: 1                    OBJ: WWW

62. Which of the following is a qualitative research problem?
- What is the effect of a computer-based SAT prep class on minority students' performance on the SAT?
  - Do SAT prep classes improve SAT scores?
  - How do teachers in inner-city high schools control student behavior in the classroom?
  - What is the relationship between high school size and the extent of parental involvement in school activities?

ANS: C                      PTS: 1

63. Quantitative and qualitative research have different philosophical assumptions. Quantitative research is most closely associated with \_\_\_\_\_, while qualitative research is associated with \_\_\_\_\_.
- phenomenology, positivism
  - positivism, phenomenology

ANS: B                      PTS: 1

Exhibit 2-7: Choose the research methodology that would be most appropriate to investigate each of the following questions.

64. Refer to Exhibit 2-7. How does a new mentoring program contribute to the effectiveness of beginning teachers at Rogers Elementary School?
- qualitative, ethnography
  - quantitative, ex post facto
  - qualitative, case study
  - quantitative, correlational
  - quantitative, survey

ANS: C                      PTS: 1

65. Refer to Exhibit 2-7. Do students who have a high score on a reading test also have a high score on a writing test?
- qualitative, ethnography
  - quantitative, ex post facto
  - qualitative, case study
  - quantitative, correlational
  - quantitative, survey

ANS: D                      PTS: 1

66. Refer to Exhibit 2-7. What effect does the gender of a counselor have on how he or she is received by counselees?
- qualitative, ethnography
  - quantitative, ex post facto
  - qualitative, case study
  - quantitative, correlational
  - quantitative, survey

ANS: B                      PTS: 1

67. Refer to Exhibit 2-7. From a list of extracurricular activities, which do high school students rate as most important?
- qualitative, ethnography
  - quantitative, ex post facto
  - qualitative, case study
  - quantitative, correlational
  - quantitative, survey

ANS: E                      PTS: 1

68. For which of the following research problems would the ex post facto method be most appropriate?
- How many students in the senior class are taking advanced placement (AP) classes?
  - Do students like the selection of AP classes offered?
  - Do students who take AP classes in high school earn better grades in college?
  - Which is the most popular AP class?

ANS: C                      PTS: 1                      OBJ: WWW

Exhibit 2-8: Choose the research methodology that would be most appropriate to investigate each of the following questions.

69. Refer to Exhibit 2-8. Do parents support the charter school movement in this community?
- qualitative
  - experimental
  - ex post facto
  - survey
  - correlational

ANS: D                      PTS: 1

70. Refer to Exhibit 2-8. What is the relationship between gender and performance on standardized math tests?
- qualitative
  - experimental
  - ex post facto
  - survey
  - correlational

ANS: C                      PTS: 1

71. Refer to Exhibit 2-8. How do autistic children use facilitated communication in their daily lives?
- qualitative
  - experimental
  - ex post facto
  - survey
  - correlational

ANS: A                      PTS: 1

72. Refer to Exhibit 2-8. What is the relationship between high school students' scores on the SAT and the ACT?
- a. qualitative
  - b. experimental
  - c. ex post facto
  - d. survey
  - e. correlational

ANS: E                      PTS: 1

73. Which of the following types of research would an investigator likely use to study the internal operations of a school board?
- a. Survey
  - b. Document analysis
  - c. Grounded theory
  - d. Phenomenological study
  - e. Case study

ANS: E                      PTS: 1

74. An investigator can reasonably conclude that changes in one variable produced changes in a second variable only with the \_\_\_\_ research method.
- a. naturalistic observation
  - b. case study
  - c. correlational
  - d. experimental

ANS: D                      PTS: 1

75. Over the years Professor Brown has noticed when returning test papers that the nearer students sit to the front of the lecture hall the higher their test scores tend to be. Which research method is he applying?
- a. Case study
  - b. Correlational
  - c. Experimental
  - d. Basic interpretive
  - e. Ex post facto

ANS: B                      PTS: 1

Exhibit 2-9: Label the following variables as continuous or categorical.

76. Refer to Exhibit 2-9. Fluency in French.
- a. continuous
  - b. categorical.

ANS: A                      PTS: 1

77. Refer to Exhibit 2-9. Native French speaker.
- a. continuous
  - b. categorical.

ANS: B                      PTS: 1

78. Refer to Exhibit 2-9. Aptitude for learning foreign language.
- a. continuous
  - b. categorical.

ANS: A                      PTS: 1

79. Refer to Exhibit 2-9. Whether a student is enrolled in a French class or not.
- a. continuous
  - b. categorical.

ANS: B                      PTS: 1

80. A qualitative researcher would view the concept of learning disability as
- a. value-laden
  - b. value-free.
  - c. theory-free.
  - d. value-specific.

ANS: A                      PTS: 1

Exhibit 2-10: Indicate whether the following characteristics apply to the quantitative or qualitative approach in educational research.

81. Refer to Exhibit 2-10. Hypotheses emerge after careful exploration and observation.
- a. quantitative
  - b. qualitative.

ANS: B                      PTS: 1

82. Refer to Exhibit 2-10. Cause-and-effect relationships are sought.
- a. quantitative
  - b. qualitative

ANS: A                      PTS: 1

83. Refer to Exhibit 2-10. Generalizations are made from one time and place to other times and places.
- a. quantitative
  - b. qualitative

ANS: A                      PTS: 1

84. Refer to Exhibit 2-10. Seeks the meaning of experiences from the participants' perspective.
- a. quantitative
  - b. qualitative

ANS: B                      PTS: 1

85. Recent reports have suggested that children who play soccer may sustain brain injury resulting from repeated hits to the head by the soccer ball. What methodology would you recommend to investigate the claim that children who play soccer have more brain injuries?
- a. An experimental study in which one group plays soccer for a semester and a second comparable group plays basketball and then the groups are compared for the number of brain injuries.
  - b. An ex post facto study, which compares brain injuries for two pre-existing groups one who has played soccer and another group who has been in a sport like swimming where they were not routinely hit in the head.
  - c. A survey of parents whose children have played soccer.

ANS: B                      PTS: 1

86. Which of the following would be most like an ethnographic research study?
- The study investigated gender differences in scores on a standardized mathematics test administered to three different primary schools in China.
  - The study investigated the relationship between the number of years an individual had served as principal of a school and the extent of expressed teacher satisfaction.
  - The study described the experiences of immigrants from Mexico who had been enrolled in ESL classes at a local community center.
  - The study documented the number of hours that high school students at a large high school worked at a part-time job during the school year.

ANS: C

PTS: 1

### SHORT ANSWER

1. Based on methodology, what are the two broad types of educational research?

ANS:

Qualitative and Quantitative

2. List three characteristics of qualitative research.

ANS:

Uses inductive approach, uses small samples, report uses rich narrative description

OBJ: WWW

3. List three characteristics of quantitative research.

ANS:

Uses deductive approach, uses large samples, uses statistical analysis of numeric data

OBJ: WWW

4. List three types of qualitative research.

ANS:

Case study, ethnographic study, and document analysis

5. List three types of quantitative research.

ANS:

Experiment, ex post facto study, correlational study

6. Distinguish experimental research and ex post facto research.

ANS:

Both are quantitative research. In an experiment, the researcher manipulates the independent variable; in ex post facto, he or she does not manipulate the independent variable.

7. List the steps that are common to all research studies regardless of methodology.

ANS:

Selecting a problem, reviewing the literature, designing the study, collecting the data, analyzing the data, interpreting the findings and reaching conclusions, reporting the results

OBJ: WWW

8. Distinguish between continuous and categorical variables and give an example of each.

ANS:

A continuous variable is one that can take on any value within an interval on the measurement scale, e.g. height. A categorical variable is one that varies in kind; gender and grade in school are categorical variables,

9. Define mixed methods research and list its advantages.

ANS:

Mixed methods research combines both quantitative and qualitative approaches within a single study. It has the advantages of each approach and may result in findings that are more dependable and complete than either method alone could provide.

10. Define operational definition and state its importance in research.

ANS:

An operational definition is one that defines a construct in terms of the operations that researchers must perform in order to measure the construct. They are important because they specify observable events that represent abstract constructs and thus make research on the construct possible.

## ESSAY

1. Describe the main differences between the quantitative and the qualitative approaches in educational research.

ANS: Responses will vary.

2. Distinguish between the two big categories of quantitative research and describe some specific methodologies included in each category.

ANS: Responses will vary.

3. What is an operational definition and what purpose does it serve in research studies? Give an example of an operational definition.

ANS: Responses will vary.