

# How Much Do Students Remember from an Introductory Psychology Course?

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## Abstract

Nearly 100 students were given a Pre-Test in psychology on the first day of class without warning in order to assess their knowledge of basic course content derived from the prerequisites of the course (PSYC-100 Introduction to Psychology or PSYC-220 Child Development) and other life experiences. This was intended as a low-stakes testing situation, since students were assured that the results were to be used only for curricular/instructional decision making and the results would have no impact upon the student's grade in the course. The Pre-Test was found to explain 12% of the variance in final course grade average. This research report contains an item analysis of the Pre-Test depicting the extent of psychological knowledge students brought with them to the class. The achievement results were very disappointing. For example, only 2 students knew the names and proper order of Piaget's 4 stages of cognitive development. The author hypothesized that even some fundamental psychological knowledge that was retained from previous learning allowed students to more effectively and efficiently re-learn such content for the new target course. This pedagogical research supported the use of the existing pre-requisite for the course, but extreme caution is urged when instructors assume that a substantial and accurate knowledge base in psychology is brought to the learning context based upon satisfying the pre-requisite course requirement.

Descriptors: Academic Achievement, Prerequisites, College Curriculum, Retention (Psychology), Curriculum Evaluation, Educational Improvement, Higher Education

## How Much Do Students Remember from an Introductory Psychology Course?

A large number of course instructors in psychology have pre-requisites attached to their upper-division courses, such as an Introduction to Psychology course. It is often assumed that such a pre-requisite is a necessary, but not sufficient ingredient for most students to successfully complete the course. This premise is usually based upon the following belief: A carefully identified previous course in psychology lays the foundation of psychological knowledge that will allow students and instructor to build upon such knowledge, apply such knowledge, and critically analyze theories and ideas. Another belief is that a pre-requisite course is needed to increase the likelihood of success in a particular course. Unfortunately, little is known about the transfer and retention of psychological knowledge through pre-requisites as a preparation for future academic work based upon a review of the literature.

This research report offers specific information regarding student ability to recall psychological theory and research content covered in most all introductory courses in psychology some time after the completion of such a pre-requisite. The findings of such a study have important implications for the teaching and learning of psychology and the use of pre-requisites in upper division courses.

Several caveats exist when doing such research. We often make the false assumption that a pre-requisite course is the only source of existing psychological knowledge for students in a class. This is a dangerous assumption, since students could have taken additional psychology courses other than the pre-requisite course; completed coursework outside the discipline of psychology that dealt with psychological content; or acquired psychological knowledge from

personal reading, electronic web-based sources on the Internet, and normal discourse inside or outside traditional academic settings.

Empirical support exists for the fact that students do really learn psychology outside the confines of a psychology course structure. For example, Rickard, Rogers, Ellis, and Beidleman (1988) reported that subjects in a control group who had never taken a psychology course correctly answered 62% of the questions in a 60 item multiple-choice psychology test taken from the instructor's manual of the textbook. Another explanation for this finding lies in the possibility that such questions were written at lower levels of the cognitive domain and thus might be considered questions that tapped common knowledge about psychology.

The paucity of research in the literature that examined the effectiveness of pre-requisites in upper-division psychology courses forced a broader exploration of such a phenomenon in other disciplines and institutional settings. Kaufman and Gilman (2002) found no relationship between students' completion of pre-requisite courses and success in future courses in a business program. Abou-Sayf (2008) explored the suspension of mathematics and English pre-requisite courses for 12 target courses in history, information technology, food service, e-business, and information and computer science at a community college setting. Findings here indicated changing a math or English requirement from "required" to "recommended" was somewhat detrimental to grades, but the complete waiving of the English prerequisite actually led to an increase in student performance. Sibulkin and Butler (2008) investigated whether a college algebra course should be a pre-requisite for taking a psychology statistics course. Prior completion of such an algebra class did not significantly add to the prediction of statistics grades.

Disciplinary and curricular specific domains could yield different findings.

Arismendi-Pardi (1997) found that a college algebra pre-requisite course led to better

performance in a future calculus course. Wilson (1994) found evidence that a mathematics course pre-requisite was not a significant predictor of success in a future chemistry course. Hoyt (1999) reported the usefulness of pre-requisites, but added a caveat that an above average achievement was needed in such pre-requisites.

The current study outlined in this report more accurately attempts to measure previous knowledge in psychology from all potential sources. It is hypothesized that for the majority of students, accumulated knowledge from a pre-requisite Introductory Psychology course is likely to be the most powerful contributor to such a knowledge base. Several items in the Pre-Test employed in this study were intentionally written at higher levels of learning in the cognitive domain such as application and analysis (see Bloom, Engelhart, Frost, Hill, & Krathwohl, 1956) in order to provide considerable challenge to the task. Most items (75%) were fill-in-the-blank rather than multiple-choice, since free recall items are thought to be more challenging than recognition items.

Additional measurement issues are of concern here. It is impossible to easily control when students actually took such a pre-requisite course in their collegiate experience. A greater time lag between the completion of the pre-requisite and another target psychology course might account for the forgetting of some acquired knowledge. The actual grade in the pre-requisite class was not considered in this research study, but it might be hypothesized that students with higher grades in the pre-requisite course would retain information longer. Also at issue here is the quality of the pre-requisite course and the instructional delivery mode, since transfer courses, on-line courses, community college courses, and home-campus courses are all judged to be equivalent in meeting the pre-requisite. The quality of teaching and learning in the pre-requisite

course is a further unknown factor when students arrive having already met the pre-requisite on the first day of class.

## Method

### Participants

Data collection was completed during the fall semester of 2007 in three sections of the research investigator's own Educational Psychology course. The classes were offered at a rural campus of a state university system with a total undergraduate and graduate population of just under 4,500 students. Approximately 80% of the 96 students in the classes were female. Most students took this course because it was a requirement in their teacher preparation program. The class year breakdown indicated that 95% of students held either junior or senior undergraduate status. All students in this convenience sample had already met the educational psychology course pre-requisite (PSYC-100 Introduction to Psychology or PSYC-220 Child Development). Over 90% of students also had previously completed an introductory statistics course.

### Measurement Instrument

The Pre-Test was composed of 18 items covering content found both in PSYC-100 Introduction to Psychology and PSYC-220 Child Development as well as the course for which the participants were currently enrolled. Content, such as Piaget's 4 stages of cognitive development, Freud's three personality elements, Erikson's 8 psychosocial stages, and characteristics of the correlation coefficient, was included in the measure. The first seven items required the free recall of theoretical content in a fill-in-the-blank format and the final 11 items were multiple-choice items. See Table 1 for the actual Pre-Test questions and answer key format.

## Results

The overall findings in terms of Pre-Test performance were disheartening. An extreme positive skewness of the data set was found due to the fact that most student scores on the Pre-Test were extremely low. See Table 2 for the detailed results for specific questions. Table 3 offers the descriptive statistical results for all the multiple-choice items in terms of actual responses for each option. A summary of the student responses will help the reader grasp the nature of the findings.

Students had great difficulty remembering the correct names and order of the developmental stages and theories proposed by Piaget, Erikson, and Freud. Only two students correctly identified Piaget's four stages of cognitive development in the proper order. Not a single student came close to correctly listing Erikson's 8 psychosocial stages in the proper order (the best job was the first 3 stages correct). The item on Freud's personality structure was intended to be challenging, since it was structured so that respondents had to also identify each structure according to its general functional nature. A total of 28 students (29 % of the sample) knew that the answers were id, ego, and superego; but only 3 of these students knew that in general terms the id represented biological issues, the ego represented psychological issues, and superego represented social issues. Student knowledge of the correlation coefficient was also disappointing. Only 19% of students knew that the correlation coefficient allowed for judging "assumed" cause and effect rather than true cause and effect relationships. A total of 41% of students incorrectly believed that  $r = +.94$  was a more powerful linear predictor than  $r = -.97$ .

The poor overall student performance on the Pre-Test encouraged a change in scoring strategy. Partial credit was given for correct answers in the free-recall items such as one point for knowing Freud's personality theory included the id, ego, and superego and an additional

point for knowing the general functional nature of each part of the personality (biological, sociological, and psychological).

The results of the Pre-Test completed on the first day of class were also employed as a tool to predict eventual achievement in the course. The Pre-Test was found to be statistically significantly related to end of course average [ $r(96) = .35, p < .01$ ] (see Herman, 2009).

## Discussion

Readers are reminded that correlational research does not imply direct cause and effect relationships. This often overlooked and misunderstood fact often lulls readers into assumptions that the selected variable might be the only variable involved in predicting a dependent variable. In this study, the Pre-Test in Psychology was designed as a measure of what students might have retained from a pre-requisite course rather than independent variables such as intelligence, memory, motivation, study habits, etc. that might be some reasonable assumed causes and expected predictors of the end of the course average. The Pre-Test in Psychology is obviously a crude measure of what students bring to the target course, but such research on teaching and learning is rarely performed. Certain limitations in measurement and research design are acceptable when you consider the ease with which such a Pre-Test could be designed in any course and employed in order to offer an expedient check of how a pre-requisite is functioning in a target course. It is reasonable to acknowledge that had the correlation coefficient between the Pre-Test and end of the course average been found to be zero-ordered (positive or negative, but near zero) and not statistically significant, the case for maintaining the pre-requisite for the target course would not be able to be supported.

The poor ability of students who have taken an introductory-level psychology course to accurately recall content in this study generally supports what has been found in the literature.



The current study offers unique contributions in that 1) even the small amount of psychological content remembered was found to be related to later course success and 2) the specific correct answers and errors presented in descriptive form were used to enhance learning and teaching in the classroom. For example, Pre-Test questions, errors, and correct answers were shared with students at the start of all future semesters in order to help students succeed in the course.

The major lesson learned from this pedagogical research is that instructors may need to assess student knowledge of psychology very early in the semester in order to ascertain the level of psychological knowledge obtained from pre-requisites or other life experiences. It seems that even some rudimentary psychological knowledge that is retained and brought to a class by a student offers the chance for easier learning, re-learning, teaching, and re-teaching.

Constructivist theory would suggest that the building upon the foundation of such pre-requisite content is essential prior to expecting students to apply knowledge and critically compare and contrast theoretical ideas. The poor retention of psychological-knowledge finding might well account for a considerable portion of poor student academic performance, increased anxiety in and out of the classroom, lack of motivation, and frustration in learning.

VanderStoep, Fagerlin, and Feenstra (2000) found evidence that vivid instructional tools such as dramatic videos and novel in-class demonstrations helped students recall course content from introductory psychology courses. This style of teaching would seem to encourage the improved retention of psychological content.

Another approach to investigating the validity of pre-requisites compared student grades in upper-division courses based upon whether or not they had completed a “necessary” pre-requisite course by the use of multivariate analysis of variance. Seven target business administration courses were selected as a part of the investigation. Pryor and Gordon (1974)

found that overall student GPA was a better forecaster of successful completion of a target course than the completion of the stated pre-requisite.

The unique contribution of this paper lies in the suggestion that such pedagogical research as outlined here empowers educators and students. Any instructor who teaches an upper division course with a pre-requisite can test for himself/herself how effectively the pre-requisite prepares students for a target course. This can be done with a minimal effort on the part of a course instructor and is by design relevant to an instructor's discipline, institutional context, and course content. The sharing of such findings in professional forums could help us sort out the existing research findings that lack consensus. Students also need early access to current course information that they likely once learned in a pre-requisite course, since they will now be expected to understand and apply such information.

The establishment of reasonable course pre-requisites is a bit like trying to find your way through an uncharted minefield. If only 25% of students retained the basic content from a pre-requisite course, can we live with a casualty rate of having 75% of students less than adequately prepared for a college upper-division course? Do we lower the academic expectations in upper division courses to better match what most students bring to the learning situation? Such decisions can lead to increased failure rates in courses or a "dumbing-down" of the curriculum. Substantial increases in course failure can have a tragic impact upon campus retention goals. An increase in students failing a course could lead to weaker course evaluations of a professor. Since these measures are often employed for tenure, promotion, and merit pay decisions, the change in a pre-requisite could have a negative impact upon professional advancement and livelihood.

The judicious implementation of course pre-requisites would seem to be crucial for instructional design, student success, curricular decision making, graduating on-time, successful teaching, and institutional student retention. It would appear that a change in a course pre-requisite could have a widespread negative or positive impact across the entire campus. This is a topic in psychology that has been overlooked for far too long and demands out immediate attention.

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**Table 1**  
**Pre-Test in Psychology Questions**  
Initial Class Pre-Test of Psychology  
PSYC-350 Educational Psychology  
Developed by William E. Herman, Ph.D.

**Directions:** Read each question very carefully. Place your best answers into the blanks on the Answer Sheet for items #1-#7. Select the “one” best answer from the options provided for items #8-#18 and use the bubble options on the Answer Sheet.

1. List Jean Piaget’s stages of cognitive development in proper order from least sophisticated to complex.
2. List Erik Erikson’s stages of psychosocial development in proper order from earliest to latest in the lifespan.
3. List Sigmund Freud’s three parts of the human personality according to the most appropriate general heading.
4. List Sigmund Freud’s psychosexual stages in proper order from earliest to latest in the lifespan.
5. List Robert Sternberg’s three (3) elements of his Intelligence Theory.
6. List J. P. Guilford’s three (3) faces of the Structure of the Intellect Model.
7. List Howard Gardner’s eight (8) areas of Multiple Intelligence theory.
8. Which of the following correlation coefficients represents the most powerful linear prediction from one variable to another?
  - a.  $r=+.94$
  - b.  $r=+.54$
  - c.  $r=-.07$
  - d.  $r=-.97$
9. Which of the following disciplines is listed correctly under its accurate generic heading? (Note: All disciplines must be listed correctly in order to be the answer.)
  - a. Humanities: music, art, religion, and modern languages
  - b. Social Sciences: psychology, sociology, and geology
  - c. Social Sciences: philosophy, cultural anthropology, and politics
  - d. Natural Sciences: physics, biology, and geography

10. The correlation coefficient provides accurate information for
- linear variables.
  - non-linear variables.
  - all types of variables.
  - curvilinear variables.
11. A scatterplot for the correlation coefficient of  $r = -.88$  would look like
- a random distribution resembling a shotgun blast.
  - a pencil with one end in the southwest corner and the other end in the northeast corner.
  - a pencil with one end in the southeast corner and the other end in the northwest corner.
  - a very thin straight line where all the dots fall on the same line.
12. The most major difference between identification and modeling is that
- modeling is more unconscious.
  - modeling is more likely to occur in males rather than females.
  - identification is more unconscious.
  - identification is more likely to occur with females rather than males.
13. The scientific study of behavior rests most fundamentally upon
- subjectivity.
  - objectivity.
  - the humanities.
  - unproven hypotheses.
14. According to Erik Erikson, identity formation involves the
- conscious selection of values around adolescence from unconsciously implanted values.
  - unconscious selection of values around adolescence from consciously implanted values.
  - modeling of behaviors during childhood and values associated with such a process.
  - adopting of values imposed by parents.
15. According to Piaget, cognitive disequilibrium involves
- an unconscious dependence upon parental values rather than personal values.
  - thinking about the past or future instead of the present moment.
  - a comfortable match between your beliefs and real world events.
  - an uncomfortable match between your beliefs and real world events.
16. Identity foreclosure is best captured by a situation where a
- delay of decision is consciously made in order to make a better life decision later.
  - person adopts what someone else wishes them to be in life.
  - person adopts a mentally healthy position and makes healthy choices.
  - person adopts an antisocial set of behaviors.

17. Correlational research studies allow for judging

- a. true cause and effect relationships.
- b. assumed cause and effect relationships.
- c. qualitative relationships between variables.
- d. non-measurable variables in a research study.

18. Existentialism forms the primary basis for which approach to psychology?

- a. psychoanalysis.
- b. humanistic psychology.
- c. S—R psychology.
- d. behavioristic psychology

### ANSWER SHEET

1. Piaget’s Cognitive Stages

2. Erikson’s Psychosocial Stages

\_\_\_\_\_ (earliest) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(later) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(latest) \_\_\_\_\_

3. Freud’s Personality Structure

4. Freud’s Psychosexual Stages

Psychological \_\_\_\_\_ (earliest) \_\_\_\_\_

Sociological \_\_\_\_\_

Biological \_\_\_\_\_ (later) \_\_\_\_\_

\_\_\_\_\_

(latest) \_\_\_\_\_



5. Sternberg's Intelligence Theory  
(List the three types of IQ)

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6. Guilford's Structure of the Intellect Model  
(List three different intellectual processes)

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7. Gardner's Multiple Intelligence Theory  
(List the eight types)

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Multiple-Choice Responses

Items #8-#18 were marked on a traditional bubble sheet format.

## Table 2

### Pre-Test in Psychology Results

(N=96 students)

#### **Free Recall Questions Analysis**

Question #1: Piaget's 4 Stages of Cognitive Development

Only 2 students knew the names and proper order of all 4 stages.

A handful of students remembered some of the stages and the proper order of such stages.

Another handful of students mixed up the order of the stages, but knew a few of the stages.

Question #2: Erikson's 8 Psychosocial Stages

The most easily remembered stage was Stage 1 Trust versus Mistrust (N=4).

Stages 2-4 were correctly remembered only by one student each.

The best job was done by one student who was able to recall the first three stages in correct order.

Question #3: Freud's Personality Structure

Correct Answers:

Psychological: Ego (N=10)

Sociological: Superego (N=8)

Biological: Id (N=13)

Note: There were 61 total answers that had the personality structure (id, ego, or superego) incorrectly listed under the wrong heading, e.g., Sociological: Ego (N=13).

Question #4: Freud's Psychosexual Stages

Correct Answers:

Oral Stage: (N=28)

Anal Stage: (N=15)

Phallic Stage: (N=9)

Latency Stage: (N=4)

Genital Stage: (N=8)

Question #5: Sternberg's Intelligence Theory

Correct Answers: Componential (Analytic), Experiential (Creative), & Contextual (Practical)

No student correctly remembered any of these answers.

Question #6 Guilford's Structure of the Intellect Model

Correct Answers: Contents, Products, and Operations

No student correctly remembered any of these answers.

Question #7: Gardner's Multiple Intelligence Theory

Correct Answers:

Mathematical (N=5)

Spatial (N=1)

Musical (N=4)

Nature (N=1)

Artistic (Spatial or Musical) (N=3)

## **Multiple-Choice Question Findings (Provided to all students in future classes)**

64% of students correctly knew that the correlation coefficient only provides accurate information for linear variables.

39% of students could correctly visualize what the correlation coefficient of  $r=-.88$  would look like.

38% of students correctly knew that identification, but not modeling, is a psychoanalytic term that involves unconscious processes.

59% of students correctly understood that Piaget's cognitive disequilibrium involves an uncomfortable match between your beliefs and real world events.

45% of students correctly understood that identity foreclosure is created when a person adopts what someone else wishes them to be in life.

26% of students correctly knew that existentialism forms the primary basis of humanistic psychology.

20% of students correctly understood that correlational research allows for judging assumed cause and effect relationships (not true cause and effect relationships).

47% of students incorrectly believed that modeling is more unconscious than identification.

30% of students incorrectly believed that a scientific study of behavior rests most fundamentally upon subjectivity.

39% of students incorrectly believed that Erikson's identity formation only involves modeling behaviors during childhood.

31% of students incorrectly believed that identity foreclosure is where a person adopts a mental healthy position and makes healthy choices.

52% of students incorrectly believed that correlational studies allow us to judge the qualitative relationships between variables. (Note: Correlations allow us to judge the quantitative relationships between variables.)

42% of students incorrectly believed that  $r=+.94$  is a more powerful linear prediction than  $r=-.97$ .

35% of students incorrectly believed that geography is part of the natural sciences. Geography is a social science.

22% of students incorrectly believed that philosophy is part of the social sciences. Philosophy is part of the humanities.

31% of students incorrectly believed that a correlation coefficient of  $r = -.88$  would look like a shotgun blast in scatterplot form.

30% of students incorrectly believed that Erikson's identity formation involved the unconscious selection of values around adolescence from consciously implanted values.

(Note: The switching of the placement of the terms "consciously" and "unconscious" would make this a true statement.)

39% of students incorrectly believed that existentialism forms the primary basis for behavioristic psychology.

24% of students incorrectly believed that Piaget dealt extensively with unconscious processes.

21% of students incorrectly believed that correlational studies allow for judging true cause and effect relationships.

25% of students incorrectly believed that existentialism forms the primary basis for psychoanalysis.

**Table 3**  
**Descriptive Results for Multiple-Choice Items**

## Item #8

- A. N=41(42%)
- B. N=7 (7%)
- C. N=26 (27%)
- D. N=23 (24%)**

## Item #9

- A. N=29 (30%)**
- B. N=13 (13%)
- C. N=21 (22%)
- D. N=34 (35%)

## Item #10

- A. N=61 (64%)**
- B. N=3 (3%)
- C. N=27 (28%)
- D. N=5 (5%)

## Item #11

- A. N=29 (31%)
- B. N=20 (21%)
- C. N=37 (39%)**
- D. N=8 (9%)

## Item #12

- A. N=44 (47%)
- B. N=6 (7%)
- C. N=35 (38%)**
- D. N=8 (9%)

## Item #13

- A. N=28 (30%)
- B. N=53 (56%)**
- C. N=7 (7%)
- D. N=7 (7%)

## Item #14

- A. N=19 (20%)**
- B. N=28 (30%)
- C. N=37 (39%)
- D. N=10 (11%)

## Item #15

- A. N=22 (24%)
- B. N=8 (9%)
- C. N=8 (9%)
- D. N=55 (59%)**

## Item #16

- A. N=9 (9%)
- B. N=44 (45%)**
- C. N=30 (31%)
- D. N=14 (14%)

## Item #17

- A. N=20 (21%)
- B. N=19 (20%)**
- C. N=49 (52%)
- D. N=6 (6%)

## Item #18

- A. N=23 (25%)
- B. N=24 (26%)**
- C. N=10 (11%)
- D. N=37 (39%)

**1<sup>st</sup> Note: Correct answers are denoted in bold.**

2<sup>nd</sup> Note: Student response rates for items varied from 93-97 subjects based upon non-response to some items.