Methods in Computer Science Research

Dependent vs. Independent Variables

a. If you measure the difference between two groups of adults on how well they can remember a set of 10 single digits after a 5-hour period, what would be the dependent variable?

b. If you are looking at the effect of parental involvement in school on children's grades, what would be the dependent variable?

c. You want to test the effectiveness of three different teaching programs on students' programming skills. The design is illustrated in the following table.

Method of Teaching Programming		
Method A (with tutoring)	Method B (with tutoring and rewards)	Method C (no tutoring and rewards)
Average Programming Score	Average Programming Score	Average Programming Score

What would be the dependent and independent variables?

Threats to Internal and External Validity

Use Case	Threat	Internal vs. External Threat
A researcher is using an essay test to judge the effectiveness of a writing skills program. What happens to their criteria when they grade the 100th examination?		
A pretest to measure self-esteem in young people, which might awaken thoughts which had not surfaced before.		
Research involving very young infants is fascinating but often can be frustrating. They usually arrive sleeping, or crying, or ready to eat, but rarely ready to play, and many have to be sent home and rescheduled or even dropped from the study.		
From 1927 through 1932, at the Cicero, Illinois Western Electric company Hawthorne plant, Elton Mayo, a Harvard business professor, measured the effects of changing certain environmental cues—lighting and working hours—on work production. Even when the lighting was worse and the working hours were longer, production increased for the experimental group. Why?		

Definitions:

Pretest presence—Subjects increase or decrease performance because of exposure to a pretest.
Reactive arrangements—Simply knowing that one is being observed affects performance.
Instrumentation—Changes in the system used to score the dependent variable.
Mortality—The dropout rate or reduction in a sample size over time.