

## **Educational and Psychological Research Methods**

Author: Alice C. Mello Cavallo

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Child Development

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To Professor Marina Bers

### **Introduction**

How might one clearly delineate between psychological research and educational research? Should one decide based on the home academic department of the researcher? Should one categorize based upon the journal where the study is published? Should one categorize them by an empirical approach (looking at papers from APA and AERA) versus an essentialist approach (looking for stated definitions)? Could one perhaps establish the differences based on the kinds of questions studied, the research goals, the philosophical assumptions, the research methods or the language used by each field? If one excludes purely psychological studies, such as those around the perception of optical illusions, there appears to be numerous intersections between psychological and educational research making it harder to isolate distinctions between them. The fields themselves are social constructs, in flux, with shifting borders and large overlap. Typical of social sciences, even within the fields of psychology and education there is broad disagreement and this is reflected in differing research methodologies.

When one investigates the areas within psychology and education pertinent to studies of learning and development, the distinctions remain difficult. For example, Vygotsky (1978, 1986) was particularly interested in the social dimensions for human development and the development of thought, especially in the role of language in this process. People

following in his tradition, such as Cole (1996), are considered to be in the field of social psychology but also present work rooted in such ideas for education and development. As they are interested in questions that often are thought to be anthropological (leading to the development of the field of cognitive anthropology) and sociological, they employ research methodologies from those fields. Thus, they employ a variety of research methodologies, particularly ethnographic case studies, although they often use quantitative measures to assess particular questions (Scribner & Cole, 1981).

Piaget denied being a psychologist, stating often that his field was genetic epistemology. That is, in his view, he studied the growth and development of knowledge through the species over time. Yet, due to his results, most people refer to him as a psychologist and many educators have been trying, often in a misguided way, to apply his results in education. Piaget (1977) was interested in how children thought and how that thinking developed over time. For this, a careful clinical diagnosis methodology was developed in order to attempt to determine what children were thinking when engaged in certain activities. The idea was not to see what approach to the activity might be better, but rather what was happening in the child's mind. Ackermann (1997) wrote on how the clinical interview is a beneficial means of interaction for learning instead of a teacher supplying answers or conveying information. It attempts to discover what a child is thinking while engaged in a task and it helps a child to discover for herself how to better go about solving the problem at hand. Many other current researchers position themselves in the intersection of education and psychology, such as Kegan (1982), Gardner (1978), Case (1984), and Feldman (1994), among others. They employ research methodologies based

upon the accepted traditions within the disciplines they are addressing combined with an assessment of the types of research questions they are studying. This creates a dynamic situation with social roots, where the questions and methods evolve.

The Learning Sciences was conceived 14 years ago out of the necessity to depart from the educational field and to develop new methodological approaches because its philosophical assumptions and research goals were different. Learning sciences appeared as an interdisciplinary field merging some areas of psychology, education, computer science, and anthropology, among others (CHLS, in press). The distinctions between the learning sciences and educational research methods seems to be fading as some educational researchers are being influenced by the learning sciences methodologies, goals to reform school and to design progressive learning environments with computational models. The use of technological tools in learning environments is another area of research that brings together educators and psychologist and has been well explored by the learning science community. Even though the learning sciences community considers itself (CHLS, in press; Bransford et al., 2000) separate from the educational community, in this paper I will consider it as part of the educational one. The differences and similarities between psychological and educational research methods discussed in this paper revolve around the similarities and differences between quantitative and qualitative methods, which rely mainly on the kind of question asked by the researcher.

### **Similarities in the Research Methods**

When the educational and psychological researchers make use of quantitative research methods, they follow the same methodology. They search to strengthen the reliability, internal and external validity of the study in order to be able to generalize the findings to the population represented by the sample. They both try to use similar sampling procedures, even though randomly assigned samples are harder to accomplish in educational research settings. Please refer to Dunham (1988) or Wiersma (1980) to detailed information on how to create a sample of subjects (psychological research) or participants (educational research) when using quantitative methods.

### **Defining the Differences**

The differences that arise between the methods in Psychological Research (PR) and Educational Research (ER) depend on the research goals and the research questions. Quantitative research, in general, answers descriptive questions, such as the relative virtues of different teaching approaches, while qualitative research tries to answer the why or how a teaching method is working. There are some social psychologists who might take the path of qualitative research and some educators that make use of purely quantitative research. There is not a clear cut distinction between the methodologies when they both employ quantitative or qualitative methods. I try to describe some specific differences when they utilize different methods, but those differences do not always apply when the research goals are too similar between psychological and educational research as it is the case of some psychological studies that focus on learning and cognitive development (Case, 1984; Feldman, 1994) or psychological development (Kegan, 1982; Ackermann, 1997).

Sometimes the intersection between the two areas is so close that one might decide if the research is psychological or educational based on the academic department where the researcher comes from (Education, Psychology, Child Development, etc) or the journal where the study is published. The Child Development Department at Tufts University seems like a good example of this intersection; the faculty body is interdisciplinary with professors in education, psychology, communication, or technology, among others, sharing an interest in the development of the child; some professors concentrate more on the psychological development while others on the learning and cognitive development, but all are interested in some kind of intervention to improve the growth of the child.

As mentioned in the Research Methods paper, the philosophical assumptions also influence the choice of research methods, and according to that view PR would fit with postpositivism, or would even be in line with constructivism. In the field of educational research, different tendencies exist as in the case of education (most education departments) and the learning sciences (researchers with interdisciplinary background); therefore, ER could match with postpositivism, constructivism, advocacy/participatory or even pragmatism worldviews. Hence, the differences between PR and ER methods would exist only when their researchers have a divergent philosophical assumption.

### **Specific Differences between Quantitative and Qualitative Methods**

Pure quantitative PR tends to be very precise and formulates hypotheses that lead to formal predictions in relatively narrow domains, while qualitative ER can ask open-ended research questions and can deal with broader domains. Open-ended questions, such as “Higher order thinking skills and low-achieving students: are they mutually exclusive?”

(Zohar &Dori, 2003) usually lead to the existence of several variables or factors which result in a somewhat broader domain of study.

The quantitative data collection, data analysis and presentation of findings might also differ a bit from a mixed methods ER to a pure quantitative PR. Mixed methods research might collect the quantitative data separate or concomitant with the qualitative one, or can also transform qualitative data into quantitative data in order to use with some continuous measured achievement score. For example, the study from Davis (2003) entitled “Prompting Middle School Science Students for Productive Reflection: Generic and Directed Prompts” collects and codes qualitative data classifying them into categories and attaching a number flag to them. Hence, these categorical values were used in t tests, correlations, and ANOVA, which use these categorical values with results from pre and post test. Davis breaks her study in several questions and uses one kind of statistical test to answer each question. She presents the result of the statistical tests with evidences of students written responses corroborating the statistical results. In this study she does not keep any variable constant, but she performs several factorial tests checking each dependent variable against the independent variable one at a time. In her presentation of the results, Davis uses the concurrent transformative strategy.

There are some discussions in the difference of unit of analysis explored by educational and psychological researchers in areas where there is an intersection of interest, such as cognition or developmental studies. Educational researchers claim to study the participants’ points of view instead of the researcher’s viewpoint. Therefore, the unit of

analysis of the educators can be to understand the meaning the students' activities have for them and not the observer's perspective of the reasoning that happens internally in the students' mind (Cobb & Bowers, 1999). Cobb et al (1999) also emphasize the use of an evolving theory on the classroom-based research opposite to the pre-established theory used by educational psychologists. Psychological researchers establish a theory beforehand and try to prove it through the empirical study, but they do not revisit and readjust their theory during the experiment. Cobb et al mention some differences between the cognitive approaches taken by psychologists and the situated learning approaches taken by educators:

.... differing treatments of meaning, the alternative ways in which instructional goals are cast, and the conflicting views of the relationship between theory and classroom practice..... (Cobb & Bowers, 1999, pp.4)

The presentation of the quantitative data on mixed methods research (Creswell, 2003) can be separate or intertwined with the qualitative one. ER can make use of a much more varied number of techniques to conduct and present the findings of research than pure quantitative PR. Quantitative research only has the resource of numerical account without being able to show any evidence such as piece of written material, technological creations including video, digital stories, simulations, etc, or pieces of art work, among others on the explanation of the findings.

In qualitative research, validity does not carry the same connotations as in quantitative one; neither is reliability a companion of validity. Internal and external validity are also accomplished in different ways between qualitative and quantitative methods. Internal validity is the ability to accurately explain the findings. Pure quantitative PR requires the

researcher to hold factors constant or controlled in order not to have surprising effects and to be able to exactly explain the effect of the dependent variable. When ER does not control for variables (qualitative method), it tries to accomplish the “trustworthiness, authenticity, and credibility” (Creswell, 2003, pp. 196) of its findings by the use of several different techniques: triangulate different data sources, present the findings to the participants in order to get their agreement for accuracy, use rich and thick description to convey findings, clarify researcher bias, present negative or discrepant information that goes against the themes, use peer debriefing, use external auditor, etc. In summary, these strategies replace the cut-and-dry procedure of keeping variables constant.

External validity is the ability to generalize the findings from the sample to the original population. Pure quantitative PR accomplishes external validity mainly by randomly sampling assignment, rigorous operational definitions and controlled variables, while qualitative ER might utilize other techniques such as some of the ones described in the prior paragraph and found at Creswell (2003).

When educational research is purely qualitative, there is a difference in the meaning and ways to accomplish the study reliability. In quantitative research reliability relates to how the measurements of the variables are done and which instruments are used. On the other hand, reliability in qualitative research might mean “to check for consistent patterns of theme development among several investigators on a team” (Creswell, 2003, pp. 195).

### **Conclusion**

Once again, the differences between educational and psychological research methods remain in the philosophical assumptions, the kind of question asked and the purpose of the research, as these factors lead to qualitative, quantitative or mixed methods used in the research design. When the question or hypothesis of both fields leads to a purely quantitative study, it implies that there is no difference between educational or psychological research methods other than perhaps the settings and the extent of internal and external validity. On the other hand, if the research question and purpose lead to different methods (qualitative X quantitative), then the differences may appear. When the educational researcher uses mixed methods in her inquiry, the similarities between the quantitative methods used by the psychological researcher might arise because of the introduction of measurement of variables in a numerical account, the use of statistical tests, and the approaches used to explain the numerical data might also be similar. Or in the other direction, if the psychological researcher uses qualitative method, the similarity arises, because mixed methods make use of qualitative strategies as well.

If one considers the existing similarities in research goals that have been seen in the last forty-five years, the areas where there are intersections of interest between psychological and educational research might merge in the near future into a larger field of research in learning. Learning Sciences might already be a first attempt of integrating psychological and educational research into one field interested in understanding, designing and improving learning with the use of technological tools.

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