What Principals Need to Know About Education Research

The more principals understand research, the better they are able to use it.

Patricia A. Lauer
With the advent of the No Child Left Behind (NCLB) Act, “research-based” has become a phrase frequently used by educators, program developers, and publishers. But what does it mean? How does one determine whether a research study is good or bad? What information can different types of research provide?

Knowing the answers to these questions is particularly important for principals, whose job is to identify and implement strategies that can improve the education outcomes of their students. More than ever, principals need to understand education research, evaluate whether the research is trustworthy, and determine the usefulness of the research in guiding their schools’ education practices.

Information from research is more reliable than information from other sources, such as stories, personal experiences, opinions, or logical arguments. This is because research is based on the systematic gathering of observable facts or data, such as students’ test scores or classroom instruction.

Descriptive research answers questions about what, how, or why something is happening. For example, what kinds of teacher professional development occur in high-performing schools? Experimental research answers questions about whether something causes an effect, the so-called “what works” questions. For example, does increasing the amount of professional development for teachers increase student achievement? Whether conclusions drawn from a research study are valid depends on the type of research and the research design.

Understanding Descriptive Research

A simple descriptive research design is used when data are collected to describe persons, organizations, settings, or phenomena. For example, a researcher might administer a survey about professional development to new teachers and report on their responses. With a comparative descriptive design, the researcher describes and compares two or more groups of participants. For example, a researcher might survey teachers in low- and high-

IN BRIEF

In this overview, the author discusses the differences between descriptive and experimental research, and what each is designed to accomplish. She also emphasizes the need to understand quantitative and qualitative research data and provides four key questions to ask when evaluating education research. Finally, the author reveals three key factors to consider in determining the practical usefulness of research.
Understanding Experimental Research

An experimental research design is needed to answer questions about causation or “what works.” These designs include true experiments (also referred to as randomized controlled trials) and quasi-experiments. In a true experiment, the researcher randomly assigns the participants to two or more comparison groups, sometimes referred to as treatment and control groups. For example, a researcher conducting an experiment to study whether teacher professional development increases student achievement might randomly assign half of a district’s fourth-grade teachers to receive professional development in reading (the treatment group), while the other half receives none. At the end of the school year, the achievement gains in reading by the students of the two groups of teachers are compared.

In a quasi-experiment, the researcher does not randomly assign participants to comparison groups, usually because this is not feasible. Instead, the researcher matches comparison groups on characteristics that relate to what is being measured. For example, a researcher might assign one elementary school to the treatment group and use as the control group another elementary school that is similar to the treatment school in student socioeconomic status, a characteristic that is related to student achievement. It is assumed that because the two groups are similar, characteristics that relate to what is being measured. For example, a researcher might assign one elementary school to the treatment group and use as the control group another elementary school that is similar to the treatment school in student socioeconomic status, a characteristic that is related to student achievement. It is assumed that because the two groups are similar, characteristics

What Is Scientifically Based Research?

A ccording to NCLB, scientifically based research is rigorous, systematic, objective, empirical, peer-reviewed, and reliant on multiple measurements and observations, preferably through experiments or quasi-experiments.

While NCLB’s definition emphasizes the importance of research design, the National Research Council (2002) explains that the quality of a research study is determined by the degree to which the study follows six principles that underlie all science. A scientific study:

- Poses significant questions that can be investigated empirically;
- Links research to relevant theory;
- Uses methods that permit direct investigation of the question;
- Provides a coherent and explicit chain of reasoning;
- Replicates and generalizes across studies; and
- Discloses research to professional scrutiny and critique.

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that might influence reading achievement favor neither group. However, this assumption might not be true and for this reason quasi-experiments are considered less rigorous than true experiments.

Understanding Research Data
An additional consideration in understanding education research is the type of data that are collected. Quantitative data consist of numbers and measurements (e.g., student test scores) while qualitative data consist of narrative descriptions or observations (e.g., descriptions of classroom instruction). Distinguishing between the types of data collected and the type of research is often a source of confusion. In general, research studies with experimental, quasi-experimental, or correlational designs collect quantitative data. Research studies with simple descriptive or comparative descriptive designs collect either type of data. It is important to note that neither type of data is more rigorous or valid than the other. Rigor and validity have more to do with the research design and how the study is conducted than with the type of data collected.

Evaluating Education Research
When researchers discuss whether findings and conclusions from research can be trusted, they are referring to research validity (Shadish, Cook, and Campbell 2002). Evaluating a research study involves asking four questions that address several considerations:

1. What is the research question?
2. Does the research design match the research question?

To answer these two questions, it is necessary to identify the research question and then determine whether the appropriate descriptive or experimental research design was used (see box).

3. How was the study conducted?
This question concerns the research method and how the research design was implemented. A research report should provide enough details about the method so that the study can be repeated. Without these details, it is difficult and sometimes impossible to judge the validity of the research. Four key components of the research method influence its validity.

Participants. Who participated in the study and how were they selected? The research report should describe the number of participants in the study, as well as their characteristics and the characteristics of entities such as schools and districts.

Treatment. How is the treatment defined and described in the study? How was it implemented? Most education research studies concern a particular education treatment or intervention (e.g., a reading program, a type of staff development, or a mathematics curriculum). The researcher should define the treatment carefully and provide evidence that it was implemented consistently.

Data Collection. What data were collected and how were they collected? The most commonly used data-collection instruments in education research are tests, attitude scales, surveys, interviews, and observations. It is critical that these instruments have both validity and reliability. For example, results for ninth graders on a test of...
algebraic ability should be similar to their results on other tests of that ability.

Data Analysis. How were the data analyzed? The computation of statistics is the primary basis for research conclusions about a treatment effect (i.e., that a treatment or intervention worked). A statistically significant effect at the 0.05 level means that there is a 5 percent or less probability that the result occurred by chance.

4. Are there rival explanations for the results?
   At the end of a research report, the researcher presents conclusions based on results obtained through the study. To judge whether a conclusion can be trusted, it is important to ask, Could there be an explanation for the results other than the conclusion reached? Some common rival explanations include bias in assigning participants to different comparison groups, loss of participants from the study sample, and influences from events unrelated to the research. It is the responsibility of the researcher to rule out rival explanations by demonstrating they do not apply to the study.

Using Education Research
   After reading education research and making judgments about whether the results and conclusions can be trusted, principals need to decide whether and how the research should be used to influence school practice. Local factors, including the cost of implementation, are obvious influences. In addition, coherence, applicability, and educational significance of the research should be considered.

   The coherence of education research is influenced by whether the research findings are based on a theory or conceptual framework and have been replicated in other studies with various settings and participants.
   Applicability refers to the degree to which the study is comparable to the principal’s school in its setting and participants.
   Finally, principals need to know the educational significance of research findings. In other words, what difference will it make if a school practice is changed or adopted based on this research? Without knowing educational significance, it is difficult to estimate the costs and benefits of adopting a practice or program. For this reason, studies of programs designed to improve student achievement should indicate how much of an effect a particular program has on student achievement.

A Balancing Act
   In the end, for principals to apply research to school practice they need to balance the criteria of usefulness in a way that reflects local circumstances. First, it is necessary to determine if the research is empirical and the researcher’s conclusions are valid. Next, principals must decide how much weight
to give to different aspects of research usefulness. Costs and potentially harmful effects are factors that should always be considered.

References

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This article is adapted from An Education Research Primer: How to Understand, Evaluate, and Use It by Patricia A. Lauer (2006).

WEB RESOURCES

The Educational Resources Clearing Center (ERIC) is a federally funded system that has a wealth of information for researchers, practitioners, and policy-makers.
www.eric.ed.gov

An important online source for education research is the Web site of the U.S. Department of Education (ED), which provides access to more than 200 ED-sponsored sites and more than 150 other federal agencies. It also provides tips for searching ED documents.

The National Center for Education Statistics produces access to hundreds of reports and numerous education statistics.
http://nces.ed.gov

The What Works Clearinghouse (WWC) is designed to provide educators, policymakers, and researchers a source of scientific evidence on education interventions that “work.”
www.whatworks.ed.gov

The Institute of Education Sciences has published a guide, Identifying and Implementing Educational Practices Supported by Rigorous Evidence, that can be downloaded.

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