

Research Methodology- An Overview

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Abstract

Research in common parlance refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. Dictionary definition of research is a careful investigation or inquiry especially through search for new facts in any branch of knowledge. Some people consider research as a movement from the known to the unknown. It is actually a voyage of discovery. We all possess the vital instinct of inquisitiveness. When the unknown confronts us, more and more our inquisitiveness makes us probe and attain understanding of the unknown. This inquisitiveness is the mother of all knowledge and the method, which one employs for obtaining the knowledge of whatever the unknown, can be termed as research.

KEYWORDS: Research Methodology, overview of Research, Quantitative and Qualitative Research, Strengths and Weakness of Research Methodology etc

Introduction:

This component is unable to do more than help you to begin thinking about quantitative methods in educational research. Its aim is to give you an insight into the issues should you choose quantitative methods as part of your research methodology.

We will briefly address the following questions:-

- What are quantitative methods?
- What are the ingredients of quantitative methods?
- How do you go about research design?

Education research has moved away largely from the numbers approach in recent years, and the emphasis has been on qualitative methods. However, the use of numbers can be a very useful tool, either as part of a larger project that employs many different methods or as a basis for a complete piece of work. With the use of sophisticated software packages such as SPSS it is relatively easy to deal with the computation side of things and it is possible to come up with numerous tables and charts almost instantly once your data is installed. However, it is very important that the underlying principles of statistical analysis are understood if sense is to be made of the results spewed out by such a package in terms of your research.

Objectives of the Research:

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose, we mention some general objectives of research below:

- To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or forum/ olive research studies);
- To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies);
- To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies);
- To test a hypothesis of a causal relationship between variables (such studies are known as Hypothesis-testing research studies).

Scope and limitation:

The limitations are the inherent design or methodology parameters that can restrict the scope of the research findings and are outside the control of the researcher. These reservations, qualifications or weaknesses arise when all variables cannot be controlled within a project design, or the optimum number of samples cannot be taken due to time/budgetary constraints. Therefore, these factors have the potential to reduce a studies validity of results, i.e., the credibility or believability of the findings. If after careful consideration, you feel that the findings will still be valid and useful even after accepting a compromising position the research can continue by appropriately reporting the limitations.

Types of Research:

The basic types of research are as follows:

- A) **Descriptive ve. Analytical:** Descriptive research includes surveys and fact—finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. In social science and business research we quite often use the term Ex post facto research for descriptive research studies. The main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening. Most ex post facto research projects are used for descriptive studies in which the researcher seeks to measure such items as, for example, frequency of shopping, preferences of people, or similar data. Ex post facto studies also include attempts by researchers to discover causes even when they cannot control the variables. The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlation methods. In analytical research, on the other hand, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

B) **Applied vs. Fundamental:** Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization, whereas research is mainly concerned with generalizations and with the formulation of a theory. Gathering knowledge for knowledge's sake is termed fundamental research. Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research. Similarly, research studies, concerning human behavior carried on with a view to make generalizations about human behavior, are also examples of fundamental research. However, research aimed at certain conclusions facing a concrete social or business problem is an example of applied research. Research to identify social, economic or political trends that may affect a particular institution, marketing research, evaluation research are examples of applied research.

Review of Literature

Literature research methodology is to read through, analyze and sort literatures in order to identify the essential attribute of materials. Its significant difference from other methodologies is that it does not directly deal with the object under study, but to indirectly access to information from a variety of literatures, which is generally referred to as "non-contact method." Literature materials are the crystallization of wisdom, are the ocean of knowledge, have important values for the development of human society, history, culture and research scholars. Education researches shall fully share information, conduct literature researches to grasp sources of relevant researches and scientific developments and to understand what our predecessors have achieved and the progress made by other researchers.

Overview of Research Methods in Education:

Research methodologies can be classified in many different ways. For example, some researchers distinguish between quantitative and qualitative studies; others distinguish between experimental and non-experimental research; still others distinguish between research that is conducted in laboratories versus in the field (i.e., in classrooms). Obviously, there are many ways to categorize research methods. However, there also is much overlap in such categorizations. For example, a "non-experimental" study can be either quantitative or qualitative; an experimental study can include some qualitative components. This entry does not attempt to classify these methodologies; rather, the various methods are first briefly described and then compared and contrasted

Quantitative and Qualitative Research:

In simple terms we can think of two approaches to investigations in educational research: qualitative and quantitative. In the former we use words to describe the outcomes and in the latter we use numbers.

Quantitative research methods were originally developed in the natural sciences to study natural phenomena. However examples of quantitative methods now well accepted in the social sciences and educations include:

- **surveys;**
- laboratory experiments;
- formal methods such as econometrics;
- Numerical methods such as mathematical modeling.
- **action research:** aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework;
- **case study research** - a case study is an empirical enquiry that investigates a contemporary phenomenon within its real-life context;
- **ethnography-** the ethnographer immerses her/himself in the life of people s/he studies and seeks to place the phenomena studied in its social and cultural context.

Ingredients' of quantitative Research:

As part of your research you will be looking at certain characteristics (variables) and endeavoring to show something interesting about how they are distributed within a certain population. The nature of your research will determine the variables in which you are interested. A variable needs to be measured for the purpose of quantitative analysis.

We may collect data concerning many variables, perhaps through a questionnaire, or choose to measure just two or several variables by observation or testing. The variables we are interested in may be dependent or independent. There will be other features present in the problem that may be constant or confounding.

- Describe variables in terms of distribution: frequency, central tendency and measures and form of dispersion. Descriptive statistics include averages, frequencies, cumulative distributions, percentages, variance and standard deviations, associations and correlations. Variables can be displayed graphically by tables, bar or pie charts for instance. This may be all the statistics you need and you can make deductions from your descriptions. In fact univariate (one variable) analysis can only be descriptive. But descriptive statistics can be used to describe a significant relationship between two variables (bivariate data) or more variables (multivariate).
- **Infer** significant general sable relationships between variables. The tests employed are designed to find out whether or not your data is due to chance or because something interesting is going on.

A) Co relational Research.

Co relational research involves quantitatively studying the relations between and among variables. One of the hallmarks of co relational research is that cause and effect relations cannot be determined.

B) Experimental Research.

In an experiment, participants are randomly assigned to one of several treatments. One of the most basic experimental designs involves random assignment to either an experimental group (which receives some kind of treatment), or a control group (which does not receive the treatment). If the differences in treatment between the experimental and the control group are tightly controlled, and if subsequent to the experiment there are measurable differences between the two groups that were not present before the experiment, then researchers often conclude that the experimental manipulation “caused” the differences to occur. In experimental studies, researchers attempt to control for differences between non-randomly assigned groups in a number of ways. Two of the most common methods include (a) matching, and (b) statistical control. The following example explains the concept. A researcher is interested in comparing the effects of a traditional third-grade reading curriculum with the effects of an enhanced version of the curriculum that includes extra homework assignments. If the two versions of the curricula are being administered in different classrooms, the researcher can try to “match” similar classrooms on certain variables. For example, the researcher might decide to match classrooms on years of experience of the teacher, wherein teachers with much experience

C) Qualitative Research.

Qualitative research represents a broad framework for conducting educational studies. Whereas quantitative research focuses on measurable variations between and among variables, qualitative studies focus on holistic descriptions of learners and teachers in naturalistic settings.

Fraenkel and Wallen (1996) describe five general characteristics of qualitative research studies. These include:

1. Researchers collect their data in naturalistic settings (e.g., classrooms), by observing and participating in regular activities.
2. Data are collected via words or pictures (not via numerical or quantifiable indicators).
3. Processes (i.e., how individuals communicate with each other about a lesson) are as important as products (i.e., whether or not students obtain the correct answers to a problem).
4. Most qualitative researchers do not start out with specific hypotheses; rather, they use inductive methods to generate conclusions regarding their observations.
5. Qualitative researchers care about participants' perceptions; investigators are likely to question participants in depth about their beliefs, attitudes, and thought processes.

D) Micro genetic Research.

In micro genetic research studies, the same individual is observed intensively over a long period of time; this could be for many weeks or even months. Data are collected in order

to examine both large-scale and small-scale changes in learners' use of strategies over time (Kuhn, 1995). Data can be analyzed via either quantitative or qualitative methods, depending on the types of data that are collected. As noted by Chinn (2006), most educational research using a micro genetic approach has examined learners' usage of cognitive strategies (e.g., problem solving). Micro-genetic studies are time consuming and are expensive, but they also can provide researchers with rich and detailed information concerning cognitive processes in learners. An example of a micro genetic study would be an examination of a kindergartener's strategy usage in solving simple addition problems over a three-month period.

E) Single-Subject Research.

In a single-subject study, there is only one participant. Researchers generally examine a variable at a baseline stage (prior to the start of an intervention), and then later examine how this variable changes at different time intervals, as an intervention is introduced. In single-subject research, control or comparison groups are not used. Researchers are particularly interested in whether or not patterns replicate over time within the same subject; in addition, researchers also examine whether or not similar patterns can be generated in new subjects.

F) Action Research.

Action research is research that is conducted by classroom teachers, examining their own practices. The goal of action research is to examine one's practices critically and then to make changes to those practices based on the results of the research. Action research can be conducted by a single teacher, or by a group of educators working together.

Ferrance (2000) summarizes five steps in action research. These include:

1. Identify the problem or question that is going to be investigated.
2. Gather data to help answer the driving question. Data can be collected in many forms (e.g., interviews with students, surveys, journals, video or audio tapes, samples of student work, etc.).
3. Interpret the data by critically examining all data sources, and identifying major themes.
4. Evaluate results; in particular, examine whether or not the research question has been answered.
5. Take next steps—develop additional research questions, or make changes to instructional methods.

Action research can improve instruction for students; in addition, it can empower teachers, since it is a tool that allows them to judge their own efforts and evaluate the outcomes of their practices.

Strengths and Weakness of Research Designs:

Each of the aforementioned research designs has both strengths and weaknesses. Some of these differences are obvious but others are not. Table 1 presents some examples of the key strengths and weaknesses of the various research methodologies discussed in this entry. This is not an exhaustive list; rather, it is provided to demonstrate that each methodology is complex and has both pros and cons. When researchers and consumers of research evaluate the strengths and weaknesses of various designs, there are many issues to consider. Specifically, there are several key questions that can serve as a framework for evaluating research designs. The main questions are discussed below.

A) The Sample Being Studied.

Researchers must consider the nature of their samples when selecting a methodology. This is an important question because some methodologies are challenging to implement with certain populations. For example, most studies that use survey-based methodologies require the participants to be able to read the survey items. If the sample included young children, or individuals with impaired visual abilities, then this might preclude the use of a self-administered survey. In addition, if the researcher is studying a large sample, with more than 1000 participants, in many cases this would prohibit the investigator from implementing single-subject designs, since the sample is so large.

B) Resources Available to Do the Research.

Many resources are needed to complete research studies. Novice researchers often do not realize the cost involved with educational studies. A college student doing a small study for a research methods course will certainly not have the same resources available as an experienced investigator with a multimillion dollar grant.

Resources involve more than money. Another important consideration is personnel. Some research methodologies require more personnel than others. For example, a microgenetic study might be carried out by one investigator who can focus on the progress of a few subjects. In contrast, a large experimental study that requires collection of large amounts of data from many participants will require many more personnel. Thus if fewer resources are available, a researcher might not be able to use the ideal methodology to conduct a study.

C) The Intended Audience for the Research.

Different audiences will benefit from different kinds of research studies. If the audience is practitioners, then action research might be highly appropriate. First, teachers can be directly involved in action research studies; second, other educators might be more willing to accept the results obtained from one of their peers via action research than from unknown researchers. Certain funding agencies might be interested in only funding some types of studies. For example, there is much debate among educational researchers about the advantages and disadvantages of using experimental designs in educational

research; whereas many funding agencies encourage experimental studies, many educational researchers argue that sometimes, true experiments are difficult to implement in actual classroom settings.

D) Using Mixed Methods.

Many educational issues are multifaceted and complex; consequently, often one single methodology will not yield all of the essential information that researchers desire. Given the strengths and weaknesses of the various designs, and the many decisions that researchers must make before choosing a methodology, a number of scholars in recent years have begun to use mixed methods in educational research. When researcher use mixed methods, they use a variety of different methodologies within the same study. A mixed methods study is usually challenging; the researchers must be able to utilize multiple designs appropriately. Some mixed methods studies involve two or more methodologies being carried out simultaneously, whereas others involve a succession of different studies, all designed to answer one general research question.

Conclusions:

The conclusions drawn from the findings of both the secondary and primary research. These should include a critical commentary covering the strengths and weaknesses of the study and possible alternative explanations.

- i) Its contribution to knowledge/ understanding;
- ii) Its contribution to theory and theory development;
- iii) Its contribution to practice and application;
- iv) Its implications for future research.

Specific recommendations that arise from the preceding section in terms of the implications of the findings.

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