INTRODUCTION TO EDUCATIONAL RESEARCH

1. What is Educational Research?

Research in education is a disciplined attempt to address questions or solve problems through the collection and analysis of primary data for the purpose of description, explanation, generalization and prediction. Research is fundamentally a problem-solving activity which addresses a problem, tests a hypothesis or explains phenomena.

Research is a scientific process which assumes that events in the world are lawful and orderly and, furthermore, that the lawfulness is discoverable. This is the meaning of determinism and the researcher acts in the belief that the laws of nature can be understood and ultimately controlled to at least some degree. In a nutshell, educational research is the systematic process of discovering how and why people in educational settings behave as they do.

1.1. Ten Characteristics of Educational Research

1 Educational research attempts to solve a problem

2 Research involves gathering new data from primary or first-hand sources or using existing data for a new purpose.

3 Research is based upon observable experience or empirical evidence.

4. Research demands accurate observation and description.

5. Research generally employs carefully designed procedures and rigorous analysis.

6. Research emphasizes the development of generalizations, principles or theories that will help in understanding, prediction and/or control.

7. Research requires expertise—familiarity with the field; competence in methodology; technical skill in collecting and analysing the data.

8. Research attempts to find an objective, unbiased solution to the problem and takes great pains to validate the procedures employed.

9. Research is a deliberate and unhurried activity which is directional but often refines the problem or questions as the research progresses.

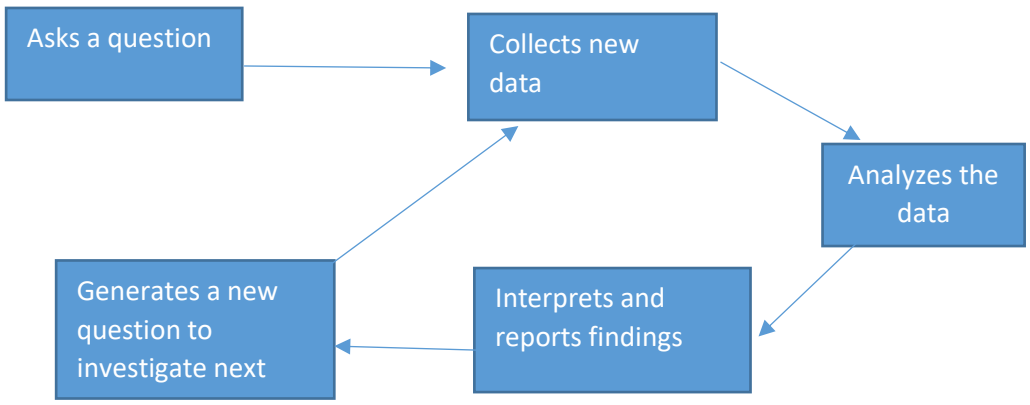
10. Research is carefully recorded and reported to other persons interested in the problem.

2. Educational Research: Using the Scientific Method

Since the beginning of formalized education, research has been used to help improve education and to determine how education works in a wide range of situations. Through scientific research, educators hope to obtain accurate and reliable information about important issues and problems that face the educational community. Specifically, scientific educational research is defined as the application of systematic methods and techniques that help researchers and practitioners to understand and enhance the teaching and learning process. The steps used in the scientific process are shown in Figure 1.1.

Figure 1.1 The Scientific Process.

The Researcher:



Much like research in other fields, research in education uses two basic types of reasoning: *inductive reasoning and deductive reasoning.* **Inductive reasoning** is often referred to as a "bottom-up" approach to knowing in which the researcher uses particular observations to build an abstraction or to describe a picture of the phenomenon that is being studied. Inductive reasoning usually leads to inductive methods of data collection where the researcher (1) *systematically observes the phenomena under investigation*, (2) *searches for patterns or themes in the observations*, and (3) *develops a generalization from the analysis of those themes*. So the researcher proceeds from specific observations to general statements—a type of discovery approach to knowing. In contrast, **deductive reasoning** uses a top-down approach to knowing. Educational researchers use one aspect of deductive reasoning by first *making a general statement and then seeking specific evidence that would support or disconfirm that statement*. This type of research employs what is known as the hypothetic

deductive method, which begins by forming a hypothesis: a tentative explanation that can be tested by collecting data. For example, one might hypothesize that small classes would result in a greater amount of student learning than large classes. This hypothesis would be based on a theory or a knowledge base composed of the results of previous research studies.

A theory is a well-developed explanation of how some aspect of the world works using a framework of concepts, principles, and other hypotheses. For example, a humanistic theory of education might emphasize strong teacher-student relationships as part of effective learning. Previous research studies may have shown that such relationships are more common in small classes. Therefore, based on the humanistic theory and these previous studies, the researcher in our example may have hypothesized that small class sizes will result in better student learning based on humanistic theory and previous studies. The next step in the hypothetic-deductive approach is to collect data to see if the hypothesis is true or should be rejected as false. The researcher might compare student learning in classrooms of 15 or fewer students with those of 25 or more students. If students in the smaller classes show a greater amount of learning, the hypothesis would be supported. If the students in the smaller classes do not show a greater learning, then by deductive reasoning, the hypothesis is shown to be false. To summarize, the researcher (1) began with a theory and a knowledge base and used them to form a hypothesis, (2) collected data, and (3) made a decision based on the data to either accept or reject the hypothesis or prediction. The inductive and hypothetic-deductive approaches to knowing represent two general routes to knowledge used in educational research. *Inductive reasoning is most closely associated with qualitative approaches to research, which collect and summarize data using primarily narrative or verbal methods: observations, interviews, and document analysis.*

Qualitative researchers are often said to take inductive approaches to data collection because they formulate hypotheses only after they begin to make observations, interview people, and analyse documents. These hypotheses are examined and modified by further data collection rather than being accepted or rejected outright. Qualitative researchers believe that full understanding of phenomena is dependent on the context, and so they use theories primarily after data collection to help them interpret the patterns observed. However, ultimately qualitative researchers do attempt to make claims about the truth of a set of hypotheses. *The hypothetic-deductive method is most closely associated with quantitative approaches, which summarize data using numbers*. Hypotheses and methods of data collection in quantitative research are created before the research begins. Hypotheses or

theories are then tested, and when supported, these hypotheses or theories are typically considered to be generalizable: applicable to a wide range of similar situations and populations. Quantitative researchers may also use inductive reasoning as they look for similar experiences and results and form new ideas, concepts, or theories.

3. Philosophical Frameworks for Educational Research

Educational research today is beginning to move away from a hard and fast distinction between qualitative and quantitative research methods. Researchers can, however, be separated into groups based on their philosophical frameworks, identified in terms of the assumptions they make about the nature of the reality being studied, claims about what we can and cannot know, and the ways in which they utilize theories and findings. Each framework also makes assumptions about whether qualitative or quantitative methods are most appropriate for extending our knowledge about education. As a beginning researcher, it is important that you consider which approach best captures your own assumptions about how the world works.

3.1. Scientific Realism

Scientific realism is a term applied to the framework used by most researchers *who take a purely quantitative approach to research*. Quantitative research is characterized by a desire to answer research questions by producing numerical data that represent various constructs and variables. A construct is a hypothetical concept that is typically developed from a theoretical framework. Although constructs are names for things that cannot be seen (e.g., intelligence, motivation, selfesteem), they are assumed to be real characteristics that influence educational outcomes. *When constructs are measured in educational research, they are known as variables.* Like the constructs they represent, variables are defined as attributes, qualities, and characteristics of persons, groups, settings, or institutions, such as gender, social skills, socioeconomic status, exclusiveness, or achievement. *Scientific realists strive to establish cause-and-effect relationships where possible,* using data collection methods such as questionnaires, tests, and observational checklists to produce quantitative data.

3.2. Social Constructivism

Traditionally, *purely qualitative research is often done by persons who hold a framework referred to as interpretive, constructivist, or naturalistic*. (We will use the term social constructivism to refer to this approach.) Social constructivists challenge the scientific

realist assumption that reality can be reduced to its component parts. Instead, they argue that *phenomena must be understood as complex "wholes" that are inextricably bound up with the historical, socioeconomic, and cultural contexts in which they are embedded*. Therefore, they attempt to understand social phenomena from a context-specific perspective.

3.4. Pragmatism

Pragmatism is the framework that has been most developed by American philosophers. Unlike the other frameworks, pragmatism is not concerned with whether research is describing either a real or socially constructed world. Instead, for pragmatists, *research simply helps us to identify what works*. Of course, we might ask our pragmatists what they mean by what works. They are likely to reply that *knowledge arises from examining problems and determining what works in a particular situation.* It does not matter if there is a single reality or multiple realities as long as we discover answers that help us do things that we want to do. A pragmatist might insist that a good theory is one that helps us accomplish a specific goal (or set of goals) or one that reduces our doubt about the outcome of a given action. *Most pragmatic researchers use a mixed-methods approach to research; for example, they use both qualitative and quantitative methods to answer their research questions.* Pragmatic researchers propose that even within the same study, quantitative and qualitative methods can be combined in creative ways to more fully answer research questions. In current research, pragmatic frameworks are used by both professional researchers and researchers who are primarily practitioners (e.g., teachers, counsellors, administrators, school psychologists).