

CHAPTER 5

RESEARCH DESIGN PART 1

Classification of Research Designs

Research designs, which are generally referred to as research methods have been classified differently by different scholars depending on the perspective they take. Some scholars (Bogdan & Biklen, 1982) discuss research methods under two broad headings: qualitative research as opposed to quantitative research. Gay (1987, p. 209) indicates that while naturalistic researchers prefer qualitative methodologies, such as participant observation and in-depth interviewing, rationalistic researchers tend to use quantitative methodologies such as random selection of subjects and administration of standardized instruments.

Gay (1987, pp. 6-9) cites different types of research under two major groups:

- Classification of Research by Purpose
 - a) **Basic research:** Research that involves the development of theory.
 - b) **Applied research:** Research that is concerned with the application of the introduced theory.
 - c) **Evaluation research:** Research that involves decision making between or among the existing alternatives.
 - d) **Research and development:** Research concerned in developing products for use in schools.
 - e) **Action research:** Research that is concerned with solving "classroom problems through the application of the scientific method" (p. 8).

- Classification of Research by Method
 - a) Historical research
 - b) Descriptive research
 - c) Correlational research
 - d) Causal-comparative research
 - e) Experimental research

Fraenkel and Wallen (1990) discuss the research design under the following headings:

1. Experimental research
2. Correlational research
3. Causal-comparative research

4. Survey research
 - a) Cross-sectional surveys
 - b) Longitudinal surveys
5. Qualitative research
 - a) Participant observation
 - b) Non-participant observation
 - c) Ethnographic research

Isaac and Michael (1977, pp. 14-15), without making any subcategorization, cite nine basic methods of research:

1. Historical
2. Descriptive
3. Developmental
4. Case and field
5. Correlational
6. Causal-comparative or "ex post facto"
7. True experimental
8. Quasi experimental
9. Action

Major Components of Research

Although, the design of each research method is different, there are some common major components of research:

1. Introduction
 - A. statement of purpose or problem
 - B. hypotheses
 - C. review of literature (In most theses and dissertations it is dealt with under a main heading as Chapter 2)
2. Method
 - A. Subjects (population/sample)
 - B. Procedure (control and/or manipulation of relevant variables)
 - C. instrumentation (selection or development of the criterion measures)
3. Analysis and Results
 - A. Descriptive statistics
 - B. Inferential statistics
4. Discussion
 - A. Restatement of purpose and hypotheses
 - B. Theoretical, research or educational implications
 - C. Limitation of the study
 - D. Future research (Moore, 1983, p. 352)

Main Types of Research Designs

In giving detailed information on research methods, Gay's (1987) classification will be taken as a model. Additionally, action research will be

included in the classification since this research method has recently gained popularity especially in the field of education. In introducing the methods, after giving a brief definition the purpose of the method, the research process will be explained depending on the steps to be followed. If there are different types of designs of the same method, these will be explained under a separate heading.

Historical Research Design

Purpose

The purpose of an historical method is "to reconstruct the past objectively and accurately, often in relation to the tenability of an hypothesis" (Isaac & Michael, 1977, p. 14). For example, a study reconstructing practices in the teaching of reading in Turkey during the past 70 years would be considered a historical study. This is a systematic collection and evaluation of data related to the past in order to be able to understand and explain the past events or actions. The evaluation and citations are given generally within a chronological order, with the aim of testing the hypotheses concerning the causes, effects, or trends of the past events. These explanations help the researcher to make guesses concerning the present events and to anticipate future events. Thus, historical research enables us to be aware of what has happened in the past and find out the applicability of some of the past practices in solving the present problems.

Historical research may look similar to surveys done on literature but in the historical design there is tracing of information from the present to the past or from the past to the present. Additional unpublished materials, interviews could compromise part of the data collection.

Basic Steps

The basic steps to be followed in historical research are as follows:

1. Defining the problem and stating the aim and the hypothesis
2. Collecting data
3. Analyzing data
5. Synthesizing data
6. Stating the conclusions

Defining the problem and stating the aim. The purpose of the research should be formulated to explain or predict, and not to say what has already been discovered. In defining the problem, the applicability of the method could be speculated upon by asking the following questions:

- a. Is the historical method suitable to solve the problem?
- b. Are there enough data available?
- c. Will the findings be of scholarly significance?

It is "better to study in depth a well-defined problem with one or more specific, well-stated hypotheses, than to investigate either a too-broadly stated problem with a fuzzy hypothesis, or a problem for which insufficient data are available" (Gay, 1987, p. 187).

Collecting data. A review of the related literature is part of the study procedure; therefore, all sorts of written documents are introduced and analyzed within the data collection and analysis. Written documents may be in the form of legal documents, records, minutes of meetings, letters, and other documents that can be indexed alphabetically by subject, author, or title.

Aside from written documents, interviews with people who have participated in the event or process under investigation are used as a source of data for historical research. The research is usually limited with what is available in terms of data collection.

Original documents and reports received directly from actual participants and observers comprise the primary sources; reference books or reports given by relatives or friends of actual participants or observers comprise the secondary sources of information. Usually, historical research is criticized for relying too much on secondary sources rather than the primary sources.

Note-taking is considered to be especially important in the historical method. If only one item of information is written on each card coded by topic, the cards can then be filed and rearranged easily.

Analyzing data: External and internal criticism. All sources of data should be analyzed for the establishment of authenticity (external criticism), and accuracy (internal criticism). It is easy to establish authenticity because the age of the document can be estimated fairly accurately by the application of some physical and chemical tests. In regard to the establishment of accuracy, Gay (1987) mentions four factors that need to be considered:

- a. How knowledgeable and competent is or was the author?
- b. How much time is likely to have passed between the occurrence of the event and the recording of the facts?
- c. How biased is or was the author?
- d. How much agreement or disagreement is there between the authors in reporting the same event? In other words, is the account of the event given in the same manner by different sources?

Synthesizing data. The collected data are organized and synthesized, and conclusions and generalizations are formulated rather than simply reporting the events in a chronological order. This synthetic process entails summarizing historical events within the framework of logical analysis. Since historical research generally involves observation and interpretation of events rather than statistical analysis, the researcher should pay attention to being objective, and should not report any event that is not supported by some evidence.

Descriptive Research Design

Purpose

This is used "to describe systematically the facts and characteristics of a given population or area of interest, factually and accurately" (Isaac & Michael, 1977, p. 18). For instance, a survey reporting the results of Master's Degree

graduates in English from the University of Hawaii, would be considered a descriptive study. A study of this kind involves collecting data that test the validity of the hypotheses regarding the present status of the subjects of the study. It does not seek or try to explain relationships, or make implications. Population census studies, public opinion surveys, fact-finding surveys, observation studies, job descriptions, surveys of the literature, reports, test score analyses can be cited as examples of a descriptive research.

Types

Self-report studies. Self-report studies are based on the opinions or behavioral patterns of the chosen population. Therefore, there are some considerations in conducting self-report research. First of all, the problem to be investigated should be of some interest to the subjects so that sufficient response can be obtained from the questionnaires. Secondly, the questionnaire should be prepared with great care so that no biased questions would be included (see Vol. 2 for details in constructing questionnaires and conducting interviews). Thirdly, in follow-up activities, if the percentage of the subjects to be followed is less than 70%, the conclusions arrived at will not be considered valid. The most common self-report studies are survey research, developmental studies, and follow-up studies.

Survey research may be in the form of a *sample survey* or a *census survey*. In a sample survey, the researcher gathers information from the responses of part of the population that is of interest to him; in a census survey, however, information is gathered from every member of the population. For that reason, a census survey is applicable when the population is relatively small and readily accessible.

Developmental studies are applied when the aim is to investigate the behavioral variables that differentiate children at different stages of development. The development of children can be studied by a *longitudinal method* to find the development of the same individuals over a long period of time or by a *cross-sectional method* to determine the various stages of development of a specific behavior among subjects of different ages or status groups within the same period of time. For example, describing the language development of a child within a long period of time such as a year is considered to be a longitudinal study.

As long as threat to internal validity is avoided by forming the sample from a homogeneous population, this type of study has the advantage of discovering the unknown related to the population, but this is usually impossible. This method requires the continuity of the procedures for a long time and thus requires financial support and extended effort.

The findings of longitudinal studies, however, can be generalized by conducting a cross-sectional study on *children carrying the same characteristics of the subject(s) in the study*. In cross-sectional studies, information is also gathered from different groups to investigate the difference between the subgroups. When compared to longitudinal studies, collecting data is easier, but sampling is rather difficult because to form groups of the same age with the same characteristics may cause complications. In such instances, sample surveys are preferred.

Follow-up studies are conducted to investigate the status of a group after a period of time to see the pace of improvement, decline or deterioration. These studies are used mainly for educational purposes. Universities may conduct follow-up studies to find out how their graduates have been stationed at different posts.

Observational research. Observational research is useful to obtain background information for planning major investigations; however, since they have a narrow focus, they do not allow the researchers to generalize their findings for the whole population. Moreover, the results obtained are subjective rather than objective.

In observational research, the steps are the same as the ones for other descriptive research. There are certain issues that the researcher should be careful about in conducting a research of this type. The following are some suggestions given by Gay (1987, pp. 227-228):

1. The behavior to be observed should be defined in specific and clear terms.
2. Observations must be structured so that all observers will have the same criteria. For instance, Flander's interaction analysis categories (Flander, 1960) are excellent in guiding the observer.
3. Observation times may be randomly selected so that behavior at different times of the day and the week are reflected.
4. It is better to record the observations as the behavior occurs by using some coding system, or a checklist.
5. Recording the situations on a video tape helps the researcher to go back and observe the same situations with a more critical eye and with less bias.
6. Subjects to be observed usually feel uncomfortable, and thus, they may not demonstrate their typical behavior. For this reason, observers should be very sensitive to this issue, and should make some acquaintance with the subjects prior to the observation sessions.

In *nonparticipant observation*, the researcher is not involved in the observational situation. "Nonparticipation observation includes naturalistic observation, simulation observation, case studies, and content analysis" (Gay, 1987, p. 206). The observation is made in a naturalistic setting, or by means of simulation, where a situation is created and the subjects are asked to engage themselves in the simulated activity. In the case study, an individual, group, or institution is investigated in depth to determine the factors, and the relationships among the factors, affecting the current status of the subject under study. Content analysis is done to provide a systematic and quantitative description of the composition of an object or sets of objects to decide whether they meet the criteria set up for a specific purpose. For example, in choosing teaching materials, textbooks are analyzed from different perspectives such as the readability level, vocabulary frequency etc. for students at a certain grade. The need of the students determines the criteria and the content analysis is done accordingly.

In *participant observation*, the researcher is directly involved in the situations to be observed. This type of observation may be conducted to test hypotheses, to derive hypotheses, or both. If the aim is to test the formulated hypotheses, then the observation needs to be more structured and guided so that the

data collected will be directly involved with the issue of interest. Thus, an attempt is made not to collect irrelevant data.

In *ethnographic study*, the data are collected intensively over an extended period of time to investigate the variables as they occur naturally rather than in a controlled environment. Ethnography was mainly used by anthropologists when it was first introduced as a method of research. Now that it has gained popularity, it has been used by scholars with more traditional backgrounds.

In ethnography, aside from observation, different strategies of data collection are applied. For this reason, it represents a "multi-instrument research." During the observation the researcher may be involved or not.

In ethnographic studies, the interaction between subjects and observers or the interaction between subjects are looked into in order to determine the behavioral patterns. These patterns are described and compared with the behaviors of other subjects in other cultural or educational settings. Consequently, the differences are pointed out and suggestions are made as to how to implement the desired patterns and eliminate the undesired ones. The following could be cited as drawbacks for the ethnographic research:

- The results obtained over a long period of time from a large population are difficult to analyze.
- It is difficult to duplicate the results.
- It is expensive to conduct.
- Usually the unit under observation is a classroom or a school. The findings may not reflect the whole population in that geographical region. Gay (1987) expresses his concern in the following manner:

The major difference between ethnographic and traditional approaches is that the review of related literature, the study of previous research and theory, does not result in testable hypotheses, to be supported by the results of the study. Instead, the study of previous work results in tentative, working hypotheses and strategies only. (p. 211)

Basic Steps

The basic steps to be followed in descriptive research are as follows:

1. Defining the objectives
2. Designing the approach
3. Collecting data
4. Reporting the results

Defining the objectives. The objectives of the study should be clearly defined using the specific terms. In the definition, the facts and the characters need looking into should be specified (see Chapter 3).

Designing the approach. Procedure for collecting data, and selecting a sample to represent the population to be described need to be explicitly defined.

Moreover, the observation techniques that are going to be used need to be mentioned in detail. The way to construct, to validate, and administer a questionnaire should be determined (see Vol. 2).

Collecting data. Since the generalization is based on the data collected from the subjects, and not enough information is known about the status of the subjects, the researcher has to be very careful in selecting the sample population. The researcher should also mention whether there will be need for any assistants during the collection of the data. If so, how these assistants are going to be trained for this purpose need to be described.

Descriptive studies are generally categorized into two main groups *depending on how data are collected*: (1) self report and (2) observation. In a self-report study, information is gathered from individuals by means of interviews, questionnaires, or standardized attitude scales. In an observation study, on the other hand, information is not only obtained by simply questioning the individuals but also by observing them.

Reporting the results. The results are given avoiding personal bias. In other words, the report comprises objective evaluation of the findings.

Correlational Research Design

Purpose

Correlational research aims at investigating the existence and the degree of a relationship between two or more *quantitative* variables. If two variables are highly related, scores on one variable could be used to predict scores on the other variable. A study "to investigate relationships between reading achievement scores and one or more other variables of interest; a factor-analytic study of several intelligence tests; a study to predict success in college based on intercorrelation patterns between college grades and selected high school variables" (Isaac & Michael, 1977, p. 15) are some examples.

Correlational studies are appropriate when the variables cannot easily be distinguished or the existing situation does not yield to the application of an experimental method of study. In a correlation design, two different methods can be applied. The most commonly known is seen in relationship studies. In these studies, scores obtained from two variables are correlated to determine the relationship. The second method applied in the prediction studies, however, use the scores of one variable to predict the outcome of the other variable. "If a relation of sufficient magnitude exists between two variables, it becomes possible to predict a score on either variable if a score on the other variable is known" (Fraenkel & Wallen, 1991, p. 277). For instance, employees may be promoted based on their scores obtained from a test on critical thinking. The assumption underlying this case is that people with high scores on a critical thinking test (predictor variable) would make better administrators (criterion variable). In other words, the scores act as predictors for the criterion variable. In this case, the predictor variable corresponds to the independent and the criterion to the dependent variable. The only difference is that while the dependent variable can be measured; the criterion variable in a prediction study is only assumed.

Basic Steps

The steps to be followed for this type of research are as follows:

1. Defining the problem
2. Reviewing the literature (see Chapter 4).
3. Designing the approach
 - a. Identifying the variables to be examined
 - b. Selecting a sample
 - c. Selecting or developing appropriate measuring instruments
4. Collecting data
5. Analyzing and interpreting the results

Defining the problem. In defining the problem, the variables are determined according to the common characteristics of the two groups of subjects to be compared. In other words, the researcher should choose the variables that are related to each other so that an increase in one could be observed in the other or vice versa. Once the relationship is established, the researcher has to inquire how well the predictor variable predicts the criterion variable. For instance, if you see a relation between taking cold drinks and cancer, this might not be a good selection regarding the variables. Therefore, it is very important that the correlational approach to be selected fits the problem, and the process of selection is based on either inductive or deductive rationale.

Designing the approach. The existence of a relationship between two variables implies that "the scores obtained within a certain range on one measure are associated with the scores within a certain range on another measure" (Gay, 1987, p. 242). The degree of relationship is expressed in correlation coefficient (see Vol. 2). The existence of a relationship does not automatically mean that one variable is the cause of the other. The purpose is to establish a relationship and make predictions accordingly. For instance, students' success level is estimated to be correlated with their study habits. In such a case, students are given questionnaires for the purpose of investigating their study habits. Based on the results of the questionnaire, students are grouped according to the type of study skills they have adopted. Then, the success levels of each group are analyzed to find out the predicted relation. In the analysis the following issues should be taken into consideration:

- The subjects to be chosen should represent the defined population so that the collected data would reflect the degree of the identified variables.
- The testing measure to be utilized should be selected from among the reliable ones.
- The correlation approach to be selected should fit the problem.

Collecting data. One advantage of this research is that a relatively short period of time is needed to collect data. The subjects for this type of study are generally school children, and it is easier to get permission from the school administration when not much of the students' time is taken from school work. In selecting subjects as a sample, the minimum number should be thirty.

Analyzing and interpreting data. In this method, the scores obtained regarding one variable are correlated with the scores of another variable which is more complex to determine. The statistical calculation of such a correlation is done and expressed in terms of correlation coefficients. The product moment correlation coefficient (Pearson r) is commonly used for this purpose as long as the obtained results could be expressed as ratio or interval data (see Vol. 2 for the computation of correlation coefficient).

Since the results of the correlational studies are expressed in terms of correlation coefficients, the interpretation is given in statistical figures between -1.00 and +1.00. "These two values represent the two extremes of perfect relationship: a value of $r = 0.0$ represents the absence of any relationship" (Moore, 1983, p. 254). If the value of r is -1.00, this indicates a perfect negative relationship. If the value of r is +1.00, this indicates a perfect positive relationship. The values in between are interpreted accordingly. In the indication of a positive correlation high scores on one variable tend to be associated with high scores on the other variable. Similarly, low scores on one variable would be associated with low scores on another on another variable.

"If data for one of the variables are expressed as ranks, the appropriate correlation coefficient is the rank difference correlation coefficient, usually referred to as the Spearman rho" (Gay, 1987, p. 244).

As is the case for every method, correlational studies have certain limitations (Isaac & Michael, 1977) :

- They do not show a cause-and-effect relationship.
- There is less control over the independent variable(s) as compared to the experimental method.
- There is the danger of identifying false relational patterns that have very little or no validity or reliability.
- The relational patterns that are determined are, in general, arbitrary or ambiguous.
- "It encourages a 'shot-gun' approach to research, indiscriminately throwing in data" from different sources (p. 21).

Causal-comparative Research Design

Purpose

In this method one aims at determining the cause of, or reason for groups of individuals being different in behavior or status. The researcher attempts to identify the major factor that causes the group to behave differently as compared to other groups of individuals, as in the following examples:

- to determine the attributes of effective teachers by their performance evaluations,

- to look for patterns of behavior and achievement in children who have attended schools at different ages,
- to bring out the behavioral patterns of the people who cause more traffic accidents as opposed to the ones that cause fewer traffic accidents, by using the data in insurance company records.

In the causal-comparative study, the researcher either starts with an effect and seeks possible causes, or starts with a cause and tries to investigate the effect of this independent variable on some other people who have already been grouped on the basis of this independent variable.

Causal-comparative research is sometimes confused with correlational research because there are similarities as well as differences in both of these studies. They both

- aim to investigate the relationships among variables.
- are conducted when the application of experimental studies are costly or impossible as in the case of investigating the effects of smoking or the cause of lung cancer.
- do not permit manipulation of variables by the researcher (see Table 6.1).

Table 6.1

Similarities and Differences among Correlation, Causal-comparative, and Experimental Research

	Corr.	Ca-com.	Exper.
Explores relationship among variables	yes	yes	yes
Identifies variables to be explored	yes	yes	yes
Permits manipulation (treatment)	no	no	yes
Compares two or more groups of	scores	subjects	subjects
Investigates two or more variables	quantitat.	categorical	ind, dep
Provides evidence	weak	weak	strong
Results of the comparison are indicated by	scatter-pl. corr. coeff.	average sc crossbar	average sc charts
Works on formed groups(FG) or randomly selected groups (RSG)	FG	FG	RSG
Flexibility in structuring the design	no	no	yes

The difference lies in the following facts:

- While correlational studies compare two or more *scores on each variable for each subject*, causal-comparative studies compare two or more *groups of subjects*.
- While correlational studies investigate two or more *quantitative* variables, causal comparative studies focus on at least one *categorical* variable.
- While correlational studies use *scatterplot graphics* and/or *correlation coefficients*, causal comparative studies compare *averages* or use *crossbreak tables* in the analysis.

In experimental research, the researcher selects the group randomly, and puts the group under some treatment in order to manipulate a variable. Therefore, there is more flexibility in structuring the research design. Moreover, the results obtained from experimental research go beyond prediction and identification of relationships.

In causal-comparative studies, the subjects are chosen from people who have already been grouped due to the similar treatment they have received; and the independent variable, which is the real cause, cannot be manipulated because it has already occurred. The most important weakness of this method is that there is lack of randomization, manipulation, and control. As the researcher is unable to control the selection of the subjects, the individuals within the formed group are usually different in other variables as well. Thus, it is not easy to determine the real cause.

Strengths and Weaknesses

The causal-comparative method is powerful when it is not possible to select, control and manipulate the variables or the laboratory controls are impractical, very expensive or ethically unsuitable. When the manipulation of the independent variable proves to be very artificial, again the best method would be causal-comparative research, which yields useful information concerning the nature of the phenomena. It becomes easy to obtain information about the conditions the phenomena take place or in what sequence or in what patterns they occur.

Aside from the strengths, causal-comparative method has some weaknesses. The main weakness is the lack of control over the independent variable. A direct cause and effect relation cannot be drawn between the independent and the dependent variable. A phenomenon may result from multiple causes; moreover, in each case, the causes may vary.

Basic Steps

The basic steps to be followed in causal comparative research are as follows:

1. Defining the problem
2. Reviewing the literature (see Chapter 4).
3. Designing the approach
 - a. Identifying the variables to be examined
 - b. Selecting a sample

- c. Selecting or developing appropriate measuring instruments
- 4. Collecting data
- 5. Analyzing and interpreting the results

Defining the problem. The aim of the causal-comparative studies is to investigate whether there are differences between two groups of people who have already been treated differently. The differences which are expressed in terms of variables are investigated to determine which of the chosen variable seem(s) to be affecting the individuals.

To initialize the causal-comparative research, first of all, a phenomenon of interest should be chosen. Then the consequences or the causes of this phenomenon are speculated. If the study starts with the consequences, the investigation is directed towards the causes of these consequences. For instance, some students are observed to have better reading habits (consequence) than the others. One of the factors effecting the formation of these habits is speculated to arise from the behavior of their parents (cause).

If the study starts with the causes, the consequences are traced. For instance, if the phenomena is the effect of exposure to a foreign language between the ages of 5 and 11 (cause), then it might be speculated that people who have been exposed to a foreign language before puberty have better pronunciation (consequences) than the ones who have been exposed to a foreign language after puberty.

Designing the approach. At the stage of designing the causal-comparative study, attempt is made to choose the sample and the instrument to be used to measure the differences between the two groups. The selected samples should represent their respective populations. Therefore, while forming the *two equal groups varying only in one variable*, information needs to be gathered about subjects' cultural and educational backgrounds, and their present status.

It is suggested to compare very *homogeneous* groups in order to control the research. Another technique would be to form sub-groups within the main groups. If this is not possible, then the researcher pairs the subjects of similar backgrounds in each of these two groups. If there is no match, that subject may be eliminated from the study.

After the two groups of subjects are formed in line with the purpose of the study by taking the criteria into consideration, the next step would be to examine the differences between the two groups. If the example on foreign language learning is followed up, the difference in the pronunciation of the subjects in these two groups is investigated. In statistical terms, two groups differing in one independent variable (cause = early exposure to the foreign language) should be selected, and these groups should be compared according to some dependent variable (effect = better pronunciation); groups may have the same independent variable but in different degrees (e.g. much better, better, worse).

Collecting data. For causal-comparative studies, the method of collecting data may be in the form of a questionnaire /an interview (see Vol. 2) or any written document to verify the variable. The way the questionnaires or the interviews are administered, would change the direction of the results of the study (data collector characteristics threat). Therefore, the people chosen to administer the

questionnaires or the interviews should be well oriented. Moreover, the subjects should be given the questionnaires or be interviewed at a relaxed time so that their being fatigued or tense would not diversify the results of the study and thus eliminate the threat to the internal validity (see Fraenkel & Wallen, 1991 for details).

Analyzing and interpreting results. The analysis of the results obtained from causal-comparative research involves different types of descriptive (e.g. mean, standard deviation) and inferential (e.g. *t*-test, analysis of variance) statistics (see Vol. 2). If the variables are quantitative, the mean and the standard deviation of each group are calculated. The application of statistical inference test may or may not be required, depending on how the samples are randomized. A *t*-test is a common device used to find out the differences between means. When there are more than two groups involved in the study, either, *analysis of variance* or an *analysis of covariance* is used to equate groups according to one or more variables (see Vol. 2).

While interpreting about the results, caution needs to be taken in order not to misrepresent the reality. It must be kept in mind that like correlational studies, causal-comparative studies are conducted simply to investigate relationships between variables. They are not meant to prove the cause and effect relationship.

The interpretations related to the causal-comparative studies can be strengthened in two ways. One way is *to formulate alternative hypotheses* and test their validity in any applicable situation. The second way is *the application of discriminant function analysis* to examine the relationship among all the variables in the study with the condition that these variables are dependent.

Action Research

Purpose

The aim of the action research is to solve problems by developing new skills or approaches that could easily be applied to a classroom or any other working setting. This type of research is applied

- in in-service teacher training programs and in exploratory programs to orient people to apply the best among the possible alternatives depending on the existing situations and thus to avoid unpleasant events, accidents and dangers;
- in orientation and consultation programs to motivate students in taking certain courses, or helping them with their problems.

Action research is very practical in the sense that it aims to solve the problems directly relevant to actual situations in a working arena where students, the staff, or other employees or employers are heavily engaged in developing their own skills as well as others'. During these developmental and training sessions, people need to adopt new techniques and strategies in order to solve the problems they encounter.

In every research, there is a need to define the problem, review the literature, formulate the hypotheses and plan the research design accordingly by

setting up the right evaluation criteria to be applied in the analysis of the data. In action research, however, the design can not be planned completely in advance. Since action research is flexible and adaptive to different situations, it allows the researcher to make changes while conducting the research in a cyclic form. In other words, the research is designed as it is conducted. There is always a possibility to go back to the previous step and modify what has already been set as in the case of redefining the problem, redesigning the tools to be used in collecting data. All the decisions for these changes take place as a result of the reflection sessions, which allows the researcher to discuss the different issues of the problem with a colleague. It is for these reasons that during the research new innovations and on-the-spot-experimentation can be introduced to elicit new ideas.

Basic Steps

Action research differs from other types of research in terms of the steps followed (see Nunan, 1993; Wallace, 1991; Toros, 1995). These steps can be roughly categorized in the following manner:

1. Defining the problem/ identifying a specific puzzle
2. Reflecting on the problem
3. Deciding on data collection tools (The term *tools* is used in the sense of *instrument*.)
4. Reflecting on data collection tools and collecting data accordingly
5. Reflecting on the findings
6. Taking an action accordingly
7. Repetition of the cycle from starting at any point depending on the results of the action

Defining the problem/ identifying a specific puzzle. A problem that hinders the application of the process within a working setting is identified. For teachers, this problem could be any problem faced within the classroom setting. In the identification of the problem, teachers need to consider the following issues:

- How does this problem affect the teaching or learning environment? In other words, what are the negative outcomes of this problem?
- Who will benefit most from the solution of this problem (the students, the teachers themselves, the administration or the whole institution) ?
- Why is it considered a problem? What is the rationale behind it?

Reflecting on the problem. In an ordinary research design, after identifying the problem, the literature related to this area is reviewed. The aim is to investigate whether there are others who have gone through a similar type of frustration and how they have tried to solve their problem. In action research, since the problems are context specific, it might be difficult to find answers to these questions in the literature. Moreover, the aim is to make the individuals become consciously aware of the reason and the source of the problem. In order to raise this awareness, the individual has to discuss this with a colleague or a work-mate. The aim is not to seek advice. Here the role of the colleague (see Edge, 1992) is to be a reflector who is willing to listen and capable of reflecting back the teacher's

explanation in the form of a question or a statement and thus eliciting what the researcher intends to focus on. During the reflection session, the researcher starts questioning the situation rather than complaining about it. This is the desired outcome of the reflection. These questions formulated by the researcher are what Wallace (1991) calls *exploratory questions*.

An example of a reflective session is while a teacher is complaining about the classroom performance of the students for that year; the reflector may inquire the type of performance students are demonstrating and the difference of the performance of this year's students and the performance of the last year's students with whom there was no problem. An inquiry of this kind will enable the teacher to refine his/her understanding of the problem and help him/her become more aware of the source and reason for this disturbing situation.

Deciding on data collection tools. At this stage, the researcher decides what exactly needs to be looked into in order to solve the defined problem. According to the data to be obtained, a decision is made on the type of the tool to be utilized for data collection. This may be in the form of a questionnaire to find out the opinion of the students or a checklist(s), a video tape, a tape recorder to observe the actual event in the classroom from the part of the teacher as well as from the students' with an unbiased perspective.

Reflecting on data collection tools and collecting data accordingly. After the data collection tools are chosen, their suitability is inquired before the application. In other words, the researcher inquires whether the information to be gathered by these tools will be relevant and sufficient for investigating the source of the problem. For this reason, instead of using ready made tools, the researcher designs one (that is appropriate) to help him/her become aware of the source of the problem. As a result of this reflection period, the researcher may decide to apply the data collection system that has already been set with the belief that it will match the problem. If some reservation is seen in the application of these tools, the researcher goes back to the previous step and tries to think of another way that might serve the purpose better.

Reflecting on the findings. First of all, the researcher asks himself/herself, what information has been obtained so far. The second question could be whether the problem could be solved with the obtained results. The researcher tries to be unbiased in finding answers to the above questions. If the findings are based on one's intuitions, satisfactory results cannot be obtained. According to the findings, the researcher designs an action plan to put it into practice for the purpose of solving the problem.

Taking an action accordingly. The name of the research comes from the fact that investigation is conducted to find an action to put into practice. The main characteristics of this research is that the researcher has to focus on a problem based on his/her personal experience in order to become aware of the situation and take actions to improve the working situation. For instance, teachers can easily modify their teaching styles by going through this professional learning process, which involves self-evaluation, reflection and problem solving.

There is no end to this developmental learning process because any new situation would bring some adaptation with it, and this requires people to develop new skills and adopt new strategies to eliminate the confronted problems.