Research Methods and Skills

Module

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A. Introduction

Research in our universities has become an indispensable component of eligibility for a degree. The education programmes in the universities in social sciences and natural sciences may vary, but practically in all such programs there is a requirement of research.

In the world of academia, there are some new terms used with knowledge, such as, knowledge economy, knowledge arts, etc. Research also comes under knowledge. Therefore, mastering knowledge of research methods or basics of research is not only a necessity, but also very essential and useful for universities.

The Research Methods and Skills Module is written primarily for you to teach your graduate students. At this level they will, probably for the first time, encounter formal training in conducting research.

In this module, you are first introduced to the **concept of research** along with definitions of, the **reasons for conducting research**, where it is conducted, how it is done, and by whom. It is followed by an important question '**why research**' and finally it addresses the **attributes of quality research**. Furthermore, you will have an overview of the kinds of research under the **qualitative and quantitative paradigm**. Additionally, the research process has to adhere to some **ethics** that you have to keep in mind.

You cannot undertake research until you have read and reviewed **literature**. A thorough reading of related literature helps you select a **research problem**. Based on the literature, you formulate your **research question/problem** for building your logical framework. Here you are also briefed as to how to access resources and use them for your research with proper **citations and references**.

The research outcomes have to be measured for which you need reliable and valid **tools** for collecting data from your **sample** selected from the **population**. After your data collection you are ready for its **analysis** using either **descriptive or inferential statistics** with or without the statistical package of **SPSS**. In the course of data collection you will need to write various letters for which we give you exposure to forms of **academic writing**. Putting everything together is the final activity of research where you learn to prepare the research report/manuscript. The finale session of the module is how to perform your role as a **supervisor**.

B. Aim

The primary aim of this module is to introduce the faculty participants to the concept of research and key elements involved in the research process.

C. Module Objectives

Participants will demonstrate knowledge of

- the concept of research

- the reasons for conducting research, where it is conducted, how it is done, and by whom.

- why research

- the attributes of quality research.

- qualitative and quantitative research.

- ethics of research

THEME ONE   PERCEPTION OF RESEARCH TYPES

Session I: Introduction of Research (1.5 hours)

1. Session Learning Outcomes

After the completion of this session the participants will be able to:

- explain the meanings of research and its functions

- compare types of research from different view points

- employ the appropriate research type to their respective discipline

2. Key Concepts and Content

2.1 *Key Concept: Research*

Research has different meanings to different people. If you understand the concept of research at an early stage, it would be easy for you to deal with more concepts in the research process. The following definitions will help you in understanding the research concept.

According to Oxford English Dictionary (2002), research is defined as "the systematic study of materials and sources in order to establish facts and reach new conclusions."

McMillan and Schumacher (1997) define research as "a systematic process of collecting and analysing information (data) for some purpose."

Kerlinger (1986) defines scientific research as, "Systematic, controlled, empirical, and critical investigation of natural phenomena guided by theory and hypotheses about the presumed relations among such phenomena."

2.1.1 **Why do research?**

We conduct research because we want to explore ideas and find solutions that make sense. In doing so a person thinks, constantly assesses, reassesses and makes decisions about the best possible means of obtaining information that is trustworthy. We may like to call this process a person's thinking game or
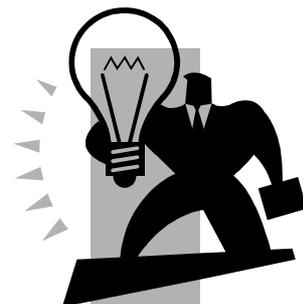
whole brain activity and the psychologists call it right and left brain attributes (Cherry et.al. 1993).

2.1.2 Where does research occur?

Research is conducted in many settings: educational institutes, laboratories, classrooms, libraries, the city streets, foreign cultures, etc. Some research is of short duration. Other research is spread over a long period of time. Research is usually done at universities at graduate or undergraduate levels as a required course. It can be done in various formats which fall under the categories of qualitative and quantitative research, the details of which will follow later in the module. Research is done by researchers, who are professors from education, natural sciences or social sciences, experts, and students of graduate or undergraduate programmes from related and multiple disciplines.

2.1.3 What do researchers use?

The information gathered through research recommendations provides an insight to the researchers for future course of action to be taken for better implementation and application. Some businesses, industry and Departments of Education spend vast amounts of money for research activity for improvement and advancement in their programs.

2.2 Research Types

When carrying out research, our purposes are different. Therefore research types will vary according to our purposes. The major research types will fall under application, objectives, inquiry mode, and sometimes we may use mixed method research.

2.2.1 Application (Pure and applied research)

Applied research is "hands-on", which means that the researcher is actually working with the topic/subjects while conducting the research. Generally, applied research focuses on "practical problems" such as climate change in order to come up with solutions to better or improve an existing condition.

Basic research is often considered researching for the sake of increasing knowledge as opposed to applied where the research truly is intended to solve a problem. Basic Research is often called "pure" research and is considered the foundation for applied research.

2.2.2 Objectives (Descriptive, Co-relational, Exploratory and Explanatory)

Descriptive research is also called statistical research. The main goal of this type of research is to describe the data and characteristics about what is being studied. The idea behind this type of research is to study frequencies, averages, and other statistical calculations. Although this research is highly accurate, it does not gather the causes behind a situation.

Correlation research measures the relationship between two or more variables or gives an indication of how one variable may predict another.

Exploratory research is a type of research conducted because a problem has not been clearly defined. Exploratory research helps determine the best research design, data collection methods, and selection of subjects. Given that it is fundamental in nature, exploratory research often concludes that a perceived problem does not actually exist.

Explanatory research explores "why," and attempts to explain as the purposes of explanatory research. It builds on exploratory and descriptive research and further identifies the reasons for something that occurs. It looks for causes and reasons.

2.2.3 Inquiry mode (qualitative and quantitative)

The inquiry mode of research can be categorized as qualitative and quantitative:

Qualitative research is research undertaken to gain insights concerning attitudes, beliefs, motivations and behaviours of individuals, to explore a social or human problem. Qualitative research methods include focus groups, in-depth interviews, observation research, and case studies. You can use **qualitative research** to study past events or current events. When you use it for past events, it is specifically called ***historical research***. The salient features of qualitative research are:

- Conducted to have an insight and better understanding of not only about the current situation is but also why it is so.

- More open and responsive to the research participants.

- Uses a variety of methods and data collection strategies,

- Offers opportunities for descriptive and exploratory studies.

Quantitative research is research concerned with the measurement of attitudes,

behaviours and perceptions. It includes interviewing methods such as telephone, intercept, and door-to-door interviews, as well as self-completion methods such as mail outs and online surveys. Quantitative research:

- Means the data is analyzed in terms of numbers.

- Involves the collection of numerical data.

- Predicts and explains data in the form of statistical analysis.

- Uses the numerical method to analysis and interpret the results.

- Finds out the relationship among quantifiable variables and the results are inferred.

3. Teaching Approaches

The introductory part of Research Methods and Skills will be delivered through:

- Ice breaking activity, which engages the participants

- Lectures based on PowerPoint presentations designed on key points of the content

- Participant discussions and activity based worksheets

4. Learning Activities

4.1 **_Activity 1: Ice-breaking Activity_**

Objectives of the activity:

- The activity aims at making participants feel comfortable about research in Pakistan in general. Introduction to research is an entry into an alien world.

- The activity will also enable the participants to see how they can relate research to their daily lives; and will help them understand that it is a systematic process that involves certain steps.

- As an ice-breaking activity, the facilitator can ask the participants to think and plan for buying something such as a car, a dress or a television. Let us suppose

that the facilitator asks participants to plan for buying a car, the facilitator would give directions and set the limits for this planning. For example:

- You have 5 lacs to buy a car

- You can buy only one car; and have to spend all the money but can not over spend.

- You may buy a new or an old car.

Now ask the participants to think of their personal and social context, personal and family needs, likings /choices, limitations etc. and ask them to rationally plan the process. Give them ten minutes to plan.

Now ask them how they planned it. As some of the participants share how they planned it, through this discussion establish that the planning involves a complete research process. One has to see the problem and needs. One has to do literature review by gathering information from relatives, friends, or family who have already bought car. The process also involves research methodology. For instance, some participants will directly go to the market and survey; some would contact a dealer in cars; and some would go for the newspaper advertisements.

Ask them in the same way how they would analyze gathered information and share that it is their data analysis that leads to their conclusions and decision making.

4.2 *Activity 2: Identify the Research Types from the Following*

After the introductory lecture on types of research, the facilitator will provide the participants with a worksheet which contains the following statements:

1. If you are going to study the relationship between job satisfaction and career development of secondary school teachers, this is an example of _____.

2. If you are going to find out causes of dropouts in primary schools of Rawalpindi, this is an example of _____.

The facilitator will ask the participants to fill in the blanks with appropriate statements about the types of research.

5. Summary and Transition

In this introductory session of the module, you have learned about the different definitions of research, why research is done, where it is conducted and what researchers use. At the end of the section, you have acquired basic knowledge about research methods and skills based on your educational background and professional experiences. You can easily differentiate among perspectives on and approaches for classifying different research types. The classification will help you understand different concepts related to research described in later sessions.

6. Assessment

Match the research types with the descriptions.

Research types	Descriptions
Applied research	to describe the data and characteristics about what is being studied
Basic research	looking at the past events
Descriptive research	to gain insights concerning attitudes, beliefs
Correlational research	predicts and explains data in the form of statistical analysis
Exploratory research	helps determine the best research design and data collection method
Historical research	is pure research
Qualitative research	researching for the sake of knowledge as opposed to applied
Quantitative research	often concludes that a perceived problem does not actually exist

THEME TWO   PLANNING AND DESIGNING A RESEARCH STUDY

Session II: Literature Review: Why and How (1.5 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- identify and formulate a research problem using literature review as sources of information

- construct research hypotheses on the basis of knowledge of the research area through literature review

- access resources and use the proper citations and references

- construct reliable research tools for data collection on the basis of how other researchers in the field worked

2. Key Concept and Content

2.1 *Key Concept: Literature Review*

Literature review is an important part of any research. It provides an underpinning for the research by enlightening the researcher about the process.

2.1.1 Literature review as sources of information and its procedure

Any research, no matter at what scale, requires reading about what other people have done in the area of your interest, how they have done it, and what are the gaps in the research in that area. Any new production of knowledge is necessarily based on previous and existing knowledge. You need information to support or refute your arguments and write about your findings. You need to provide evidence that you are aware of the current trends and issues in your area of interest and are cognisant of the current state of knowledge on the subject.

Ideally this reading should form the basis for choosing your research methodology. However, this is usually not possible in practice. After some preliminary reading, the research topic is finalized. Reading continues and spills over into the stage of data collection

and analysis. Some reading is naturally required at the stage of interpretation of the qualitative or quantitative data to embed your research in its milieu. Moreover, every new article/book you read will have a cumulative effect on the existing body of knowledge in your mind, pushing to you reinterpret or rethink some of your previous assumptions or ideas. But there is a limit to the changes you can make in your literature review. The best way is to prepare a first draft and then polish it at the stage of data interpretation when you will be reading your literature review again to present your analysis in a coherent manner with cross-references related to your literature review.

2.1.2 **Why review literature?**

Some reasons for including a literature review in your research paper/thesis are:

1. The basic reason for literature review is to contextualize your research. Every academic research project is related to a particular area and is a link in a chain of similar research taking place in the area. This contextualization shows your awareness of the work going on in your field and also identifies the niche you wish to occupy.

2. It gives you ideas about how to classify and present your data. When you read critically, you can sees how writers explore the relationships between facts and how facts and relationships are explained. Methods used by other writers may not be suitable for your purposes, but they may give you ideas about how you might categorize your data.

3. Literature review helps you to distinguish what has been done from what needs to be done and how it should be done. Readings in an area reveal gaps in the literature and this fine tunes your research question and subsequent research methods.

4. Literature review assists you to synthesize your ideas and gain perspectives to look at your research problem with different lens. Other researchers may have looked at a similar issue but from different angles. This knowledge can fortify you to find your own angle.

2.1.3 **Sources of literature review**

One important question that new researchers always ask is "Where do we find the material for doing a literature review?" The following are the primary and secondary sources for finding the material that you need to read:

- Articles in Journals

- Books

- Internet

- Research Reports

- Government Documents

- Abstracts

- Reviews

- Unpublished Theses

- Electronic Research Information Center/Social Sciences Citation Index/Dissertation Abstracts Index

Most of this material is now available on the Internet. Libraries in established higher education institutions are another rich resource for locating the required materials.

2.1.4 **Managing the literature**

The bibliography at the end of a recent article or book can provide you with an adequate reading list of most of the relevant material related to that topic. Once the relevant literature has been located and found through the sources suggested, the next step is to manage it. This requires efficient and selective reading. Once you try locating the relevant literature, you will discover that it is available in vast quantities. Now the primary task is to pick out the material that is actually related and relevant to your research area. This requires you to be a proficient reader who can get the gist of things quickly as you will have to go through a lot of reading.

In an article published in a journal, the first thing to do is look at the abstract or summary of the article. This will give you an idea whether it is relevant for you. In the case of a book you should look at the list of contents, the blurb, the summaries usually given at

the end of the chapters and the introduction. This will tell you quickly if any part is pertinent for you.

The next step is to follow a clear system of keeping track of your reading references. You need to create a management system that will incorporate your sources with all relevant details including a note about where you found that article or book. This means that you put down that the article/book was on the shelf of your supervisor or in the library of the Institute of Business Administration. This will save a lot of hassle and futile finger-biting at the end when you desperately need a page number for a quote and cannot remember where you had found the material. The convenient traditional way was to write down the complete bibliographical reference (based on the style you will follow) on a 6x4 inch Index Card. These cards are much better than papers as they are hardier, will not fly away under the fan, can be stored alphabetically in shoe boxes, and can be spread like deck of cards with respect to the notes that are written. Today, a number of computer programs like Endnote, Procite, or Reference Manager are available to keep track of your references. These programs can automatically format references in any number of styles once the basic details have been entered.

It is also useful to annotate your references. You can write brief notes on the Index Cards. This will provide you with a methodical and organized review of materials that you have read. It is a record of the accuracy, relevance, and quality of the sources you have consulted. Your critical comment, that is your informed and considered evaluation, can also be added. These annotations can be varying in length and content depending on the pertinence of the material reviewed. It will minimize the time when you have to incorporate them in your writing.

2.1.5 Brief Sample Annotation

Sample from O'Leary, 2004: 75	
O'Leary, Z (2001) 'Conversations in the Kitchen', In A. Bartiett and G. Mercer (eds). Postgraduate Research Supervision: Transforming Relations. New York: Peter Lang.	Citation (Harvard reference)
The author is a senior lecturer at the University of Western Sydney who has written a chapter in a book targeting postgraduate research students and supervisors.	Author / Audience
This is basically an anecdote that discusses, and attempts to	Summary

normalize the emotional and intellectual hardships many research students can go through when trying to juggle family obligations and study.

The anecdote is quite short and written in a warm and personal style that makes it very easy to relate to. It is not, however, a research study backed up by any data/rigour and therefore does not allow one to assess the extent of the issues raised to whether the concerns she raises are widespread. That said it does not seem to relate well to the more rigorous research studies conducted by Field and Howard (2002) and Dreicker (2003) on similar issues.	Critical Comment
This relates quite well to my chapter on 'coping mechanisms and strategies for managing roles and workloads' and may be good for a quote or two especially if I feel my text is too dry.	Relevance

2.2 *Presenting the Literature Review*

> The formal literature review is a very specific piece of writing designed to inform your readers of your topic, establish your credibility as a researcher, and argue the need for, and relevance of, your work. Most find it difficult task that takes patience, practice, drafts, and redrafts. *(O'Leary, 2004:84)*

O' Leary's quote encapsulates the essence of the literature review. You have to be certain that the review is adequate and sufficient. It should not be a shopping list or a catalogue of books and articles that you have read, but should help in making a case for your study.

Clarity is essential in presenting your ideas. The literature review should have a definite structure based on the arguments that you want to make or the task that you want to accomplish through it. Prepare a blue print of the structure of your research. This can be revised as your thinking evolves but a basic outline would help you to begin writing. You can also use it to fill in the bits and pieces as your reading advances or your theoretical perspectives develop.

Use empirical evidence to substantiate your argument (Gay, 2000). This will authenticate your stance. Citing opinions only can weaken the review. Moreover, be careful

to be recent and up to date in citing. With the Internet revolution, the pace of knowledge generation and meaning making has multiplied manifold and access to the Internet is also within reach. Be judicious in the selection of relevant literature and avoid the temptation to include every single source that you have accessed.

One valid suggestion for writing a good literature review is to read a few well-written literature reviews. This will give you an idea about how to go about it. At the end, I would like to say again what was said earlier; let the literature review be an ongoing process that overlaps other stages of your research. It will then support your arguments and contribute to your analysis and interpretation of the data.

In social sciences, literature review is usually a separate chapter. Sometimes it is built into the introduction and chapters related to methodology and analysis. However, in sciences, the literature review is usually part of the introduction. The role of literature remains the same both in sciences and social sciences.

A note of caution: Be valiant and get feedback from your peers and supervisor. Be prepared to redraft and revise.

2.3 *Sample of Literature Review*

If you are doing action research, a good way to begin your literature review would be to define what it is.

Action Research

Action research can be defined as the process of studying a real school or classroom situation to understand and improve the quality of actions or instruction…. It is a systematic and orderly way for teachers to observe their practice or to explore a problem and a possible course of action…. Action research is also a type of inquiry that is pre-planned, organized, and can be shared with others. (Johnson, 2005: 21)

Action research in fields other than education involves studying a real problem in its authentic setting such as in industry, in agriculture in a community setting. Etc. Nunan (1992: 18) suggests that for 'Kemmis and McTaggart the essential impetus for carrying out action research is to change the system'. Cohen and Manion (1985: 219), however, suggest that action research may in fact be 'concerned with innovation and change and the way in which these may be implemented in ongoing systems' (authors' italics). They have a more

integrative approach compared to the more revolutionary one of Kemmis and McTaggart. This approach is more appropriate for our indigenous locale.

Lieberman (1986) has defined collaborative action research as a tool for staff development and an opportunity for teachers and university researchers to work together to investigate and solve school and classroom challenges. This research practice is encouraged in the departments of education in the universities in Pakistan.

Finnan (1992) states that interventions can succeed if they are designed to help members of the school community (culture) make the changes they have identified as important. As most of their school teachers are trained in research, academics from Higher Education Institutions collaborate with them to plan successful interventions for facilitating teaching and learning. This is not our scenario. We have externally prepared curriculal imposed on us. All that we can do is may be graft an innovation onto an 'ongoing system which normally inhibits innovation and change' (Cohen and Manion, 2003, p. 220) to facilitate learning across the curriculum. This is a process that can be initiated and practiced by classroom practitioners individually and collectively.

McCarthy and Riner (1996) argue that the obvious strength of action research is that it creates an environment where assumptions are opened for questioning. They reiterate Oja and Pine (1989 as cited in Webb, 1990) by stating that teachers participating in action research become more critical and reflective about their own practice and attend more carefully to their methods, their perceptions and their approach to teaching process. The research of Qadir (1996) is a proof of this.

It is a participatory process in which teachers are … 'creating new data and new interpretations as they struggled to understand each other' (Johnston, 1990: 180). Teachers involved in collaborative action research 'usually feel empowered both professionally and personally and there is a decrease in their feeling of frustration and isolation. … These outcomes are typically attributed to the collaborative nature of teacher research' (Henson, 2001: 821). Firestone and Pennell (1993) also reiterate that collaboration becomes an intrinsically reinforcing activity that builds commitment to teaching. It is therefore a preferred mode of research at school and tertiary level for classroom practitioners.

3. Teaching Approaches

The session on literature review will be delivered through:

- Lectures based on PowerPoint presentations (The facilitator should use all the headings in **2. Key Concepts and Content** of this session and should write the main points under each heading by using bullets.)

- Handouts are to be used. Provide '**Brief Sample Annotation**' given in **2. Key Concepts and Content** to the participants as a handout.

- '**Sample of Literature Review**' given in **2. Key Concepts and Content** can also be provided as a handout that participants can carry as a future reference. Or, show this sample on the PowerPoint and generate a discussion based on it.

- Group work of the Participants

4. Learning Activities

4.1 Objective of the Activity

To give the participants a practical experience of how to do a literature review.

4.2 Activity

After the facilitator has delivered the lecture, if possible, take the participants to the library; if not possible, arrange for almost 30 books. Make 5-6 sets of these books; each set of books should be related to one general theme. Use 5-6 themes such as higher education in Pakistan, gender issues, primary education, and teaching of English etc.. Give these sets to different groups. Ask each participant to develop a research topic for himself/herself and then do a brief literature review using the set of books provided to his or her group.

If they are using a library, they can use journals and Internet as well. Ask them to consult 5 to 7 sources to write their literature review.   Content of the session will serve as the resource.

5. Summary and Transition

In the literature review session of the module, you have learned what a literature review is, and why review of literature is necessary for any research. You have also been introduced to various sources for conducting literature review. It is also discussed how literature review can be managed well. To facilitate learning, a brief sample of annotation and a sample literature review are also provided.

6. Assessment

Assessment would be done through the outcome of the activity of writing literature review as provided in **'4. Learning Activities'.**

Session III: Identifying and Formulating a Research Problem (1.5 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- identify and formulate a research problem using literature review as sources of information

- identify research variables

- construct research hypotheses

- write a statement of the research problem

- formulate research questions

2. Key Concepts and Content

2.1 Define a Research Problem

This is a fact that research starts from some problem. The research journey starts from the identification of the problem. To work on that specific problem only the identification is not sufficient. It is necessary for the researcher to define that problem in more practical terms. Literature review helps the researcher in defining the research problem so that it can be measured in its true sense.

2.2 Key Concept: Variables

A variable is a characteristic that takes on different values or conditions for different individuals. Variables are of different types:

Dependent variables are the variables that we measure to determine if the independent variable has an effect, such as science achievement. The dependent variable is what is affected by the independent variable.

Independent variables often simply are classifying variables, classifying the individuals of the research study. For example, if we are looking at the student's achievements in science using some new teaching methods, then the teaching method would be an independent variable and the achievement of the student is an independent variable.

Controlled variables are independent variables. They are controlled variables only if their effects are determined, i.e., controlled. In the example of science achievement, the learning style of the students is an organismic variable, as it would probably appear as an intervening variable. For example: a treatment of program or cause.

Extraneous variable is related to the dependent or independent variable, but is not part of the experiment.

Moderator variable is related to the independent and dependent variable and has an impact on dependent variable. In such a situation, it becomes an interacting variable also.

2.3 *Constructing Hypothesis*

A hypothesis is a specific statement of prediction, which is also called an academic guess. It describes in concrete (rather than theoretical) terms what you expect will happen in the research. Not all studies have hypotheses. Sometimes research is designed to be exploratory. In such a case, there is no formal hypothesis. A single study may have one or many hypotheses:

Null hypothesis is the hypothesis in which there is no relationship between two or more variables. It is symbolized as H0.

Research hypothesis or the **alternate hypothesis** proposes a relationship between two or more variables and is symbolized as H1.

Directional hypothesis is one tailed. You assume that by manipulating the independent variable the dependent variable will change in a specific direction. You can predict if this change will be positive or negative.

Non-directional research hypothesis is two tailed. You assume that by manipulating the **independent variable** there will be a change in the dependent variable. You cannot predict if this change will be positive or negative.

2.4 *Writing a Statement of Research Problem*

- A good research statement makes clear to the reader what issue the research is dealing with.

- Ideally a research statement should be presented in one sentence.

- A research problem statement is to the point, focused, and measurable; it is not ambiguous and abstract.

- Now select a research topic and try to write the research problem.

3. Teaching Approaches

The session on identifying and formulating a research problem will be delivered through:

- Lectures based on PowerPoint presentations

- Participatory activities

- Discussion

- Practical experience through exercises

4. Learning Activities

- To introduce the topic and deliver the contents, the facilitator should use all the headings in **2. Key Concepts and Content** of this session and should write the main points under each heading by using bullets. Mainly it would be lecture based. However, asking questions, sharing examples, and giving comments can help engage participants.

- While the participants are introduced to what a research problem is, what variables are, how a good hypothesis can be constructed, and how a research problem is stated, the facilitator should give the participants two to three examples of each topic at different stages in research; and should ask the participants to apply this knowledge to practical instances.

The content of the session will serve as resources.

5. Summary and Transition

In this session of the module, you have learned what a research problem is, what is the definition of a variable, what are different types of variables, and how the research problem is stated, what is a hypothesis, and what are the characteristics of a good hypothesis.

6. Assessment

Assessment would be activity based. Prepare a handout of the following to use it for assessment:

Activity 1

Identify the independent and dependant variables in the following situation:

A university teacher is interested in determining the best way to teach introductory technology course, and ensure that her students have learned the material.

Activity 2

Formulate hypotheses for the following two situations:

Situation 1

What effects does viewing violence on television have on boys?

Situation 2

A sanitation department is nearby and the smell is coming from the same direction. The sanitation department does a series of steps to process the sewage and wastewater.

Hypothesis: If _____then_____.

Session IV: Research Study Designs (1.5 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- define different research designs and their functions

- adopt appropriate approach for selecting a study design

- differentiate among different study designs according to the characteristics

2. Key Concept and Content

2.1 *Key Concept: Research Design*

We cannot conceptualize a research design until we are sure what we want to do. Therefore it is very important that we exactly know what we mean by the terms and language we use. It should not be vague or unspecified. Conceptualization is to specify exactly what we mean and don't mean by the terms we use in our research.

You may call the research design a plan for addressing the research question you have posed. Your question points to a particular type of study: Is it going to be an exploratory or explanatory study? Your question points to the target population: The group of people you would study for your question. Your question also points to the kinds of questions you would ask and how you would go about asking the questions.

2.2 *Different Study Designs*

The research is not restricted to one single design. The researcher can adopt any of the design according to the requirements of the research. Following are most commonly used research designs:

2.2.1 Based on the number of contacts

Based on the number of contacts following are the most commonly used research study designs:

- the longitudinal study design

- the cross-sectional study design

2.2.2 The longitudinal study design

The longitudinal research design employs the following characteristics:

- Longitudinal research design is to track participants over an extended amount of time (5 years, 10 years, 15 years etc).

- Same people are studied at more than one time to record the developments in growth etc.

- People hesitate to become the sample of these studies due to the long duration.

2.2.3 Cross sectional study design

The cross sectional research design employs the following characteristics:

- Involves studying many people at one point in time.

- Involves less time period and cost as compared to the longitudinal method.

- Describes the linear relationship (positive or negative) between the variables.

2.2.4 Based on the reference period

The historical study design is a commonly used design under the category of reference period:

2.2.5 Historical study design

Following are its main features:

- Historical research, also known as "Historiography", is related to the interpretation of the events which can be in the form of issues or the movements that have occurred in the past and factual analysis.

- It is longer than other types of research because the researcher has to search for the documents and has to do a deep analysis of these documents.

- After the identification of issue, data is collected through:

  o **primary sources** which can be the original documents or the people who have themselves experienced that particular event.

- **secondary sources** which can be the second-hand documents or the people, who did not experience themselves but they know about that event.

- Material is studied, information is synthesized, facts are analyzed, and the results are drawn.

- The researcher is more responsible in selecting the documents as the accuracy of these documents counts a lot in producing the authentic results.

2.2.6 Based on the nature of investigation

According to the nature of the investigation, research designs have following categories:

- the experimental study design

- the non-experimental study design

- the quasi-experimental design

2.2.7 The experimental study design

Experimental designs involve the control and the treatment groups to check the cause and effect relationship. In experimental design, the researcher chooses some element to try it out and to check its effect on something else. Both the treatment technique and its effect on the specific subjects on which the treatment is applied are termed as the Independent and dependent variables respectively.

2.2.8 The non- experimental study design

Non-experimental research includes a variety of different methods that describe relationships between variables. They do not set out or test, any causal relationship between variables.

Non-experimental research methods are descriptive, historical, or correlational.

2.2.9 The quasi-experimental study design

In the quasi-experimental research you assign the participants to groups based on some characteristics or quality that these people bring to the study. It is also called post hoc research or after the fact research.

2.2.10 **Case study**

● The study of an individual or an institution in a unique setting or situation in an intense and detailed manner for long period of time.

● Several techniques can be used within a case study i.e. Interviews, Observations or Experiments

● Data collected through case studies lead to the formation of the theories.

● The results may be affected by researcher's own perceptions and the results cannot be generalized.

2.2.11 **Action research**

Action research is a methodology that combines action and research to examine specific questions, issues or phenomena through observation and reflection, and deliberate intervention to improve the practice.

3. Teaching Approaches

The content of the session will be delivered using the following approaches:

● Lectures on each of the research designs clarify the meaning of conceptualization. PowerPoint presentations can be designed to highlight the bullet points

● Discussion of participants on differences and similarities among research designs

● Involve the participants through activity based tasks

4. Learning Activities

4.1 Activity 1

The ML will present n interactive lecture on the content of this session noted above.

4.2 Activity

The objective of this activity is o enable the participants to identify the research study design used in research articles. In this activity, the facilitator will bring some research articles according to the field of specialization of the participants or take the participants to the library. According to the number of available research articles the groups of the participants will be made. The participants will be asked to:

- Read these research articles

- Identify the research study design used in the research

- Define the procedure of study design used in the research study

- Share with other groups

5. Summary and Transition

In this session, you have learned about different research designs and important functions involved in each research design. Approaches for selecting the research designs will help you select appropriate research design for conducting research in the social setting. The concepts described here will help you in your professional life while conducting your own research or as resource persons for teaching research methods and skills as a subject.

6. Assessment

The learning of the participants will be assessed through the following activity:

Carefully read the statements given below and answer the following questions:

- What is the design used in the research study?

- What do you say to support your argument?

Statements

1. If you were to test a group working women to assess coping strategies in their workplace in 1995 again the same group in 2000 and again in 2005, this is an example of _____.

Justification/Argument for your answer

_____

_____

2. Effectiveness of cognitive behaviour therapy for the treatment of aggression in adolescents, this is an example of _____.

Justification/Argument for your answer

_____

_____

3. The speech problem of a hearing impaired child in school, this is an example of _____.

Justification/Argument for your answer

_____

_____

Session V: Research Tools (2 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand the characteristics of the valid and reliable research tools

- define the procedure for the construction of different research tools

- construct reliable research tools for data collection

2. Key Concepts and Content

2.1 *Key Concept 1: Research Tools for Data Collection*

Tools of research are basically used for data collection. These tools vary from one research type to another. Qualitative and quantitative researchers use different tools of measurement according to the purposes. Before proceeding further, let us look at the term "data" and understand its application in research.

Data include:

- Facts and principles used in finding the answers.

- Characteristics of people i.e. ages and income etc.

- Scores in tests and anecdotal records of the students.

- Answers to questions whether in questionnaires or in interviews etc.

- Measures of scales and statements of the beliefs and opinions.

- Laws and descriptions of the social set-up in which the research is being conducted etc.

The following are the most commonly used tools for the collection of data:

- Questionnaires

- Interviews

- Observations

- Tests (achievement, aptitude, personality, vocational and personality etc.)

● Scales (nominal, ordinal, interval, ratio, likert etc.)

2.2 *Key Concept 2:The Questionnaire*

Questionnaires are the most commonly used tool for the collection of data, which involve the following details:

● Questionnaire: a written document based on different open and close-ended questions with different purposes, sizes and appearances.

● It is used for descriptive research studies to get information from the research participants or target population.

● It is used when the straightforward information is required and the respondents of the study are large in number.

● Time and cost is involved in getting the print and postage.

● Can be group administered (if the respondents are illiterate, the research can ask the questions directly from the respondents and record their answers) and it can be self-administered (when the respondents themselves answer the questions).

2.3 *Key Concept 3: The Interview*

● A less technical tool for the collection of data in the form of formal conversation i.e. in surveys.

● Can be structured, unstructured and semi-structured:

o **Structured:** tight control over the questions and answers.

o **Unstructured:** Interviewee is free to share his/her thoughts and the interviewer can change the next question in the light of what has answered the interviewee.

o **Semi-Structured:** Although tightly controlled yet a bit of flexibility for the interviewee in answering the questions.

● Can be:

o **One to One:** meeting between one researcher and one respondent.

- o **Group Interviews:** meeting between one researcher and more than one respondent.

- o **Focus Group:** collection of information on non-sensitive issues by arranging a discussion of experts.

- ● Can be conducted face to face, or through telephonic or other electronic sources i.e. e-mail etc.

- ● Notepad, tape recorder, video recorder are the equipment used to record and save the data.

2.4 *Key Concept 4: The observation*

- ● Observation is the recording of the behaviour of the sample.

- ● Relies on what the researcher has witnessed rather than on what people say or think about issues.

- ● Observation can be of two types:

- o Participant Observation: When you as a researcher become part of some social set-up and people know that they are being observed.

- o Non-participant or Systematic Observation: When you do not interfere in the social set-up, or do not disturb the natural settings of the sample to be observed.

- ● Behaviour is recorded through observational checklist.

2.5 *Key Concept 5: Observational Checklist*

There are a lot of techniques, which can be used for observing the behavior of the sample i.e. field notes, tape and video recording, and the observation checklists. Observational checklist is prepared by the researcher. Observation checklist is based on *rating scales* and the coding systems. Different forms of rating scales are present in observation checklists and you must know the proper coding system. There can be different techniques for preparing the observation checklist according to the requirement of the topic and the perception of the observer. But most observational checklist can be based on following categories:

- **Duration Recording:** length of time involved in occurrence of some behaviour.

- **Frequency Recoding:** number of occurrence of behaviour.

- **Interval Recording:** observation of one subject during a fixed period of time.

- **Continuous Recording:** each and every happening is recorded.

2.6 *Key Concept 6: Scales*

Measurement scales are used to collect the different forms of data and quantify the response of the respondents to measure the variables. The type of measurement scale will depend upon the type of data i.e. nominal, ordinal, interval and ratio. Scales can also be part of a questionnaire.

(See **Learning Material for Session V** for Details)

2.7 *Key Concept 7: Tests*

- Test is a measurement tool, which is used to measure the performance of an individual in some specific areas of interest. There are two main types of tests: **Norm Referenced** or **Standardized Tests** and **Criterion Referenced Tests**.

- In **norm referenced tests**, the norms are used relatively to measure the performance of some individuals. Norms are basically the standard with which the performance is compared. Following are the most commonly used types of norm referenced tests:

o **Achievement Tests:** to measure the performance of an individual in different subjects which they have learned and interpreting this performance in the form of grades to compare with the performance and learning of others.

o **Aptitude Tests:** to measure the potential of some individual in learning about what s/he can learn not about what s/he has already learned.

o **Intelligence Tests:** to measure the mental abilities i.e. to analyze the situations, to create meaning and to organize the ideas and to measure the abstract intelligence of an individual.

- o **Personality Tests:** to measure the type or the characteristics of the personality and to measure the human behaviours, their skills and their needs etc.

- o **Vocational/Career Tests:** to measure the ability and suitability of some person in adopting some profession and career.

- o **Sensory Motor Tests:** to measure an individual's sensory capabilities and motor abilities and to measure the sensory coordination.

- **Criterion Referenced Tests**

  - o When the performance of an individual is interpreted on the basis of some criterion, which is absolute, but not the relative one is referred to as criterion referenced test.

  - o Criterion is basically some specific subject or skill.

  - o Main purpose of this test is to measure some specific objectives, which are pre-defined operationally and behaviourally.

  - o Content validity of these tests are required.

  - o There is no restriction about the number of individuals falling in pass marks criterion.

  - o The cut off or the passing marks criteria is set by either the subject teacher or by the researcher.

2.8 Constructing the Tools

Following are some common rules, which are followed in construction of all the tools:

- Selection of topic

- Identification of the variables to be measured

- Considering the audience

- Determining the objectives

- Constructing the items more than the required

- Selecting of the most appropriate items

- Development of Keys (If necessary)

- Assigning Codes (If necessary)

- Pilot testing of the tools

- Determining the Validity and the Reliability of the tests

o **Reliability:** Consistency of the results of the test

o **Validity:** Does the test measure what it is actually supposed to measure?

3. Teaching Approaches

The content of the session can be delivered through following approaches:

- Lectures on the characteristics of each tool and how to design these tools through PowerPoint presentations based on important points

- Group work of the participants in performing activities

4. Learning Activities

The facilitator is required to perform any one or two of the three activities in **D1. Learning Material of Session V** by involving the participants after the content is delivered. The objective is to enable the students to work on already designed tools and get a better understanding of the construction of these tools.

5. Summary and Transition

Collection of data is the most important part of all the studies, whether qualitative or quantitative. Data cannot be collected without a measurement tool. If you are using any standardized or pre-established tool, it will guide you in the process of administering the tool and coding the data. If you are using the tool constructed by yourself, you have to have a thorough study of the details about the tools given in this section. You have leaned about different tools, their purposes, and their uses. It can be certainly said that all the tools are similar to a great extent. You can combine two or more than two tools for the collection of

data. You can include different scales into your questionnaires and interviews as well. So if you are able to design a good research tool, you will collect authentic data based on it.

6. Assessment

The facilitator will ask the participants to do the following activities in the light of the learned materials:

- List the types of measurement tools.

- Compare the use of measurement scales.

- Differentiate between the norm referenced and criterion referenced tests.

- Consult the recommended readings and find out how to determine the validity and the reliability of the tools.

Session VI: Selecting Samples (1 hour)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- define the population and sample

- differentiate between the probability and non probability sampling

- apply procedures involved in different sampling techniques

2. Key Concepts and Content

2.1 *Key Concept 1: Population*

Population is a large group of people, which you specify to conduct the research and to answer the research question. Population is the area where the results of the study are generalized. Population is the whole or the entire group; the research study is being conducted to get information about the population, whose properties are analyzed to find the answer or the solution to the research question and the results are drawn from the analysis. Population is referred to as "Whole" or "All".

Example of Population:

All the private schools of Rawalpindi

All the seventh grade students of Islamabad

All the primary school teachers
All the slum areas of the city

2.2 *Key Concept 2: Sample*

Sample is a smaller group, which is selected from the population to be observed and included in the research. Results are drawn from the sample and generalized to the entire population. Sample size depends upon the requirement of the research. To get the concept of the sample, look at the following example:

Example of Sample:

Fifty students of fifth grade

Sixty primary school teachers
Hundred students studying in private school

2.3 *Need for Sampling*

A question may arise in your mind, "why to select the sample if the population is there to be studied and to get information?" There can be many answers to this question:

- Impossibility of studying each and every individual in the whole population.

- Studying the whole population requires more time and efforts of the researcher.

- Large amount of money is involved in studying the whole population

2.4 *Steps involved in Selecting the Appropriate Sample*

Following are the steps involved in the selection of an appropriate sample:

- Defining the population

- Selection of specified group from population referred to as accessible population (Salkind, 1997).

- Selection of the sample from that accessible population.

2.5 *Types of Sampling*

Now what will you do to get a representative and unbiased sample? So the research offers following two sampling techniques to select the sample for the study:

- Probability Sampling

- Non-Probability Sampling

2.5.1 **Probability sampling**

In probability sampling, every individual in the population has a non-zero chance to be included in the sample of the study. It provides the researcher with a more representative sample, so it is a more reliable sampling procedure.

There are four types of probability sampling:

1. Simple Random Sampling

2. Stratified Sampling

3. Cluster Sampling

4. Systematic Sampling

2.5.2 **Non-probability sampling**

In non probability sampling the sample is not selected randomly. It is used where the population is widely spread and it is difficult to use any sampling frame for such a great population.

Following are the most commonly used techniques of non-probability sampling:

1. Purposive Sampling

2. Quota Sampling

3. Convenience Sampling

4. Snowball Sampling

(See **Learning Material for Session VI** for Details)

3. Teaching Approaches

The content in this session will be taught through the following approaches:

- Lectures based on PowerPoint presentations

- Group work based on activities after the lecture

4. Learning Activities

After the completion of lecture, the facilitator will arrange some research articles or take the participants to the library. Then the groups of 4-5 members will be formulated. 2 articles will be given to each group. The group members will be asked to do the following:

- Identify the population and sample of the researches in article

_____

_____

- If you conduct a research and select a sample, what will you use in the following situations?

  o If you use the simple random sampling, what will be the procedure?

     _____

     _____

  o If you use the systematic sampling, what will be the procedure?

     _____

     _____

  o If you use the cluster sampling, what will be the procedure?

     _____

     _____

  o If you use the stratified sampling, what will be the procedure?

     _____

     _____

Resources: (See **Learning Material for Session VI** for Details)

5. Summary and Transition

Results of a research are generalized if they have been taken from a representative sample. The whole process of identifying the population and selecting the sample from this population has been explained in this section. Different sampling procedures have been highlighted in this section. If you apply these procedures to your own researches, you will be able to produce the authentic and more generalizable results from the sample of your research.

6. Assessment

Based on the work done in lecture and the activities, the assessment will be done through the following activity.

The facilitator will ask the participants to answer the following questions:

- Differentiate between the population and sample.

- Briefly discuss the need for sampling.

- Write down the procedure for selecting the appropriate sample.

- If you conduct a research, which sampling type you will use, probability or non probability? Why will you select this type, discuss?

Session VII: Writing a Research Proposal (1.5 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand what the important components of a research proposal are

- write a research proposal

2. Key Concept and Content

2.1 *Key Concept: Research Proposal*

Writing a research proposal is a different experience than any other types of writing. It involves more clarity of mind as well as a more systematic approach towards the writing process itself. A research proposal is an outline, a sketch, or a blueprint of a building that you want to build. In fact you can divide your whole research work into three stages:

- Stage i - Thinking About the Research

- Stage ii - Preparing the Research Proposal

- Stage iii - Conducting the Research

This chapter mainly deals with the first two stages. It addresses the issues of thinking systematically, identifying a research problem, defining the topic, preparing a title, forming a hypothesis, and making research questions.

2.1.1 **Where to start from?**

Do not abruptly start writing your research proposal; think well before you write. Thorough and detailed thinking would reduce the number of attempts to revise the proposal. At the 'Thinking about it Stage' it can be helpful if you:

- are inclusive with your thinking

- write down your ideas

- are not overly influenced by others- it's your research

- try and set a realistic goal

- set appropriate time lines

Once you start thinking, your line of thought should be in the following sequence:

- Idea ↓

- Topic ↓

- Problem statement ↓

- Hypothesis ↓

2.1.2 Defining the topic

A well-defined research topic gives focus, sets boundaries, and provides direction. It:

1. Defines and identifies the focus of the research.

2. Defines the nature of the research endeavour- whether the aim is to discover, explore, explain, describe, or compare.

3. Defines the areas of interest- whether the interest is why, when, where, what, or how.

4. Indicates if a relationship is foreseen between concepts being explored- whether looking for impacts, decreases, causes, correlations, etc.

2.1.3 Including a title on your proposal

Title of your research is the first introduction of the reader to your work which implies it should clearly convey the intended message. Preparing a good title means:

- having the most important words appear toward the beginning of your title

- limiting the use of ambiguous or confusing words

- looking for unnecessary words when you have too many words,   and

- including key words that will help researchers in the future.

2.1.4 Selection of a research problem

At the outset of your research, make sure you have identified a worthwhile problem which has not been previously answered. Since research is always about some problem/s, identification and selection of this problem is most crucial in designing a research proposal. According to Tuckman (1994), "Although selecting the research problem is one of the most difficult steps in the research process, it is unfortunately the one for which the least

guidance can be given". However, According to Tuckman (1994), a problem statement must have the following characteristics:

- It should ask about a relationship between two or more variables.

- It should be clearly and unambiguously stated.

- It should be stated in question form (or, alternatively, in the form of an implicit question such as, the purpose of this study was to determine whether…).

- It should be testable by empirical methods; that is, it should be possible to collect data to answer the question(s) asked.

- It should not represent a moral or ethical position.

Apart from these guidelines provided by Tuckman (1994), it can also be useful if ensure that the problem that you have identified is of some theoretical or practical significance. It can also be helpful if from the wide range of potential problems for study, at the initial stage, you narrow the range to problems that are relevant to your academic/ professional interest and current level of research skills. Later on, considering other factors such as available resources, time etc. you can select a problem for your research. Tuckman (1994) has presented various models that can be helpful in the selection of a problem; for instance, the following three-dimensional model:

Characteristics of Instruction	Components of Instruction	Student Outcomes
Instructional Program	Student Learning Characteristics (e.g., learning style I.Q., aptitude, prior achievement, sex, age, SES)	Specific Knowledge and Comprehension
Instructional Materials		General Knowledge and Comprehension
Teaching Style or Strategy	Teacher Characteristics (e.g., attitudes, age, experience, style)	Thinking and Problem-Solving
Learning Environment		Attitudes and Values
Learning Activity	Learning Materials Characteristics (e.g., subject matter, structure)	Learning-Related Behavior

2.1.5 Statement of the problem: examples

A problem can be stated in the form of an explicit or an implicit question. For example:

The study examined whether students taught by direct method achieved higher reading scores than those taught by the communicative approach. (Implicit question)

Or, What is the relationship between motivation and achievement? (Explicit question)

2.1.6 What is a hypothesis?

Once you have identified and stated a problem, the next step is to create a hypothesis. Putting it in a simple way, a hypothesis is a wise or educated guess. It is an assumed answer to the question posed in a research problem statement. However, it is only an 'assumed' answer or an expectation that is tested in the study later on. You must bear in mind that a hypothesis differs from an observation, which represents outcomes actually found.

2.1.7 How to form a hypothesis?

Focusing on your research problem, you can create the hypothesis. Simply try to give a direct answer to the question posed in the problem statement. For example:

Research Q1: What is the relationship between motivation and achievement?

Hypothesis1a: Motivation and achievement are positively related.

However, this is not the only possible guess you can make. You may assume that:

Hypothesis 1b: Motivation and achievement are negatively related.

Thus, a hypothesis shows some (positive or a negative) relationship between the variables. As far as the question of structuring a hypothesis is concerned, there can be varieties of ways for instance:

Research Q2: Do students learn more from a directive or nondirective teacher?

Hypothesis 2: Directive teachers give more effective instruction than non-directive teachers.

It is also important here to introduce you to the 'Null Hypothesis'. It is a small little creature who says: 'I represent no relationship between the variables that you are studying'.

Example: There is no relationship between motivation and achievement.

2.1.8 Where do hypotheses come from?

Given a problem statement- Are A and B related? A researcher can construct three possible hypotheses:

1. Yes, as A increases, so does B.
2. Yes, as A increases, B decreases.
3. No, A and B are unrelated.

The number of possible hypotheses may possibly increase as the number of variables increases.

3. Teaching Approaches

This session will be delivered through:

- Lectures based on PowerPoint presentations which will be designed on the key points of the content

- Activity based tasks

4. Learning Activities

● To introduce how to write research proposal, the facilitator needs to make a PowerPoint presentation from the contents, especially using the points that are given in the form of bullets under various headings in the contents.

● The facilitator will take the participants through

○ Idea ↓

○ Topic ↓

○ Problem statement ↓

○ Hypothesis

● At every stage of delivery, ask participants to practically do it that is ask each participant to choose an idea, then to develop a topic out of it, and finally write the problem statement and finally make the hypothesis.

Resources: The content will serve as resource.

5. Summary and Transition

In this session of the module, you have learnt the important components of a research proposal: problem statement, research question, and hypothesis.

6. Assessment

6.1 Exercise 1: Self Test Items

1. Which of the following statements is phrased as a research problem?

The purpose of this study is to determine

a. whether the promotion policy should be changed.

b. the truth of the proposition that American education has encouraged a social class system in the United States.

c. how students can overcome test anxiety.

d. whether there is a difference in the mean gain scores in reading achievement between comparable students taught word attack skills and those taught comprehension skills.

2. The statement of the research problem provides

a. the educational context of the study.

b. the framework for reporting the results.

c. the importance of the study.

d. All of the above are correct.

3. Quantitative problem formulation requires

a. the use of deductive logic for the problem.

b. selection of a construct, variables, and operational definitions.

c. selection of a population and/or sample.

d. All of the above are correct.

4. Quantitative research questions may be phrased to indicate

a. a descriptive study of current status of a group.

b. a relationship study predicting the influence of one variable on another variable.

c. a comparative study between two or more data sets.

d. All of the above are correct.

5. A statement of the expected relationship or difference between two or more variables is called a

a. concept.

b. hypothesis.

c. definition.

d. construct.

6. Which is an *incorrect* statement regarding a research hypothesis? A research hypothesis

a. is supported or not supported.

b. relates variables that can be measured, manipulated, or categorized.

c. is more specific than the problem statement.

d. is the same as a statistical hypothesis.

7. Which of the following criteria for a good research hypothesis is violated most in the following hypothesis: Students in an exploratory vocational educational program will make more contributions to society than those not enrolled in the program.

a. A hypothesis is concise.

b. A hypothesis is worthy of testing.

c. A hypothesis can be stated operationally.

d. A hypothesis is logically precise.

6.2 Exercise 2: Application Problems

Answer the questions for each research problem.

1. The following are examples of research topics. Indicate the decisions necessary in order to conduct the study, and restate each as a useful research question.

a. effects of different ways of learning social studies

b. effects of cooperative versus competitive instruction on attitudes toward learning

c. opinions of parents toward education

d. family characteristics and school attendance

e. validity of WISe for school performance

2. Write a directional hypothesis for the following problem statement, and identify the type of variables in the hypothesis. "Low-achieving students frequently respond positively to behaviour modification programs. Is there any relationship between the type of reward (tangible or intangible) and the amount of learning?"

3. State a hypothesis based on each of the research questions listed below:

a. What is the effect of individualized and structured social studies on high school students?

b. Is there any difference in students' engagement in tasks when a teacher uses a positive introduction and when a teacher uses a neutral introduction to tasks?

c. Does non-promotion of elementary pupils improve their personal adjustment?

d. Do middle school children produce more narratives when taught in an academic teacher's class or when taught in a cognitive-development teacher's class?

e. Do teachers' perceptions of job stress differ among teachers of mildly retarded, moderately retarded, and non-retarded children?

THEME THREE   CONDUCTING A RESEARCH STUDY

Session VIII: Research Ethics (1 hour)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand the ethics involved in conducting research

- recognize the three research ethics concerning the research participants

2. Key Concept and Content

2.1 *Key Concept: Ethics Concerning Research Participants in the Procedure of Data Collection/Fieldwork*

Recognize the three main research ethics related to research participants. In research ethics, you have to follow the application of fundamental ethical principles to a variety of topics in scientific research. Different disciplines and professions have norms for behavior that suit their particular aims and goals. Some of the norms promote the aims of research, such as pursuit of knowledge and truth as well as avoidance of error. The research ethics maintain prohibitions against fabricating, falsifying, or misrepresenting research data. It helps to promote the truth and avoids error. The ethical standards promote the values that are essential to collaborative work, because research often involves a great deal of cooperation and coordination among different participants, disciplines, and institutions. The ethical norms such as patenting policies, data sharing policies, and confidentiality rules in peer review are designed to protect intellectual property interests while encouraging collaboration.

2.2 *Information for Participants*

In context of all research, there is the need for cooperation and collaboration from the participants who may belong to different disciplines and institutions. The first and foremost thing is to seek their cooperation. They have rights and they cannot be forced into participation. It is their voluntary participation that is needed. This will only happen on the assurance of honouring and upholding their rights.

2.3 *Informed Consent*

The second research ethic is to get information from the people, who are going to be your participants. You cannot work with them unless you have their consent. You get their consent by informing them about what you are going to do. You give this information through an informed consent form, which is on the official letter pad and carries the following:

- the purpose of the research

- who you are

- what you are doing

- how long will the participants be involved

- an offer to withdraw from the experiment at any time for any reason

- potential benefits to the individual as well as to society

- potential harm or risks for discomfort to the individual

- an assurance that the results will be kept in strict confidence

- how to get a copy of the results

- how can you be reached should anyone have questions

- a place for the participants to sign to confirm their willingness

Informed consent form is to inform and not to force people into participating.

2.4 *Maintaining Confidentiality*

The third very important research ethic is the participants right of privacy through our assurance of confidentiality. The participants need the assurance that their information will not be made available to anyone who is not directly connected with the research. The information provided by the participants should in no way reveal their identity. This means they will remain anonymous through out the study.

3. Teaching Approaches

The research ethics will be taught by the following method:

- Lecture with a PowerPoint presentation.

● Group discussion on the three research ethics related to the participants

4. Learning Activities

● The facilitator will introduce the theme by brainstorming the term ethics and how it is being used in daily life.

● From the responses, picking out the terms that relate to research ethics.

● Discuss the importance of ethics in conducting research.

● Make a concept map of the three research ethics related to participant information, informed consent and confidentiality

● Discuss the informed consent format.

● Share Resources

● Online Resource: Research Methods: Knowledge Base Online. Available< http://www.socialresearchmethods.net/kb/contents.php

5. Summary and Transition

In this session we have discussed the importance of research ethics in all context of research. Research cannot be conducted unless we ensure collaboration and cooperation of different participants, disciplines, and institutions. The three major ethics principles related to participants information, informed consent and confidentiality were addressed specifically.

6. Assessment

Answer the following questions:

1. How do you observe ethics in your day to day interaction with your colleagues?

2. You want to get information on the students of your class through a survey of their parents' background and socio economic status. How will you get this information? What research ethics related to the participants will you address and how will you deal with it?

Session IX Processing and Analyzing Data (2 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand the concepts of descriptive and inferential statistics

- differentiate between the qualitative and quantitative research

- apply simple procedures of descriptive statistics to a data set

2. Key Concepts and Content

2.1 *Key Concept 1: Data Analysis*

After the data is collected from the participants of the research, there is the need to organize and analyze data into a meaningful form to generate results. Qualitative and quantitative studies follow different procedures for the analysis of data.

2.2 *Key Concept 2: Quantitative and Qualitative Research*

Quantitative research deals with the numbers and the qualitative research deals with the text. Although the qualitative and the quantitative studies share some common feature, they differ in following ways:

Quantitative	Qualitative
●Measures the Quantity	●Measures the Quality
●Deals with the numbers	●Deals with the text, coding and generating the meaning from the text
●Can be conducted in short time span	●Extended over long period of time
●More Objectivity	●More Subjectivity
●Can be restricted to limited variables	●Involves many variables
	●Purposive sampling
●Sample is selected randomly	●Researcher does not have control over variables
●Researcher has control over the variables	
●Results are inferred through hypothesis testing	●Results are based on interpretation of the researcher

2.3 Key Concept 3: Statistical Analysis

The process of compilation and interpretation of quantitative data is called statistical analysis. There are many procedures involved in statistical analysis but the most commonly used procedures are:

- Descriptive Statistics

- Inferential Statistics

2.4 *Key Concept 4: Descriptive Statistics*

Descriptive statistics involve such procedures that are used to describe the data meaningfully and summarize it. The following two types of data are analyzed through descriptive statistics:

- Categorical Data

- Numerical Data

2.5   *Key Concept 5: Categorical Data*

- Categorical data involves categories or groups.

- These can be made without the fear of their order to be disturbed i.e. sex, age, marital status.

- It covers the following topics:

o   Frequency Distribution

o   Graphs

2.6   *Key Concept 6: Frequency Distribution*

It is used to highlight the number or frequency of the occurrence of variables. Look at the following example of frequency distribution:

Example

Make a frequency distribution from these observations:

65, 98, 55, 62, 79, 59, 51, 90, 72, 56, 70, 62, 66, 80, 94, 79, 63, 73, 71, 84

Steps in making a frequency distribution:

1. Arrange the observations in ascending order

    51, 55, 56, 59, 62, 62, 63, 65, 66, 70, 71, 72, 73, 79, 79, 80, 84, 90, 94, 98

2. Estimate "K (number of classes)"

3. K = 2 (if "K" raise to the power) >n

4. So the number of classes will be 5 for example is "5" is raised to the power of 2, it will be (2x2x2x2x2) = 32 which is > number of the observations. If the number of the classes are 50, K will be 6 as (2x2x2x2x2x2) = 64 which is greater than 50 (total number of classes)

5. Determine the size of the classes (how many numbers will be present in one class). It will be done according to the formula which is (maximum number-minimum number/no. of classes)

    (98-51/5 = 9). Each class will be comprises of "9" items

6. So there will be "5" classes based on "9" items

Frequency Distribution of the marks of the 6ᵗʰ grade students in Science

Classes	Frequency	(f)
51-59	IIII	4
60-68	IIII	5
69-77	IIII	4
78-86	IIII	4
87-95	II	2
96-104	I	1
Total		**20**

2.7 *Key Concept 7: Graphs*

A percentage is the absolute figure required to interpret the data. Graphs are used when a large number of data is presented. Following are the important types of graphs i.e. pie charts, bar charts and line graph etc:

2.7.1 **Pie charts**

Pie chart is a circular shape, presenting different percentages. It is also known as the sector graph.

Example:

Percentage of Marks Obtained by a Student in Diffrent Subjects
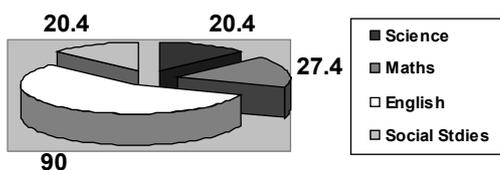
2.7.2 **Bar chart**

Bar chart is a most commonly used type of graphs, in bar chart, the reader can have a quick overview of the data. The data is presented in the form of percentages. You can put one variable on the x-axis or the horizontal axis and the other on y-axis or the vertical axis.

Example:

Comparison of Two Values in Three Years
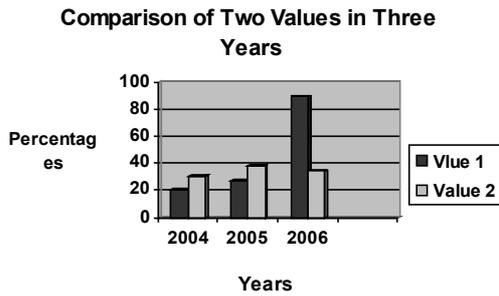
2.7.3 Line graph

Line graphs are used to compare the two or more variables. They have two axes "X axis, which is horizontal" and "Y axis, which is vertical". If you want to show the performance of a student at different times, you will write the time on x-axis and the percentage on y-axis.

Example:
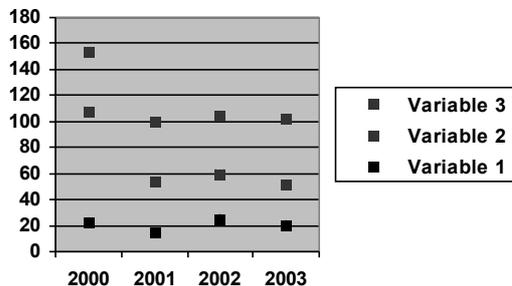
2.8 *Key Concept 8: Numerical Data*

Numerical data involves the numbers and it covers the following categories:

1. Measures of Central Tendency

2. Measures of Dispersion

3. Normal Curve

4. Measures of Relationship

5. Measures of Relative Position

(See **Learning Material for Session IX** for Details)

2.9 *Key Concept 9: Inferential Statistics*

The inferential statistics infer or conclude something through the behaviour of the sample which can be generalized for the entire population. The inferential statistics deal with the following topics:

- Standard Error

- The Null Hypothesis

- The Research Hypothesis

- Test of Significance

- Type I & Type II Errors

- Level of Significance

- Two Tailed and One Tailed Tests

- Degree of Freedom

(See **Learning Material for Session IX** for Details)

3. Teaching Approaches

The content of this session comprises statistical measures, so the following teaching approaches will be used for the delivery of this content:

- The facilitator will first clarify the concepts of the participants through lecturing the differences between descriptive and inferential statistics. PowerPoint presentation can be designed by highlighting the main points.

- The facilitator will use the procedures for descriptive data analysis with the help of given examples in the content or by consulting the material in appendix

- The facilitator will engage participants in activity based group work.

4. Learning Activities

4.1 *Activity Objective*

To enable the participants to apply the knowledge about data analysis

4.2 Activity

After the whole content is delivered through the lecture, the facilitator will arrange a few research articles. Then the groups of the participants will be formed. Articles will be given to the participants and they will be asked to identify the following from research articles:

- The null hypothesis

- The research hypothesis

- Which type of data analysis is used?

- What is the total number of sample?

- Highlight the conclusion of the study about the acceptance or rejection of hypothesis.

- Share the findings with other groups

5. Summary and Transition

Results of the research let the researcher know whether the hypothesis of the study is accepted or not and which variable is affecting the other. If the data is used just to describe the responses of the sample, it comes under the descriptive statistics; if it is further used to draw conclusions about the population it comes under inferential statistics. Both the descriptive and the inferential statistics offer alternatives to the researcher to analyse the results and to draw conclusions. These further help the researcher to certainly conclude that to which extent the results are significant. The session and the learning material will help you further clarify your concepts in a practical way.

6. Assessment

The facilitator will ask the participants to do the following activity for assessment:

Answer the following questions:

1. What is descriptive statistics?

2. What are the important types of categorical data?

3. What are the important types of numerical data?

4. What is the difference between the descriptive and inferential statistics?

Session X: Processing and Analyzing Qualitative Data (1.5 hour)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand the qualitative data analysis process

- use the computer in analyzing the data

2. Key Concept and Content

2.1 *Key Concept: Qualitative Data Analysis*

Following are the most commonly used methods for data collection in qualitative studies:

- Ethnography

- Case Studies

- Document or Content Analysis

- Naturalistic Observation

- Focused Interview

- Phenomenological Studies

- Grounded Theory

Analyzing qualitative data involves the coding of the data and production of a coherent verbal synthesis in the form description. Qualitative data analysis involves the following stages:

2.1.1 Observing the data or noticing

- Writing about happenings

- Taking notes

- Recording interviews

- Gathering documents and reading

- Coding different observations after a deep study of all the collected material.

2.1.2 Classification of the Data

- Selecting the most appropriate material

- Sorting out the connection between facts

- Comparing and contrasting ideas

2.1.3 Analyzing the Data

- Thinking about the Data and focusing on the research question

- Managing the data

- Categorizing the data

- Synthesizing: Making connections within the categories and across the categories

- Linking the ideas

- Making sense of each category

- Inferring the meanings

- Interpreting the meanings and making the discovery about the research question.

2.1.4 Methods for qualitative analysis

Following are the most commonly used methods for qualitative analysis:

- **Typology** – a system for classification or categorization of the data

- **Taxonomy**- a system of classification or categorization as typology but it involves higher and lower levels

- **Constant Comparison/Grounded Theory**- deeply studying the collected data, coding the data and finding the differences and similarities among the codes (Coding can be done with the help of the computer)

- **Analytic Induction**- Using inductive approach, compare the gathered material, and compare it with the hypothesis. If it fits the hypothesis, accept it otherwise revise the hypothesis.

- **Logical Analysis/Matrix Analysis**: Giving logical reasoning to present some concepts. Information and the concepts can be visualized also.

- **Quasi-statistics**: In observation checklists or the field notes, counting the number of occurrence of some variable or making its frequency.

- **Event Analysis/Microanalysis**: Analysing the events by separating different events from one another.

- **Metaphorical Analysis**: Using metaphors to analyse the observed facts and finding the similarities between them. Try on various metaphors and see how well they fit what is observed.

- **Domain Analysis**: Interpretation and analysis of social situations to find out semantic relationship among entities.

- **Hermeneutical Analysis**: Making meanings and interpretations from the written text not in its real meanings but how people perceive it in some situation.

- **Discourse Analysis**: Doing linguistic analysis of the situation not by some individual but among different people within a flow of communication.

- **Semiotics**: Finding out the meanings from the language of signs and symbols.

- **Document/Content Analysis**: Reading the written materials or the documents to find out the meaning and interpret them.

- **Phenomenology/Heuristic Analysis**: Analysing the individual experiences not the shared one.

2.2 *The Use of Computer software in Data Analysis*

2.2.1 Use of SPSS

Statistical Package for Social Sciences (SPSS) is software, which provides a wide range of statistical analysis applications to its user. Any type of quantitative and qualitative analysis can be done through this software.

For quantitative researches, it offers the following statistical analyses techniques:

- Chi-Square test

- T-test

- Spearman and Pearson Correlation

- One-way ANOVA (Lessons attached in Appendix)

For qualitative research, computer does not perform the conceptual tasks such as synthesizing ideas, analyzing, and testing hypothesis, but it performs mechanical tasks as follows:

- AskSam

- NUD*IST

(See **Learning Material for Session X** for Details)

3. Teaching Approaches

The session content will be delivered through:

- Lecture based on PowerPoint presentations which comprise the main points

- Computer based activities using SPSS

4. Learning Activities

4.1 Activity Objective

To enable the participants to apply the knowledge learned in the session practically.

4.2 Activity 1

After the lecture, the facilitator will arrange some research articles based on qualitative research and ask the participants to do the following:

Identify from the article:

- Issues about which the research is conducted.

_____

_____

- Methods of the data collection.

_____

_____

- Techniques for the data analysis which have been used in that research.

_____

_____

4.3 Activity 2

The facilitator will take the participants to computer lab and use the computer for data analysis with the help of the material given in the learning material.

5. Summary and Transition

In this session you have learned about the procedure for qualitative data analysis. This material opens a new way for you to consult more readings and books to get expertise in qualitative data analysis. In modern times, the computer is facilitating the researcher and makes it easy to analyse the data using different types of software. This introductory material can help you in learning deeper concepts of data analysis.

6. Assessment

The assessment of this session will be based on participants' performance of assigned tasks on computer.

THEME FOUR   RESEARCH WRITING

Session XI: Academic Research Writing (1.5 hours)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- understand the issues of intellectual property

- document your research

2. Key Concepts and Content

2.1   *Ethical Issues Concerning Research Writing: What Constitutes Intellectual Property?*

In the research ethics, you have to follow the application of fundamental ethical principles to a variety of topics including a scientific research. Different disciplines and professions have norms for behaviour that suit their particular aims and goals. Some of the norms promote the aims of research, such as knowledge, truth, and avoidance of error. The research ethics maintain prohibitions against fabricating, falsifying, or misrepresenting research data. It helps to promote the truth and avoids error. The ethical standards promote the values that are essential to collaborative work, because research often involves a great deal of cooperation and coordination among different discipline and institutions. The ethical norms such as patenting policies, data sharing policies, and confidentiality rules in peer review are designed to protect intellectual property interests while encouraging collaboration

2.1.1   Key Concept 1: Plagiarism

Plagiarism refers to copying other's work. Plagiarism is an act of fraud. It includes:

- stealing and passing off others ideas and words as your own;

- using other's production without crediting the source; or

- giving incorrect information about the source of a quotation.

- Following are some of the ways of plagiarism:

- Deliberate miscues: providing inaccurate information regarding the sources making it impossible to find them.

- Accidental plagiarism: where students do not understand what document is and how to do it

- Intentional plagiarism: i.e., cutting/pasting, or presenting other's work as their own.

2.1.2 How to avoid plagiarism?

Most cases of plagiarism can be avoided by:

- citing the proper sources and acknowledging the original material.

- providing the sustainable model developed by the institutions in order to detect and prevent plagiarism.

- teaching students about plagiarism and how to avoid it helps to minimize plagiarism.

- creating a culture of research rather than detecting and punishing for plagiarism.

- introducing laws against plagiarism.

Activities

- Provide instruction and resources that teach students the skills of paraphrasing, summarizing, critical analysis, etc.

- Direct students to reference and guidelines relevant to their area of research.

- Make the task so specific that students are unable to simply download from the web, or copy from the book.

- Ask students to relate particular theories, concepts, issues in current newspaper articles.

- Get students to integrate theory and experience (e.g., field trips, practicum, and reflective writings).

- Critically analyse the given articles.

- Ask students to regularly hand in samples of their classroom notes and use these to give them feedback on their identification of key issues and their integration of these into their work.

- Ask students to keep a logbook of their learning throughout the project/thesis.

2.1.3 Key Concept 2: Ethics of research

A few other research ethics are described below:

Honesty: It includes reporting of the data, results, methods, procedures and publication of data.

Objectivity: It strives to avoid bias in experimental design, data analysis and interpretation, peer review, personal decisions, grant writing and expert testimony etc.

Carefulness: It is important to avoid careless errors and negligence and to critically and carefully examine the research work.

2.1.4 Key Concept 3: Intellectual property rights

Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, method or results without permission. Give proper acknowledgement.

2.2 Referencing

You have learned how to conduct the research. Now you are at a stage to present your research. This section of the module is based on writing of research report and the essentials of a good research report.

2.3 *Documenting Research*

Once your research proposal has been approved and you have started doing the practical research, the question of documenting or writing it starts appearing as a threat. Writing of academic research demands a lot of homework. Without ensuring the availability of required materials, texts, data etc., if you would plunge into the deep sea of academic research writing, your survival would be quite doubtful. So, to learn a few swimming strokes before plunging into the sea is a good idea. However, you also need to be careful about what Bodgan and Biklen (1982) assert:

> Novice writers are big procrastinators. They find countless reasons not to get started. Even when they finally get themselves seated at their desks, they always seem to find diversions: make the coffee, sharpen the pencil, go to the bathroom, thumb through more literature, sometimes even get up and return to the field. Remember that you are never 'ready' to write; writing is something you must make conscious decision to do and then discipline yourself to follow through.

(Bodgan and Biklen, 1982: 172)

When you sit to start writing an academic research work, remind yourself that unlike in creative writing, you cannot enjoy the freedom of making partial judgments, passing subjective comments, giving sweeping, and generalized statements. Academic research writing is a very methodical and controlled process. It involves more clarity of mind as well as a more systematic approach towards the writing process itself. As an academic research writer you need to be conscious and cautious that

1. You are systematic
2. You are logical
3. You authenticate what you say
4. You synthesize materials, citations, examples etc.

Research writing, be it a report or a dissertation, calls for self- discipline and self-control. According to Bell (1999: p199-200) it will be crucial for you as an academic research writer to:

- Set deadlines

- Write regularly

- Create a rhythm of work

- Write up a section as soon as it is ready

- Stop at a point from which it is easy to resume writing

- Leave space for revisions

- Publicize your plans

2.4 *Standard Report Format*

There can be slight variations as per institutional needs, or as per field or area of research, however, generally and broadly speaking you would follow the same outline and format. Following is a general basic format for the writing of academic research:

1: Introduction

    1.1 Background

    1.2 Identification of the Problem/ Research Problem

    1.3 Significance of the Research

    1.4 Hypothesis

    1.5 Aims / Objectives

    1.6 Delimitation

        1.6.1 Scope/Range in Time and Space

        1.6.2 Population/Sample

        1.6.3 A Specific Class, Group, Gender, Age etc.

2: Literature Review

3: Research Methodology

    3.1 Population and Sample

    3.2 Instruments of Data Collection

Tests/ Questionnaires/ Interviews etc.

4: Data Presentation and Analysis

      4.1 Presentation and analysis

      4.2 Tabulation etc.

5: Conclusion

      5.1 Suggestions

      5.2 Recommendations

      5.3 Lesson Plans

      5.4 Other Alternatives

6: References and Bibliography

(Note: Apart from these sections/chapters, at the out set of your work you would give the **Title Page, Acknowledgements, Contents,** and **Abstract**.)

2.4.1 Introduction

The introduction section is important as it provides the reader of your research with the basic information about your research work. It serves as an underpinning for the whole work. Clarity of thought should be clearly reflected at this stage through the problem statement, research question/s, hypothesis, and aims and purpose of the study. Do not forget to draw attention to any limitations of your study at this stage. It is not possible that a small study would cover everything; so it is better to make the reader conscious of this fact.

2.4.2 Literature review

Make sure your proposal has a comprehensive review of the literature included. See the session on "Literature Review" for guidance. If while reading the material, you have sorted it out and recorded under various headings, at the writing stage, you will be able to work faster and better.

2.4.3 Research methodology

This section explains how the problem was investigated and why particular methods and techniques were used. The population and sample of the research should be clearly stated. Choice of variables should be manifest. Instruments of data collection such as tests/ questionnaires/ interviews etc. should be mentioned. Also, the reason and justification for choosing these instruments should be given. All important terms used in the research work should be defined precisely at this stage.

It is important to provide a complete list of every source that you have used in you research. It provides the information necessary for a reader to locate and retrieve any sources cited in your research. Use of references allows readers to cross-reference your sources easily, and it provides a consistent format to writing. It also gives you credibility as a writer, and protects you from plagiarism. Cross-referencing allows the readers to locate the publication information of source material. This is of great value for researchers who may want to locate your sources for their own research projects. Use a consistent format of citations and referencing. Using a consistent format helps your reader understand your arguments and the sources they're built on. It also helps you keep track of your sources as you build arguments.

2.4.4 Data presentation and analysis

For guidance see the section on 'Data Analysis'.

2.4.5 Conclusion

The conclusion of your research deals with the summary of findings of your research. If the nature of the research requires any suggestions, recommendations, lesson plans etc. you can give at this stage.

2.4.6 Bibliography

The purpose of a bibliography is to authenticate your work. You should be clear about the difference in:

- Endnotes

- References

- Bibliography

Also make yourself familiar to what are different styles of citation and references. The most common ones are:

- APA (American Psychologists Association)

- MLA (Modern languages Association)

2.4.7 Referencing

There are formal accepted ways of referencing, such as the APA Format of Referencing. Examples of how to use APA format are as follows:

Book reference

Rosenthal, R. (1987) *Meta-analytic procedures for social research*. New York: McGraw-Hill.

Article reference

Mellers, B.A. (2000) Choice and the relative pleasure of consequences. *Psychological Bulletin*, *126*, 910-924.

Daily newspaper article

Schwartz, J. (1993, September 30) Obesity affects economic, social status. *The Washington Post*, p. A1, A4.

Encyclopaedia or dictionary

Sadie, S. (Ed.) (1980) *The new Grove dictionary of music and musicians* (6th ed., Vols. 1-20). London: Macmillan

Reference from book reviews

Kraus, S. J. (1992) Visions of psychology: A video of classic studies [Review of the motion picture Discovering Psychology]. *Contemporary Psychology, 37*, 1146-1147.

Motion picture

Scorese, M. (Producer), & Longern, K. (Writer/Director) (2000)

You can count on me [motion picture] United States: Paramount Pictures.

Reference from Internet

Fredrickson, B. L. (2000, March 7) Cultivating positive emotions to optimize health and well-being. Retrieved November 20, 2000 from http:// journals. Apa. Org/ prevention/volume3/pre0030001a.html

(Note: For further clarity consult APA 5th Edition).

2.5 *Academic Writing for other Purposes*

Material is provided in the **Learning Material for Session XI** and can be used if required. (Optional)

3. Teaching Approaches

The content of this session will be delivered through:

- Lectures based on PowerPoint presentations highlighting the main points of writing the research

- Participant discussions

4. Learning Activities

4.1 Activity

Deliver the lecture first. Almost all the content need to be shifted to the PowerPoint. Specially, the parts of contents that are given in bullets are to be used on PowerPoint. The facilitator would generate discussions based on these contents.

After the lecture, give the participants an activity. To practice in 'in-text citation' and 'reference writing', provide the participants some books, journals, and magazines. Ask them to cite one direct and one indirect quote from them. Then ask them to write reference of the source.

4.2 Resources

(See **Learning Material for Session XI** for Details)

The content will serve as resources

5. Summary and Transition

This session provides you an introductory material on research writing. You can consult some other books or writing material to have a more clear idea about some other forms of academic writing as this material provides you a basis for attaining further knowledge.

6. Assessment

6.1 Exercise 1

Write references following APA/ MLA or any other authentic standard reference format.

1:

Writer- Spitzer, L.,

Year of publication-2000,

Chapter- The Individual Factors in Linguistic Innovations,

Book- Routledge Language and Culture Theory Reader

Editor- L. Burke, T. Crowley, and A. Girvin,

Press- Routledge,

Place- London.

2:

Writer- Spolsky, B.

Year of publication-1998,

Book- *Sociolinguistics*

Press- Oxford University Press

Place- Oxford,

3:

Writer- Richards, Jack. C.

Year of publication 1974

Book- *Error Analysis: Perspectives on Second Language Acquisition*

Press- Longman

Place- London

6.2 *Exercise 2*

Q 1: How would you write the reference of the material that you have taken from television? Give one example according to MLA format.

Q 2: How would you write the reference of the material you have taken from an unpublished thesis? Give one example according to the APA format.

THEME FIVE   SUPERVISING ACADEMIC RESEARCH

Session XII: Academic Supervision (1.5 hour)

1. Session Learning Outcomes

After the completion of this session, the participants will be able to:

- perform your role as a supervisor at three stages: before the research, during the research and the writing stage.

- sensitize the supervisees to the expected role.

2. Key Concepts and Content

Generally, the higher education institutions are engaged in performing three functions: teaching, research and administration. Recently with the strong push of the Higher Education Commission a lot of universities and Degree Awarding Colleges in Pakistan have made research a mandatory part of qualifying for a degree at both the undergraduate and graduate level. A research culture is beginning to evolve among academic community. This has given rise to a number of queries and quandaries about the process of supervision and the roles of the supervisor and supervisee. This part of the module will deal with these issues. We will also briefly discuss the place of research in one's own career.

2.1 *Key Concept 1: the Role of the Supervisor*

Most supervisors learn how to supervise by trial and error. Sometimes the junior faculty gets the opportunity to observe the senior faculty and they can be taken as apprentices in joint supervision arrangements. This helps the junior faculty to learn the rules of the game before being thrown into the deep end. Some institutions are following these practices. This intellectual support can create a critical mass of researchers who can ably supervise valuable research.

The role of the supervisor can be divided into three stages:

1. Selection of the topic (before the research has begun)
2. During the research
3. At the writing stage

Now we will discuss each in some detail.

2.1.1 Selection of the topic

The importance of a suitable research topic for the timely and successful completion of research thesis is self-evident. The supervisors can guide the students in choosing a topic by:

- Discussing with the students areas of general interest.

- Asking the students to read theses and dissertations in the field to get ideas.

- Asking students to read articles in journals and books and book reviews.

It is recommended that a topic be selected after negotiation and interaction between the supervisor and the student, based on the interest of the student and expertise of the supervisor.

Before the topic is finalized the supervisors need to consider the feasibility of the completion of the research in the given time frame. They need to ensure that adequate resources are available and the student can access them for carrying out the research. Students need to know if any ethical issues are involved and if they need to get clearance from the relevant authorities/bodies to collect data. Supervisors can facilitate them in getting institutional support for this purpose.

The supervisors should discuss with the students the value of the research, whether the findings will extend the knowledge in the field or have practical implications. The scope of the research should also be considered in terms of its suitability for the degree. (Moses, 1995)

Sometimes the research topic requires the students to learn some special skills like learning to work with a new software or language. The supervisors should take account of these pre-requisites and consider if this is possible in the given time frame. The enthusiasm of the student cannot overcome the time constraint.

2.1.2 During the Research

The supervisor should guide the student in choosing a theoretical frame of reference that is most appropriate. Sometimes this requires acting just as a sounding board and sometimes a gentle nudge is needed to move the student in a particular direction. The rapport between the supervisor and the student can help in determining what strategy is

required at what time. Supervisors can refer the students to relevant sources including people.

A structured program of progress needs to be maintained. This is to oversee if deadlines are being met and the time management is satisfactory. Initially a weekly meeting of half an hour at undergraduate and graduate level research is adequate. This frequency can be reduced as students gain confidence in doing their work. However, a fortnightly meeting is still advisable to maintain a smooth pace. The supervisor should provide timely information to the student if a scheduled meeting is to be postponed, delayed or cancelled. The new meeting schedule should be negotiated explicitly. This structured meeting pattern would facilitate both the supervisor and the student. This does not mean that the supervisors should not be available for the students for problem-solving at other times. They should be generally available for brief sessions but have a contract for detailed meetings. Nowadays the email is one mode of communication that provides ready access. This may be used if face to face impromptu meetings are difficult to manage. Some sort of notes should be maintained of each meeting.

Supervisors should guard against too much control. Let the students come up with queries; assist them in finding solutions or answers. Recommend readings and discuss them. Keen research students are usually future colleagues. Encourage them to become a part of the academic community by attending/ presenting at colloquia/seminars/conferences. Make them a part of a research group if it exists.

2.1.3 At the writing stage

Encourage the students to start writing at an early stage. Give rapid feedback on written work. Persuade them to follow the standard format of thesis writing as required by their institution. Make sure that the discourse conventions of academic writing are being followed. This is possible when the initial drafts give critical feedback regarding style, structure, argument, analysis, etc.

The supervisors need to ensure that the language is of high academic standing. Assessing the overall coherence and logic in the structure of the thesis is also the responsibility of the supervisors. Students tend to get enthusiastic about issues that are not

directly related to their main argument. Supervisors need to see that they keep on track and do not digress from their research question.

Redrafting and revision of writing should not be considered as negative endeavour. Rather it should be treated as polishing of the product. The supervisors may have seen and commented on parts of the thesis at different times but they need to see the completed draft for final criticism. This has to done well in advance of the date of submission of the thesis to incorporate any changes that are required. (Moses, 1992)

So far we have talked about the role of the supervisors. We also need to consider the role of the students or supervisees.

2.2 *Key Concept 2: Role of the Supervisees*

The students need to choose a supervisor who is easily accessible and is related to their field. If they are part of an institution they would be familiar with the area of expertise of their teachers. They should choose judiciously according to the academic standing of the supervisor and not based on the ease of manner of the person. In our situation an academic on the list of HEC recognized supervisors is a recommendation of academic worth of the person.

Doing research is an intense and lonely experience. Support, both emotional and academic, is needed from the supervisor. But self-reliance is also very important. Supervisor may help to locate the signposts but the supervisee has to travel down the road. This becomes easier by following the guidelines and schedules set up with the supervisor. Any deviance has to be duly reported and negotiated. Tasks set have to be completed within the given time frame.

It is important that you deal with the feedback from the supervisor in a calm and professional manner. Usually when students get a lot of comments on their written work for the supervisor, they feel frustrated and devastated. They need to know that a lot of time has been spent by an expert in the field to give the comments. Look at them positively and not personally and start redrafting (O'Leary, 2004). Bell (1999) has emphasized the need for redrafting and rewriting in writing research. 'No one, however gifted, can make a passable first draft. Writing means rewriting' (Barzun and Graff, 1977: 31).

If the scheduled meetings with the supervisor are repeatedly cancelled and new times not set up, the matter becomes sticky. In such a situation you need to consult the

thesis/research committee or advisor. Maybe the head of the department can sort out the situation. You need to bring the matter to the attention of the authorities as it may lead to a delay in the completion of the thesis.

In case of conflict of interest between the supervisor and the supervisee, the best course is to request for a change of supervisors '… even at a late stage, or to supplement with a second supervisor, rather than getting into complex interpersonal engagement …' (Leonard, 2001: 243). However, this step should only be taken if all attempts at negotiation and positive interaction have proved futile. It is a course of action that should be avoided at the best.

2.3 *Key Concept 3: The Viva/Thesis Defense*

Research, its documentation and writing up is a complex and extended process. Its culmination is the external evaluation and interview or the viva voce (by word of mouth). 'It is a pretty daunting experience but also often stimulating, interesting and, in retrospect, enjoyable' (Leonard, 2001: 249). However, most of the students are quite unsure about what to expect and what to provide in the viva. The textbooks usually deal with how to prepare for the viva but have no clues about the event itself. So familiarize yourself with the routine of viva in your department. If possible attend a viva as an observer so that you can understand the practice. If this is not possible ask the recent graduates to get an idea. However, each viva is a unique experience in itself and the stories of others should neither demoralize you nor make you think that it is a walkover.

Read your thesis thoroughly before the viva. Discuss any points that you are under-confident about with your supervisor. Your external examiners would have read your thesis with care. They would ask you questions about your research, your methodology, the contribution of the research in the existing pool of knowledge and how or where you will publish it. Think about your responses. Structure your views carefully. Listen to the questions carefully before responding. Do not hesitate to request for a repetition if you have not understood clearly. Try not to get into a confrontational mode and do not be over-assertive. Defend your ideas without getting defensive. Do not give very long answers that push the examiners to interrupt. If you get rattled then admit that you are nervous and take a deep breath to compose yourself. If you do not know the answers to a question then do not bluff. Admit your ignorance and assure that you will read the related literature to get

the required information. If you cannot answer all the questions brilliantly do not fret as long as you have answered adequately. Sometimes the objections of the examiners on your work can be adequately explained during the viva so that they revise their opinion or ask you to add the verbal explanation to your written work. (We have added a chapter on this aspect in the reading package for detailed information.)

Best of luck with your viva.

2.4   *Place of Research in One's Own Career*

Research culture is beginning to evolve in our academic community. Teachers, especially in universities, know that career advancement and professional development are linked to research and its publication. 'Research and research reputation bestow peer recognition within the disciplinary field, both nationally and internationally'. It is important that we provide our teachers with adequate research training so that they can then create research projects that will not only bring name and fame to their institution but also funding. Collaborative research[1] projects can be generated in departments where senior teachers take the young faculty under their wing and introduce them to the network of scholars working in the same or similar fields. This would prepare them to be independent researchers who can then apply for research grants using the same skills. This academic activity is highly valued by the faculty and the administrators.

These are extrinsic reasons for pursuing research. However, for a lot of academics, research is an intrinsically valued activity.

- Curiosity-driven research is stimulating and highly satisfying.

- Being able to add to knowledge building and meaning making, being part of a community of scholars, locally, nationally and internationally is rewarding.

- Applied research, which contributes to solve social, industrial, environmental or economic problems, is most satisfying.

- For many academics conducting research is also a form of self-development: they remain intellectually alive and stay at the cutting edge of research through their reading. Such academics are usually better teachers and colleagues.

---

[1] This is a genre that needs to be studied carefully so as not to infringe the intellectual and other property rights of any participant.

Within universities, research is supported through an organizational infrastructure that may have a research office to accept applications and disburse research grants obtained form different sources. These offices should also disseminate information about publishing research in recognized journals of established academic standing. We need to inculcate this research culture in our academia to compete successfully in a world where information is available at our fingertips through the Internet.

In our academic environment conference culture is now becoming common. Academics are beginning to understand the importance of attending and participating in conferences. However, mostly papers that are presented at conferences sometimes become a part of conference proceedings (if there is budget for printing) or they just fizzle out after presentation. Experience shows that after sending the abstract, a rough draft of the paper is sent and a good presentation prepared for participating in the conference. This presentation then never gets translated into a document that fulfils the criteria for publication in a journal of good academic standing.

This was a little spiel to make you think carefully about your career and locate a place for research in it.

2.5 Key Concept 4: Publication

Usually the end of the viva is devoted to discussion about publication of the research. It is a moot question. Science students usually have the opportunity to publish as a team by the time they are in a position to defend their research. However, social sciences have fewer opportunities of doing so. But when you are writing up your research you should be thinking about publication as well. Ask you supervisor and even your external examiners about adequate sources that may be explored for publication. Publication is important as:

- Publication contributes to the scholarly literature in the field. All the reasons that are given for the place of research in your career apply here.

- It reaches a wide international audience.

- It identifies your area of research and facilitates contact with other professionals.

- Establishes academic credibility as thinkers and not retailers of others ideas

- Enhances your academic reputation, that of your department and of your organization.

- Publication in journals is economical

- Publication is FUN.

Just a word of caution here! Publication in a good journal is not an overnight process. It can take up to a couple of years to get published. The article/paper is sent for a blind review to the referees who give their comments. These comments are communicated to the writer for incorporation. The revised article is again reviewed and then sent to the press if all is as it should be.

2.6 *Ethics of Responsible Publications*

Plagiarism is a plague that we have to guard against. Published work assumes authenticity therefore it should be undertaken with a sense of responsibility. This requires that:

- All research and its publication should conform to accepted ethical standards.

- Plagiarism is illegal and breach of the copyright laws.

- All sources have to be acknowledged.

- Minimum requirement for authorship is participation in conceiving, executing or interpreting at least part of the research reported. Due recognition should be given to it.

- Publication of the multiple papers based on the same set(s) or sub-set(s) of data is improper unless fully cross-referenced.

- Some disciplines have special needs of research e.g animal and human experimentation. Should go through the Ethics Committee.

3. Teaching Approaches

- Lecture with PPT presentation

- Discussion

- Role Play

4. Learning Activities

4.1 Activities

- The facilitator will brain storm the terms supervisor and supervisee

- Write on board the roles under both the terms evolving from the brain storm session.

- Introduce the role of supervisor under three stages

- Do the role play of the three stages with the two participants as Supervisor and supervisee.

4.2 Resources:

- Content will serve as resource

- Book on Supervisor's role

5. Summary and Transition

In this session we have discussed issues related to academic supervision and what follows from it. The role of the supervisor is important not only during the research but also during the viva and after it.

6. Assessment

Answer the following questions:

1. What is role of the supervisor in the selection of a topic?
2. What kind of feedback is required on the drafts given by the students?
3. Though we have not talked about it, what are the advantages or disadvantages of joint supervision?

4. What would you describe as a good viva?

5. What is the importance of publication of research in the career of an academic?

   What is role of the supervisor in the selection of a topic?

D. Materials

D.1   Learning Material of Session V

1)   Activities

Activity 1

The facilitator will arrange some sample questionnaires. Then the participants will be divided into different groups. Each group will be a given a questionnaire and the groups will be asked to answer the following questions:

● What is the questionnaire about?

_____

_____

_____

● Write down your opinion about the items and construction of the questionnaire, is it well constructed or not? Support your response with arguments.

_____

_____

_____

● Do you want to give any suggestion regarding the further improvement of the questionnaire?

_____

_____

_____

Activity 2

The facilitator will give the participants the issue, "Curriculum of English Language for":

● Primary Level

● Secondary Level

● Undergraduate Level

In the next step, the participants will be asked to select one issue from the above issues and plan for an Interview. The interview will be conducted in groups. The groups will be comprised of three members. One person will perform the roles of the Interviewer, the Interviewee and the Observer. The facilitator will give 20 minutes to the participants to conduct the interview and then 10 minutes to share the findings. Before conducting the interview, the participants will be asked to do the following:

● Decide who will be the interviewee?

_____

_____

● Decide the type of Interview (one to one, Group interview, Focus Group)

_____

_____

● Decide the method (face to face, telephonic, electronic)

_____

_____

● Prepare the structure/outline for the interview

_____

_____

● Write down the method for keeping the record of the respondents' words

_____

_____

● Prepare 4-5 sample questions and conduct a role play in the group of two members

_____

_____

Activity 3

The facilitator will ask the participants to do the following:

Review what you have learned about the observational checklists and do the following:

- Consult the recommended books and search for the observational checklists

- If you are going to observe the students during microteaching, how will you prepare a checklist for it?

Resources： (See **Learning Material for Session V** for Details)

2) Questionnaire and Interview

2.1) **Example of a Questionnaire**

Imagine that you had to explain what a good citizen is or what a good citizen ought to do. Please read each sentence, then put a tick (√) under the heading 'Good Citizen' if that is what you mean by a good citizen. If the sentence does NOT help to explain what you mean by a good citizen, put a tick under 'Other' if you are not sure, put a tick under the question-mark (?)

A GOOD CITIZEN:		Good Citizen	?	Other
1.	Obeys the law			
2.	Is always Polite			
3.	Loves his /her parents			
4.	Votes in every election			
5.	Is loyal to his / her family			
6.	Goes to church regularly			

7.	Is loyal to his /her country			
8.	Cares about other people's troubles			
9.	Is good at sports			
10.	Takes an interest in the way the country is run			
11.	Works hard			
12.	Joins a political party			
13.	Knows a good deal about how our tax money is spent			
14.	Has good table manners			
15.	Studies hard to pass an examination			

16.	Pays his/her taxes regularly			
17.	Minds his / her own business			
18.	Keeps up with what is happening in the world			
19.	Tries to change things in the government			
20.	Gets other people to vote in elections			

2.2) **Some other Important Points in Constructing the Questionnaires and Planning for the Interview**

Questionnaires: Dos and Don'ts

- Take consent from the author of the questionnaire in case of using standardized questionnaires.

- A research questionnaire must be different from the questionnaire of a marketing product or the term paper.

- Ask direct questions about the point concerned in the research.

- Directions about how to answer the questions must be provided.

- Questions should be in easy and understandable language.

- Give examples to answer the questions while necessary.

- Piloting is necessary.

- Pre-coded answers should be prepared in case of close-ended questions.

- Provide the coding boxes so that the respondents can be aware of what they are answering.

- Questionnaire must accompany the cover letter.

Interview: Dos and Don'ts

- Interview should be planned in selection of:

o   topics

o   respondents

o   place

o   time for the interview

o   questions to be asked

- Interviewer must have the complete list of the respondents, with their addresses and other contact details.

- Decide the type of the interview (face to face, electronic, telephonic or focus group).

- Decide the method for recording the interview (field notes, tape/video recording or any other).

- Data is based on emotions, experiences and feelings, so it is necessary to take record of each.

- Questions should be well prepared before taking the interview.

- Do not behave in a threatening way.

- Practice to ask the questions before the actual interview session.

Questions and the interviews share some common features and these are almost similar because both involve taking people's opinion about different issues. Common features are as follows:

> ### *Common features of Interview and the Questionnaires*
>
> - Consent to take part in the study
>
> - Make the sample aware of the research purpose
>
> - Objectives of the research must be kept in mind
>
> - Confidentiality of participants' words
>
> - Your purpose is to get information, but not to provide information
>
> - Should not be very lengthy
>
> - Unbiased approaches
>
> - Brief questions
>
> - Easily scoreable coding

Question Formats

Following are the different types of questions, which can be included in interviews and questions:

- Direct questions may be asked with one appropriate answer.

- Questions may be asked indirectly.

- Statements can be given with which the respondent can agree or disagree.

- Questions about the facts can be asked, which the respondent answers according to his/her experience.

- Questions to take the opinions or the preferences of the respondents about some objects.

- Predetermined questions can be asked in which the respondent is supposed to answer each and every question.

- Response Keyed are also a type of questions in which the respondent is allowed to skip some questions which does to apply to him/her.

3) Scales for Measurement

3.1) Nominal Scale

- The term means "to name".

- The categories differ in quality rather that quantity.

- Each value belongs to only its own category but can be more than or less than the other.

- Nominal scales are based on categories which must be mutually exclusive, exhaustive and uni-dimensional.

- Most elaborating scale.

- There is no chance of addition, multiplication, subtraction or other mathematical operations with the categories

- It provides the ratio or the frequency and provides the definite information.

- Can be used to measure gender, or preferences of respondents.

Discipline:	Gender:
☐ Arts	☐ Male
☐ Humanities	☐ Female
☐ Pure Sciences	
☐ Social Sciences	

3.2) Ordinal Scale

- The term means "to order".

- In ordinal scale, the data is organized in some order (high-low or low-high).

- This scale does not specify how much different the categories are from each other.

- Categories can be presented in the form of a continuum.

- Categories are given in a logical or a rank order

- Height, weight, income and the ranks can be measured.

> **Your income is:**
>
> □ Below 30,000
>
> □ 30,100 to 50,000
>
> □ 50,100 and above

3.3) Interval Scale

- Interval scale is used to tell the order of the objects.

- It tells how much distant the categories are from each other.

- All types of mathematical operations can be performed on this data.

- Rating scales are considered the interval scales also.

- The difference between the ages of people can be identified with the help of this scale.

> **Kindly mention the number of employees at your organization from year 1997 to 2001:**
>
> | Year | Number of Employees |
> |------|---------------------|
> | 1997 | |
> | 1998 | |
> | 1999 | |
> | 2000 | |
> | 2001 | |

3.4) Ratio Scale

- Ratio scale is a scale with true value "0".

- Used to get quantitative data.

- Salary, quantities purchased and market share are all expressed on a ratio scale.

- Most sophisticated scale of all.

3.5) Likert Scale

- A uni-dimensional scale usually with five points.

- All the points have equal interval between each other.

- Records the agreement or disagreement of respondent about some particular variable.

- Options are pre-coded.

- Options are: Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree.

3.6) Rating Scales

- A scale used in observational studies.

- It is used to record the behavior or activity of the respondents.

- Descriptive statements are used with infinite points on a line.

- Point or line to record the behaviour is termed as rater.

- Can be subjected to human error.

Rating Scale
___5___,   ___4___,   ___3___,   ___2___,   ___ 1___
Students used   Students did not use
teaching aids   teaching aids
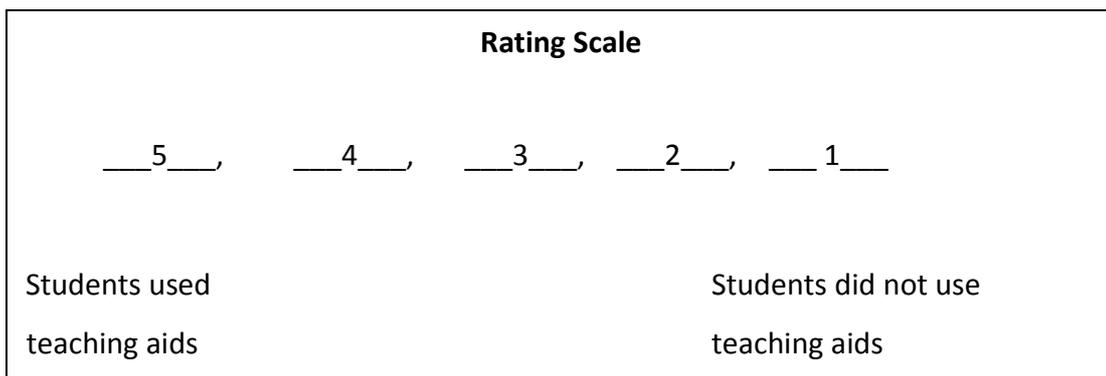
D.2 Learning Material of Session VI

1) **Probability Sampling Techniques**

   1.1) Simple Random Sampling

   In simple random sampling:

   ● Chance for every member of the population to be included in the sample is equal and independent.

   ● Chance of researcher's own bias is nowhere.

   Procedure of Simple Random Sampling:

   ● Need for sampling frame, which contains information about each individual of the population.

   ● Using the table of random numbers so that the numbers may be assigned to the population.

   ● Numbers in the table must be according to the population size (i.e. if total population is 1,000, the directory must be comprised of the numbers from 0000 to 0999).

   In the following figure, you can see some random numbers. These numbers can be assigned to every member in the population. The researcher can select any number randomly, and the person corresponding to that number will be selected in sample.

Example:		
Table of Random Numbers		
0371	0632	0845
0862	0539	0206
0932	0761	0937
0865	0903	0438

1.2)   Stratified Sampling

In stratified sampling:

- Sample is not selected directly from the population.

- Population is divided into subgroups, referred to as strata.

- Sample is selected from these strata, proportionally.

- Proportions are prior set by the researcher.

1.3)   Cluster Sampling

Cluster sampling:

- is the Identification and study of the sample in the form of groups.

- is done when the researcher cannot find the required sample due to some specific reason.

- So, it involves identifying groups and studying them.

1.4)   Systematic Sampling

In systematic sampling:

- Sample is selected with the help of sampling frame or the list containing information about each and every member of the population.

- The kth number is determined.

1.5)   Procedure for Determining Kth Number

- For determining the kth number, the total number of population (N) is divided by the desired number of sample (n) and the value is determined as the kth number.

- Then every kth number from the list is included in the sample.

Look at the procedure to determine the kth number in the following example:

Example:

Procedure for Determining Kth number

Total No. of Population (N) = 1000

Desired Sample (n) = 200

K = 1000/200 = (N/n) = 5

*K*th number = 5

In the above example, "5" is the *K*th number, so in the list of population, every 5th number will be included in the sample. Look at the following example:

Example:

List of the Names in Population

1. A	7. G	13. M
2. B	8. H	14. N
3. C	9. I	15. O
4. D	10. J	16. P
5. E	11. K	17. Q
6. F	12. L	18. R

2) Non Probability Sampling Techniques

2.1) Purposive Sampling

- In purposive sampling, the researcher includes the people in sample according to his/her own choice

- It is called Judgment Sampling also.

2.2) Quota Sampling

- Quota sampling is used in face to face interviews

- The researcher fixes a quota and then according to that quota the sample is selected.

Example:

- See if you are going to compare the status of educated and non educated individuals in a society, you identify that 50% educated individuals and 50% non-educated individuals will be included in the sample.

- It means that you are selecting a quota

- So according to this predefined quota, the sample is selected.

2.3) **Convenience Sampling**

Convenience sampling involves no prior plan, but the researcher can ask every one to be included in sample even while walking on the way.

2.4) **Snowball Sampling**

- The researcher does not prepare any sampling frame

- The researcher comes to know the availability of the people with some specific characteristics according to the requirement of the study, who are generally not available

- The researcher approaches to them

- Then these specific people inform the researcher about the availability of the people with the same characteristics somewhere else and thus the researcher moves to further people with such characteristics.

D.3 Learning Material for Session IX

NUMERICAL DATA

1) Measures of Central Tendency

- The Mean

- The Median

- The Mode

1.1) The Mean/Average

- Mean is the average of scores.

- It is the most appropriate value when the data is acquired from the interval or the ratio scale.

Example:

Calculate the mean of these values: 20, 26, 24, 37, 39, 58, 62, 70

Steps to calculate the mean of above observation:

1) Add all the observations (Xi) which is 336

2) Divide the sum of all the observations by total number of the observations (n) which is 8

3) Mean = 336/8 ($\sum$Xi/n) = = 42

Mean is X in statistical language

1.2)   The Median

- Median is the mid-point or middle value of the observations.

- It does not take any account of each and every observation but it ignores highest or lowest values.

- Appropriate measure for the data acquired through ordinal scale.

- Look at the following example and learn about the calculation of the median:

Example 1 (in case of Odd Values)

Calculate the median of these observations: 8, 10, 7, 70, 9, 6, 9, 3, 1, 2,

Steps in calculating the median

1) Arrange these values in descending order (70, 10, 9, 9, 8, 7, 6, 5, 3, 2, 1)

2) 7 is the middle value, so it is the median in these observations

Example 2 (in case of Even Values)

Calculate the median of these observations: 8, 10, 7, 9, 6, 9, 3, 1, 2, 5

Steps in calculating the median

1) Arrange these values in descending order (10, 9, 9, 8, 7, 6, 5, 3, 2, 1)

2) Now these observations are even but 7 & 6 are two middle values

3) Take the average of these two values ((6+7)/2 = 6.5)

4) 6.5 will be the median

1.3) The Mode

- Mode is the most frequent value of the recorded observations.

- The value which has been attained by more than one subject.

- Most appropriate measure in case of nominal data.

All the three measures of Central Tendency have been identified in the following example:

Example:

Marks of 7th grade students in Mathematics are 82, 87, 90, 92, 94, 94 and 98. For these observations, the three measures of central tendency are:

1) Median = 92 (the mid-point or the middle value)

2) Mode = 94 (the most frequent value)

3) Mean = 91 (the average of the values calculated by adding all the values and dividing there sum by total number of observations)

2) **Measures of Dispersion**

- The Range

- The Standard Deviation

- The Quartile Deviation

2.1) **The Range**

- Range is the deviation of the lowest value from the highest value.

- It is calculated by subtracting the lowest value from the highest value.

- The focus is only on two extreme values: A major disadvantage.

2.2) The Standard Deviation

- Square root of the variance is called "The Standard Deviation".

- Variance is actually the mean of the variation.

- It tells how much the values are distant from their center which is actually the mean or average of the values.

2.3) **Steps to calculate the Standard Deviation**

The teacher will calculate the standard deviation by using the procedure described in the following example:

Look at the following example in which the process of calculation of the Standard Deviation is highlighted.

Example:

1) The mean of all the observations is taken

2) Then the mean is subtracted from all the values

3) Then all the deviations are added and the sum of all the deviations from   mean is always "0"

4) The square of all the values is taken

5) All the squares are added and divided by the total number of values to get the variance

6) After the variance has been calculated, its square root is taken that is called Standard deviation

2.4)   The Quartile Deviation

● Quartile deviation is the one-half of the difference between the upper quartile and the lower quartile.

● The upper quartile is actually the 75th percentile and the lower quartile is actually the 25th percentile.

● The lower quartile is deviated from the upper quartile and calculated value is divided by two, thus the quartile deviation is taken.

3) Normal Curve

The normal curve is actually the bell-shaped curve in which the data is normally distributed. There are two types of distribution:

● Normal Distribution

● Skewed Distribution

3.1)   Normal Distribution

● Normal distribution is to form a curve where the mean, the median and the mode lie in the centre of the curve and all are equal.

- It is also known as symmetrical distribution as the curve formed by this distribution is bell-shaped.

Normal Distribution
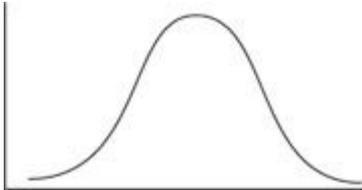
3.2)   Skewed Distribution

- A distribution which is not normal is called skewed distribution.

- It is not symmetrical or bell-shaped.

- The mean, the median and the mode are not the same or equal.

- Skewed distribution can be of two types; positively skewed distribution and negatively skewed distribution.

- In negatively skewed distribution:

Mean < Median < Mode

Negatively Skewed Distribution
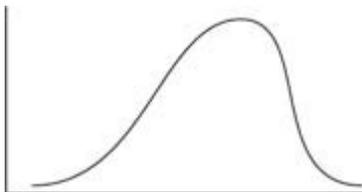
- In positively skewed distribution:

Mean > Median > Mode

Positively Skewed Distribution
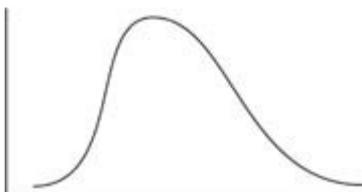
4)   Measures of Relationship

- The Pearson Correlation

● The Spearman Rank-Order Correlation

4.1) **The Pearson Correlation**

● The Pearson Correlation is used when the data about the variables is ratio or interval scale.

● After calculating the correlation the status of relationship can be determined whether it is positive or negative.

4.2) **The Spearman Rank-Order Correlation**

● If the data is in the form of ranks or it has been taken from the ordinal scale, the Spearman Correlation is used.

● It does not permit the several subjects to have the same rank. If several subjects receive the same score, the Spearman Correlation gives a technique to average their ranks.

In both the above correlation measurements, the value of correlation coefficient is somewhere between -1 and + 1. If it is towards + 1, the relationship is positive and if it is towards – 1, the relationship is negative and if the value is 0, it means that there is no relationship.

5) Measures of Relative Position

● Percentile Ranks

● Standard Scores

5.1) **Percentile Ranks**

● The percentile rank is used to measure the position of some score as compared to the others.

● Tells the percentage of the scores that lie below a given value.

● Although these are used for the interpretation of the data of interval scale data but this is very much appropriate for interpreting ordinal data.

● Look at the following example, which shows how to calculate the Percentile Rank:

Example:

82, 84, 56, 51, 58, 90, 76, 78, 66, 68, 72, 69, 50, 48, 86, 88, 60, 54, 98, 95 are the marks of 20 people in a test. If a person has got 78 marks, what will be the percentile?

Steps in calculating the Percentile Rank

1) Arrange the marks in ascending order

2) 48, 50, 51, 54, 56, 58, 60, 66, 68, 69, 72, 76, 78, 82, 84, 86, 88, 90, 95, 98

3) If a person has got 78 marks, it means that 12 people have got marks less than him/her and he or she is at 13th number

4) We will divide the number of people who have got marks less than him/her which is 12 by the total number of the people appeared in the test which are 20 and multiply by 100

5) (12/20 x 100 = 60)

6) The person is at 60th percentile

5.2) **Standard Scores**

● There are three type of standard scores which are most commonly and widely used, T Scores, Z Scores and stanines.

● It depicts that how far a raw score is from a reference point which can be the mean.

INFERENTIAL STATISTICS

1) Standard Error

● The natural difference between the means of samples of same population, which is not due to the fault or mistake of the researcher is called sampling error.

● The main characteristic of these means is this that they all are normally distributed and are very close to the population mean.

● The distribution of all the sample means will have its mean as well as its own standard deviation.

● So the standard deviation of the sampling error is called the standard error, which highlights the difference between all the sample means.

2) The Null Hypothesis

● The null hypothesis is the statement of equivalence.

● It usually states that there is no difference and no relationship between the two variables or between the means of two samples from the same population.

● In the language of research the null hypothesis is written as:

$\overline{}$ $\overline{}$

H0: X1 = X2 (There is no difference between the means, both are equal)

3) Research hypothesis

Research hypothesis can be directional or not-directional

It provides the clear direction to the researcher that there is difference or the relationship (positive/negative) between the means of the samples.

In the language of research, the research hypothesis is written as:

● Non-directional

$\overline{}$ $\overline{}$

H1: X1 ≠ X2 (Mean of one sample is greater than that of the other)

● Directional

$\overline{} \quad \overline{}$

H1: X1 > X2 (Mean of one sample is greater than that of the other)

$\overline{} \quad \overline{}$

H1: X1 > X2 (Mean of one sample is smaller than that of the other)

4) Tests of Significance

After finding out the difference between the variables, the researcher can not make the decision upon his/her own choice that how much significant the difference is. Inferential statistics offer the tests of significance which help the researcher to conclude or infer that the difference is not natural but it is due to the treatment. Following are the most commonly used tests of significance:

1) T- Test

2) Analysis of Variance

3) Multiple Regression

4) Chi Square

4.1) T- Test

T-test is used to compare the means of two samples to determine that there is difference between them which is not a chance error. There are following two types of T-test:

- Independent Samples t-test

o Independent samples neither do have similar characteristics and nor do they depend upon each other.

o The only similarity between them is that they are taken from the same population.

o Independent samples t-test is used to judge the difference between two means.

o It lets the researcher know that the difference is not natural but is the result of treatment which has been applied to one of them.

o The researcher can infer that the difference is significant.

- Dependent Samples t-test

o   The dependent samples are matched samples

o   Scores of the same group in two different tests at two different times can be the independent samples.

o   Even the samples can be the same group to be assessed at two different times.

o   The dependent samples t-test is used to determine that the difference is not due to the sampling error.

4.2)   Analysis of Variance

● Analysis of Variance (ANOVA) is used to interpret more than two variables simultaneously.

● It offers multiple applications: Simple analysis between the two or more than two variables to find the difference.

● If there is difference, to determine where the difference lies.

● Is used to determine which means are significantly different from which means.

● Is used to analyse the variables of factorial research design with the dependent, the independent and the moderator variables.

4.3)   Multiple Regression

● Multiple regression is the prediction equation to predict about the variables.

● The use of multiple regression is increasing.

● It can be used with the data attained through any of the scale.

● It can also be used in experiments, correlational and causal-comparative studies.

4.4)   Chi-Square

● Chi-square is a test of significance which is applied when the data is in the form of frequencies of two or more than two mutually exclusive or different groups.

- Not for the data in the form of test scores.

- It compares the proportions which have been observed in some study and the proportions which are expected and finds out the difference between them.

- If the difference between the observed and expected values increases, the value of the chi square also increases but how significant is it, will be determined by consulting the chi square table.

5) Type I & Type II Errors

There are two types of errors at the time of acceptance of the hypothesis:

- Rejecting the null hypothesis when it is true is a type of error and in the language of research it is called Type I Error.

- Accepting the null hypothesis when it is not true is called Type II error".

6) Level of Significance

- When the hypothesis is tested to be rejected or accepted, it is tested against standard criteria, called the level of significance.

- It determines how large the difference between the mean must be in order to be declared significantly different.

- The Most commonly used level of significance is .05".

7) Two Tailed and One Tailed Tests

- One and two tailed tests are used to test the hypothesis highlighting the relationship between the variables i.e. positive, negative or no relationship. Two tailed tests specify no direction or say A ≠ B. It shows that the relationship can be either positive or negative.

- One tailed test specifies the exact direction that A has positive relation with B, or A has negative relation with B.

8) Degree of Freedom

- Degree of the freedom is the last stage in inferring or concluding the results.

● Degree of freedom is actually the total number of observations, values or the sample from which 1 is subtracted to reduce the bias and is denoted by (n-1). Degree of freedom is given in the table of significance tests against the level of significance.

● The acceptance or rejection of the hypothesis depends upon the value of table to be consulted against the degree of freedom.

D.4 Learning Material for Session X

1) How to Create Data Set in SPSS?

Let us start to create data set in SPSS. When you open SPSS, there is a window in front of you. At the bottom left side of the window there are two options: "Data View" and "Variable View". You have to first click the variable view. This is the first step to enter data in the SPSS and to analyze it. When you click on the Variable View, a window with different columns opens. You have to write the names of all your variables in the column of "Name" one by one. It is not necessary to write the full name, but you can write the name of your variable in the form of an abbreviation. In most of the old versions of SPSS, the column of Name is limited to only eight characters. If it does not allow inputting the full name of your abbreviation, do not get worried and just write the short name. Fill the column according to the number of your variables when this column is completed, move to the other columns which have been automatically filled, but fill the other columns according the requirement of your study.

In the second column, "Type", you have to write the type of your variable. "Numeric" is the default setting, because in most of the cases the variables are numerical. If the variables are not numerical such as "educated" which consists of words. This is known as the String Variable in the language of SPSS (Connolly, 2007). To change the numeric variable to the string variable, click on the word "numeric" in the column of "Type", another small window of "Variable Type" will appear in front of you. From this window, select the word "string" and the characters as required and then click "OK". Now the variable type matches your variable.

In the column of "Width", write the number or characters for the variable that you have assigned to the options of your tool. For example, one variable is Gender (male and female), and the other one is Age. Age is numerical and it does not need any code to be assigned. If your variables are not numerical, you assign codes to them (i.e. male and female, (male = 1) and (female = 2)). Then in the column of width you write "1" for Gender because the codes that you assign to Gender are one-digit numbers: "1" or "2". For your second variable, which is age, the width will be "2", because the number of characters for Age is always two (i.e. 20, 30, 40, 50, etc.) If your variable is salary, its number of characters

can be more than one digit and the width can be written according to the package, which the researcher is finding out.

In the column of "Decimals", write "0" if the decimals are not required, but if the decimals are required according to the variable such as birth rate 66%, then write the number of decimals required.

In the next column, "Label", write proper names of your variables which will appear in the tables or the charts at the end.

Then in the column of "Value", you double click it and another window "Value Labels" opens in front of you. In this window, you have to write the codes which you have assigned to your variable and this is in the case of nominal variables as there are three types of variables used in SPSS, nominal; ordinal and scale. (For details, please see Quantitative Data Analysis in Education! A Critical Introduction Using SPSS by Paul Connolly). For example, you have assigned "1" as a code to "male" and "2" for "female", so write "1" before "Value" and write "Male" before "Value Label". It's the same for female. Write "2 = "Female"" and click "Add" as shown in the figure. Then click "OK".

The next column "Missing Value" is used for missing data of some variables. If someone had skipped the question from a 100 items questionnaire and had not answered, you can write "-1" for that question. In other case, if someone had answers as he/she was not supposed to answer, you can write "99" (Connolly, 2007).

The next two columns are "Columns" and Align". It is not necessary to enter any data in these columns because the just define the width and alignments of the columns in data view.

The last column "Measurement" is about the type of variables i.e. nominal, ordinal or scale variables. Select one type according to the variable. The Variable View is complete now, and once gain click on the bottom left of the window on Data View. The window is open in front of you. Now enter data according to the variables.
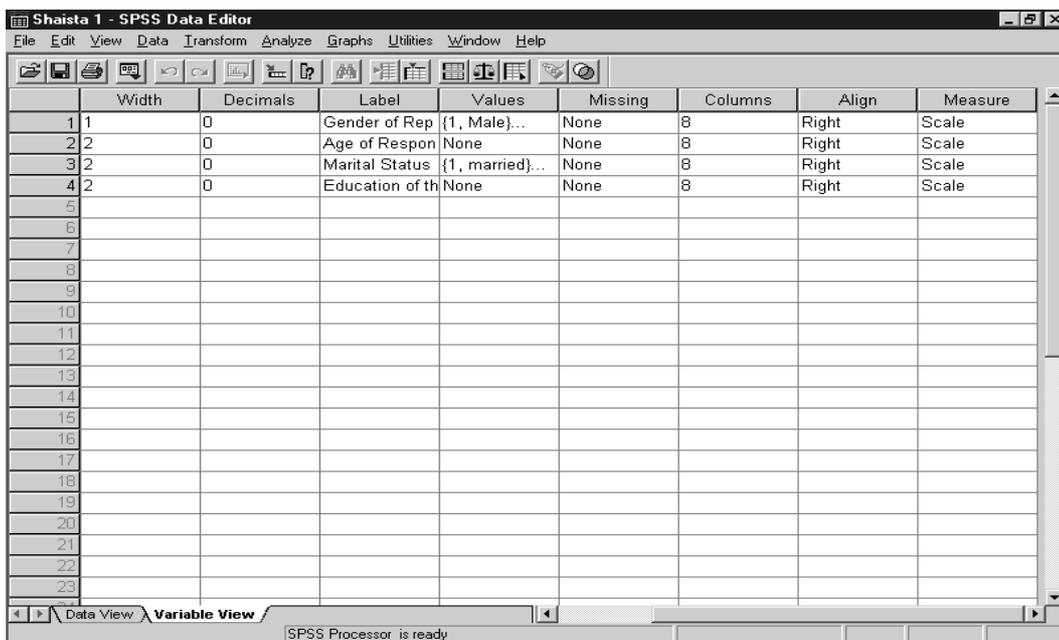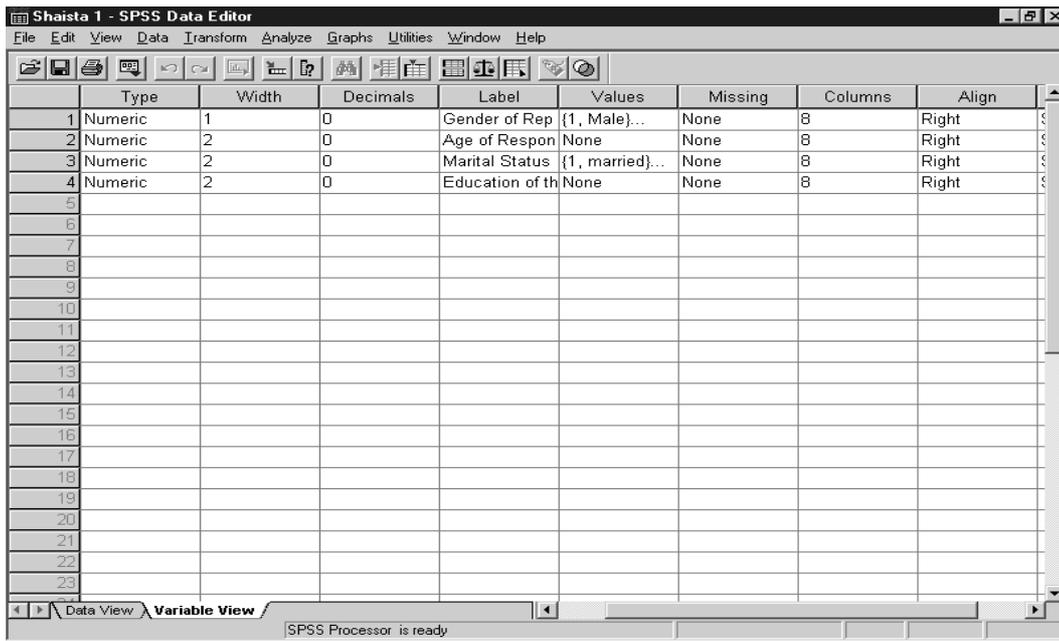
After the data has been entered, SPSS offers all types of statistical analysis which have been discussed above. It follows a common procedure for almost all types of analysis. After entering the data in Data View, the window of Data View is open in front of you.

From the top menu, click "Analyze", you will see a drop list of statistical analysis (i.e. Reports, Descriptive Statistics, Compare Means, General Linear Model, Correlate, Regression, Loglinear, Classify, Data Reduction, Scale, Nonparametric Tests, Survival and Multiple Response). You can choose any of the options according to your study.

As to create the data set in SPSS and to enter the data in it is totally practical, so first the teacher will use the SPSS in front of the students, and then the students will practice it by themselves.

SPSS provides the broad applications for statistical analysis in a variety of ways. But the procedure for only a few of them will be described here.

2) Procedure for using Pearson Correlation

- Go to ANALYZE

- Select the DESCRITIVE STATISTICS

- Go to CORRELATIONS,

- Choose BIVARIATE

- Transfer all the variables to the variable box

- Choose CORRELATION COEFFICIENT (Pearson) and TWO-TAILED TEST OF SIGNIFICANCE

- Then click OK and a window comprising of all the data, will appear

3) Procedure for using Regression

- Go to ANALYZE

- Select the DESCRITIVE STATISTICS and select REGRESSION

- Go to LINEAR

- Select the dependent and independent variable and put where these have been required

- Choose ESTIMATES, CONFIDEBCE INTERVALS and MODEL FIT

- Click OK

4) Procedure for using Spearman Rank Order Correlation

- Go to ANALYZE

- Select the DESCRITIVE STATISTICS

- Choose CORRELATE and then chose BIVARIATE

- Under variable box, chose SPEARMAN

- Choose TWO-TAILED test

- Click OK

5) **Procedure for using Chi-Square test**

- Go to ANALYZE

- Select the DESCRITIVE STATISTICS

- Then select CROSSTABS

- In CROSSTBAS window, in the field of "ROW(S)" put the variables which you want to compare, and in the field of "COLUMN(S)" put the characteristics which you want to compare between the variables.

- Then select STATISTICS in the same window and another window CROSSTABS: STATISTICS will open

- In this new window, select Chi-square and Phi and Cramer's V

- Then select CONTINUE and then OK

6) **Procedure for using Independent Samples t-test**

- Go to ANALYZE

- Select COMPARE MEANS

- Select INDEPENDENT SAMPLES T-TEST

- A window will open. Put both variables that you want to compare in the fields, "TEST VARIABLE (S) and GROUPING VARAIABLE"

- In the same window, click DEFINE GROUPS

- Another small window will open, and here you have to put the codes which you have assigned to your variables

- Then click CONTINUE

- Click OK to complete the procedure

7) **Procedure for using One-way ANOVA**

- Go to ANALYZE

- Select COMPARE MEANS

- Select One-way ANOVA

- A window appears before you; put the scale variables in the field of "Dependent List"

- Put the nominal variables in the field of "Factors"

- In the same window click on POST HOC button

- Another window will appear, click on HOCHBERG'S GT2

- Then click CONTINUE

- You are once again in the window of ONE-WAY ANOVA

- In this window, click on OPTIONS button

- This will open another window

- In the OPTIONS window, select DESCRIPTIVE and HOMOGENIETY of VRIANCE TEST

- Then click CONTINUE

- And finally click OK

D.5 Learning Material for Session XI

ACADEMIC WRITING FOR OTHER PURPOSES

1) Writing Letters

Any kind of letter, whether written by an individual, a company, or an office has the same layout. There are eight parts of this layout and this layout is to be used for all kinds of letters. This layout is given below.

1.1) Letterhead/ Sender's Address

At the minimum, your address, and phone number or that of your office is shown at the top or in the printed letterhead.

The First Women University	*90, Lane 4*
City Center	*Harley Street*
Lahore	*Rawalpindi*
051-6644268	051-5593471
citycenter@gmail.com	docred@yahoo.com

1.2) Date

The date is usually presented in this order: month, day, year, as in January 7, 2009, unless the office requires a different arrangement. The date may begin flush with the left margin.

1.3) Inside Address

The complete address is shown. Notice the use of the courtesy title preceding the addressee's name.

Ms. Saleha Sabir

Project Manager

City Center Market Branch

Rawalpindi

1.4) Salutation

The salutation is appropriate for the name given in the inside address. The kind of salutation used in a letter is determined by the name(s) shown on the first line of the inside address. Mr. Qadir/Ms. Qadir/Dr. Qadir/Professor Qadir.

1.5)   Body

The body is single-spaced with a double space between paragraphs. The paragraphs begin justified to the left margin.

1.6)   Complimentary Closing

The complimentary closing is appropriate for a formal letter from an individual/business/office to an individual/ business/office. Example:

Yours truly,

Yours sincerely,

1.7)   Signature Element

The writer's name and title are shown. If the addressee needs to respond to a letter, the information in the signature element will be used in the inside address of the letter. Example:

Ms. Sabiha Syed

Assistant Professor

1.8)   Enclosure

Often enclosures accompany a business letter. The number of enclosures may be shown, or the enclosures may be listed. A variety of styles may be used to identify the enclosures.

Encls: 08

1.9)   Format of Letters

2) Routine/pleasant letters: Deductive

- Begin directly with the main idea (easy to write)

- Details or explanations

- Closing thought

Dear Registrar:

Please send a replacement copy of the Application Form that is attached. When it was delivered in the post (see copy attached), pages 8-10 were missing.

I shall appreciate your sending a complete form in exchange.

3) Unpleasant letters: Inductive

- Begin with a neutral statement that leads to the reasons for refusing the request.

- Present the facts, an analysis, and the reason for refusal. Major portion of the letter to be an explanation. Before the refusal to prevent negative reaction.

- State the refusal. De-emphasize it.

- Close with a related idea that shifts emphasis away from the refusal. Offer counterproposal. Shows your confidence in the addressee.

Dear Ms. Siddiquii:

Your efforts to build the scholarship fund for the Association's needy children are most commendable. We wish you good success in your efforts for this worthy cause.

We here at Popular Traders are always willing to assist worthy causes whenever we can. That is why every January we budget for the year the maximum amount we feel we are able to contribute to worthy causes. Then we distribute this amount among the various deserving groups as far as it will go. As our budgeted contributions for this year already have been made, the best we can do is to place your organization on our list for consideration next year.

We wish you the best of luck in your efforts to help educate the deserving children of the Association members.

4) Special Letters

1. Congratulatory letters --- Deductive

2. Letters of persuasion: Inductive

   o Get attention

   o Introduce the topic to arouse attention

   o Give evidence

   o Encourage action

3. Letters of recommendation --- Deductive for positive ones and Inductive for the not so positive ones.

4. Letters of Invitation and responses --- Deductive

5. Letters of Sympathy or Condolence:

   o   Start with a statement of sympathy

   o   Follow with sentences about mutual experiences or relationships

   ● Close with some words of comfort and affection

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