RESEARCH METHODOLOGY

FEM 3002
(Unit 1- 9/9)

Bacelor Science (Human Development) Programme

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Hak Cipta Terpelihara. Tidak dibenarkan mengeluarkan ulang mana-mana bahagian artikel ilustrasi dan isi kandungan buku ini dalam apa jua bentuk sama ada secara elektronik, fotokopi, mekanik, rakaman atau cara lain sebelum mendapat izin bertulisan daripada Pengarah, Pusat Pendidikan Luar (PPL), Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan. Perundingan tertakluk kepada perkiraan royalti atau honorarium.

MODUL PEMBELAJARAN : FEM 3002 RESEARCH METHODOLOGY disediakan dalam bentuk bahan pengajaran dan pembelajaran kendiri di bawah program Pendidikan Jarak Jauh, Universiti Putra Malaysia. Sebarang pertanyaan dan cadangan untuk memperbaiki gaya penyampaian dan isi kandungan modul ini bolehlah dikemukakan kepada penulis dengan menggunakan alamat Pusat Pendidikan Luar.

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INTRODUCTION

a. Course Information

Name of Course: Research Methodology

Course Code: FEM 3002
Credit Hour: 3 (2+1)

This course comprises 2 hours of lecture and 3 hours of laboratory work per week. To fulfill the requirement for the laboratory work will complete 2 assignments, which are: 1) Research proposal, and 2) Managing and analyzing data using the Statistical Package for the Social Sciences (SPSS).

The authors of this module, Professor Dr. Rozumah Baharudin and Associate Professor Dr. Rumaya Juhari would first of all like to welcome and wish you all the best in this course. The course will introduce you to research methodology in the social science, with a specific focus in human development. In this course you will learn all aspects of research processes including identifying problems, developing hypothesis, sampling (probability and non-probability), measurement, research design, data analysis, and writing research proposal and research report. You will find that this will require you to integrate and apply the knowledge that you have learned from other courses in your Human Development Curriculum and utilize the scientific methods to analyze issues in the human development areas with the aim of promoting the quality of life of individuals, families, societies and human being as a whole.
b. Authors Information

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c. Module Objectives

FEM 3002 is a compulsory course for the Bachelor Science (Human Development) programme. At the end of this modul students will be able to:

1. discuss the philosophy of research, and the concepts of science and the scientific methods.
2. describe the research design in humna development
3. describe the steps in preparing and conductin a research project
4. analyze and interpret research data and prepare a research report.

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d. Course synopsis

Introduction to research design and analysis in Human Development. Meaning of science, scientific research and its application in Human Development. Research planning process, data analysis and interpretation, report writing and presentation of research findings.

e. Course Content

This course will require 28 hours of lecture (2 x 14 weeks) and at least 42 hours of laboratory work (3 x 14 weeks). Given that this is a long distance education course students will not have the opportunity to attend a hands-on laboratory work; however, the assignments and exercises in the module will allow students to apply the “learn by doing” approach on their own.

This module is divided into 9 units that cover the various main topics. Table 1 presents the weekly division of topics that students should follow closely in order to study the materials in this module. Table 2 provides a detail content of each unit in the module.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Philosophy of Research</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Research Process</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Research Design</td>
<td>3-4</td>
</tr>
<tr>
<td>4.</td>
<td>Writing Research Proposal</td>
<td>5-6</td>
</tr>
<tr>
<td>5.</td>
<td>Measurement</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>Sampling</td>
<td>8-9</td>
</tr>
<tr>
<td>7.</td>
<td>Data Collection</td>
<td>10-11</td>
</tr>
<tr>
<td>8.</td>
<td>Data Analysis: Descriptive and Inferential Statistics</td>
<td>12-13</td>
</tr>
<tr>
<td>9.</td>
<td>Writing Research Report</td>
<td>14</td>
</tr>
</tbody>
</table>
### Table 2. Unit Content

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
</tr>
</thead>
</table>
| 1.   | Philosophy of Research  
      | Research Concept  
      | Research Objective  
      | Research and the Scientific Method  
      | Types of Research  
      | Summary |
| 2.   | Research Processes  
      | Identifying Problems  
      | Developing Hypothesis  
      | Data Collection  
      | Data Analysis  
      | Writing Report  
      | Summary |
| 3.   | Research Design  
      | Meaning and Objective of Research Design  
      | Non-Experimental  
      | Experimental dan Experimental Quasi  
      | Summary |
| 4.   | Preparing Research Proposal  
      | Proposal Format  
      | Proposal Checklist |
| 5.   | Measurement  
      | Level of Measurement  
      | Nominal, ordinal, interval, and ratio  
      | Reliability and Validity  
      | Summary |
6. Sampling
   Population and Sample
   Probability sampling
   Non-probability sampling
   Summary

7. Data Collection
   Test and Scale
   Questionnaire
   Interview
   Observation
   Summary

8. Data Analysis
   Data Management
   Use of Statistic
     Descriptive
     Inferential
   Summary

9. Research Report
   Writing Format
   Writing Technique
   Summary
f. Lab Work/Assignment

To fulfill 42 hours of lab work, students need to complete the following assignments:

- Lab/Assignment I: Write a research proposal
- Lab/Assignment II: SPSS (Statistical Package for the Social Sciences) on-line tutorial report

The lab work will be explained further during the class meeting at UPM. Please take note that the laboratory contents and exercises may change from one semester to another, and students will be informed of the changes during each class meeting.

Assignment I: Research Proposal (10 pages)

For this assignment you will write a research proposal on a topic that is related to your interest and programme of study. Before writing, you need to understand the whole topics related to research methodology. Please use the proposal outline/guideline given to you in Unit 4. Failing to abide by the guidelines given will have negative influence on your marks.

Assignment II: On-line SPSS Tutorial Exercise (30 pages)

For this assignment you are required to study and work through the online SPSS (Statistical Package for the Social Sciences) tutorial at the following sites:

- [http://www.psych.utoronto.ca/courses/c1/spss/page5.htm](http://www.psych.utoronto.ca/courses/c1/spss/page5.htm)
- [http://www.mhhe.com/socscience/psychology/runyon/spss/spss.html](http://www.mhhe.com/socscience/psychology/runyon/spss/spss.html)

From the above online tutorials, learned everything about the basics of SPSS for use in data analyses. Write a report on what you have learned and provide examples where necessary. In the report be sure you include aspects related to the following topics:

1. Data entry
2. Descriptive statistics
3. Inferential statistics (such as Chi-square, T-tests, Correlations, Regression, One-way ANOVA and Factorial ANOVA)

Your marks will be determined by well you can explained what SPSS is, how we can utilized it for data analyses, and the steps and meaning of descriptive and inferential statistics.
Attention: All assignments must be typed using Times New Roman, size 12, double spacing on A4 paper. Please use the following colour code for the front page of your assignments:

- Assignment 1 = Blue (Due on First Face-to-Face Class Meeting)
- Assignment 2 = Green (Due on Week 12 of the Semester)

MARKS WILL BE DEDUCTED FOR ALL LATE ASSIGNMENTS

### g. Course Evaluation

The course evaluation is conducted in 2 ways: 1) Course work comprising the lab-work/assignments (2 reports = 35%), and Mid-semester test (which covers Unit 1 to 4 = 15%), and 2) Final examination (which covers all topics - Unit 1-9 = 40%).

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>(15%)</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>(20%)</td>
</tr>
<tr>
<td>Mid-semester Test</td>
<td>(25%)</td>
</tr>
<tr>
<td>Final examination</td>
<td>(40%)</td>
</tr>
<tr>
<td></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### h. Mid-semester Test

Students are required to sit for the mid-semester test. Questions in the test will be in both objective and subjective formats. The test will cover Unit 1 to 4, and aspects related to Assignment 1. This test carries 35% of the total marks.
i. Final Examination

The final exam is comprehensive. This means that questions will be developed based on all the units in this module. Students need to prepare to be tested on materials learned from Unit 1 to 9 and aspects related to Assignments 1 and 2. The questions will be in the objective and subjective format.

j. Main References


k. Additional References


1. **Descriptions of icons used in the module**

Icons are used to help students in understanding and memorizing the structure and contents of this module. The following are the icons used and their meanings.

- **a)** 
  - ![Icon](image)
  - **Introduction** ➔ **Introduction Unit, topic or sub-topic**

- **b)** 
  - ![Icon](image)
  - **Objective** ➔ **Objective of module, unit or topic**

- **c)** 
  - ![Icon](image)
  - **Important content** ➔ **Collections of important contents of the module**

- **d)** 
  - ![Icon](image)
  - **Suggested reference** ➔ **Additional references suggested to further understand each unit or topic (books, journal or appendices)**

- **e)** 
  - ![Icon](image)
  - **Summary** ➔ **Summary based on the unit or topic**

- **f)** 
  - ![Icon](image)
  - **Checking Answer for the Exercise given** ➔ **Answer scheme included with the questions (however, not all questions have answer scheme)**

- **g)** 
  - ![Icon](image)
  - **Questions in the text** ➔ **Questions prepared by the author for discussions on a certain topic**

- **h)** 
  - ![Icon](image)
  - **Self-test Questions** ➔ **Questions prepared by the author to help students in their understanding on the topics discussed**

- **i)** 
  - ![Icon](image)
  - **Attention** ➔ **This symbol is used to indicate to students important facts that must be given attention**
Research is always regarded as an effort to solve problems or fulfill felt needs. This perspective is relevant with the current issues and complex challenges faced by humans in this new millennium. Every day we learned from the print or electronic media on social problems such as discipline problems among school students, drug abuse problems, child abuse, infest and divorce. Societal issues like these needs to be tackled and the solutions must be able to prevent the problems from growing and threatening the strength and harmony of the society and nation. One of the efforts to overcome these problems that is considered systematic and scientific is through research. Formal and empirical research results are always more acceptable and convincing compared to explanations based on opinions.

This introductory unit will oriented you with the concepts and basic aspects of research. Specifically the objective and content of this unit are as follows.

**Objective of Unit**

At the end of this unit you will be able to:

1. Explain what is meant by the word research
2. Explain the objective of research
3. Discuss research and the scientific method
4. Describe the different types and classification of research

Read related chapter in your main references
Content

1.1: Research Concept
1.2: Research Objective
1.3: Research and the Scientific Method
1.4: Types of Research
1.5 Summary

1.1: Research Concept

The word research may be very familiar to you. You and your friends may have used the word before. Here may be some of the ways the word research is being used.

... 'I want to go to the Library to do some research for my term paper.'
... 'I have research it myself, Shop A has cheaper goods than Shop B.'
... 'Based on my research, studying consistently is more effective than studying at the last minute.'
... 'To ensure whether there is really water problem in Village A, a group of reporters went to the village and did some research on the village folks'.

What do you think; can the examples above be considered as research activities?

Try to analyze the following sentences about research. You will probably find that those examples may contain some elements of research.

Research is a ...  ...  ...  ...  ...
- seeking activity
- investigation
- effort for findings facts
- effort for discovering
- effort for solving problem
- process for data collection
- effort for gaining more explanation
- process for establishing empirical evidence
- searching repeatedly
- structure activity using the scientific method
- activity that analyze information systematically and using the scientific method

Previous scholars have provided various meaning to the word research based on their own perspective. Some of what they refer to as research is shown below.

<table>
<thead>
<tr>
<th>Scholar</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerlinger (1973)</td>
<td>An effort to analyze data using the scientific method in a formal and systematic way. Its purpose is to find answers to questions or problems.</td>
</tr>
<tr>
<td>Grosos &amp; Sardy (1985)</td>
<td>Process, procedure, or strategy using the scientific method.</td>
</tr>
<tr>
<td>Touliatos dan Compton (1988)</td>
<td>An effort in discovering new ideas, describing situations and events, as well as describing phenomena.</td>
</tr>
<tr>
<td>Ahmad Mahdzan (1992)</td>
<td>Systematic method used by humans to increase knowledge.</td>
</tr>
<tr>
<td>Barbie (2001)</td>
<td>An investigation using the scientific method that is frequently used by human to describe/predict events or future happenings.</td>
</tr>
</tbody>
</table>
Based on the meanings of the word research you can conclude that research is an investigative process that seeks information in systematic and scientific way to solve problems and discovering new knowledge.

**Exercise:**

In your own words, define the word research.

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1.2 Objective of Research

Research is an activity that has long been conducted in the area of human development. The activity is focused mainly on the effort of searching, applying and interpreting information that can help human to achieve development. Results of the achievement in research has provided today’s human to live better and comfortably although faced with complex challenges of globalization.

The purpose of research in human development can be deduced from the meaning of research. Some of the aims of research are as follows:

- Finding new information
- Expanding existing information
- Validating past information to determine whether there is a need to make changes, expand or keep the old information
- Investigate question or specific problem to obtain new information that can help to support certain assumption
- Investigate existing phenomena to provide new solution or information
- Determine new ways or using existing products or services.
Exercise:

Other than the above and based on your reading, give 3 other purposes of research:

1. 

2. 

3. 


1.3 RESEARCH AND THE SCIENTIFIC METHODS

Research is a science and requires the scientific methods. Three concepts must be defined in this sentence: science, scientific and scientific method.

Science:

Generally, science refers to:

- Science is a serious way of generating knowledge.
- Science is a way of thinking and observing the natural world that involves certain principles and guidelines.
- Science is a method of observing or analyzing an event and, to learn as well as understand the world.

Scientific:

The word scientific means orderly or systematic. It has an objective characteristic, based on objective facts, not subjective which is easily influence by values. Every research needs to be value-free so as to avoid bias.

Scientific method:

Research in the area of human development is usually conducted using the scientific method, whereby information is gathered systematically and objectively. This method can allow researchers from being prejudice or bias. The scientific method is always assumed to be more reliable as compared to other methods of gaining knowledge, such as through superstitions, intuition and authority or rational-inductive argument.
The scientific method in human development research involves the integration of two processes, which are inductive and deductive. The integration of both methods can simplify the effort for describing and predicting a phenomenon.

In the inductive reasoning, research is design to identify components that can eventually results in a conclusion or generalization. In this situation researchers make an observation on certain phenomena (concrete facts) and after analyzing the phenomena he/she will make a certain assumption. This process is generally utilized in qualitative design research.

In the deductive reasoning, generalization is stated first before observation is conducted that can support or reject the generalization. This process is generally used in the qualitative research design.

Exercise:
Briefly, state the difference between the inductive and deductive reasoning.
1.4 TYPES AND CLASSIFICATION OF RESEARCH

Types of Research:

In general, research can be classified according to purpose, design or approach. Understanding the differences between each type is important because they each require a certain set of procedures.

Research based on Objective

Two types of research that can be categorized based on objective are basic research and applied research.

Basic research
Research is conducted to answer theoretical question, to gain understanding and increase knowledge about the world around us. This research is abstract and has long term application.

Applied Research
Research is done on known or existing information. Its aims to to practical solution to an immediate problem, thus has a short-term application.

![Research classification](image)

Figure 1: Research based on objective
Research can be categorized based on its design. Listed are six types of research based on design. You can learn more about these different designs in Unit 3.

- **Historical Research**: Research can be done to objectively and accurately restructure past events or to connect the past with the present or to compare several historical periods.
- **Descriptive Research**: Descriptive research aims to depict or illustrate a situation or an event of interest systematically and accurately.
- **Developmental Research**: Developmental research is designed to study patterns or sequence of growth and or change as part of or function of time.
- **Correlational Research**: Correlational research is design to determine the extent of variation or change of a factor or variable in relation to the change in one or more other factors/variables.
- **True Experimental Research**: Experimental research analyzes the interaction of cause and effect by exposing the experimental group with treatment and later evaluating the result by comparing it with a control group. Random sampling or assignment of groups is required.
- **Quasi Experimental Research**: Quasi experimental research is design to be as similar to the true experimental research when the control group cannot be formed or the manipulation of the independent variables is not practical or difficult to do.
Figure 2: Types of Research based on Design
Research can be conducted using different approaches. The two most popular approaches is the quantitative and qualitative research.

**Quantitative Research:**
Research using parameters that can be measured with numbers is known as quantitative research. The reasoning method for this research is done deductively.

**Qualitative Research:**
Research that involves variables that can be described with words but, cannot be presented using numbers is classify as qualitative research. The reasoning method use for this research is the inductive technique.

The differences between quantitative and qualitative research can be further described based on several aspects including views on events around the world, purpose, approach and role of the researcher. Table 3 present the differences between quantitative and qualitative research.
Table 3. Differences between Quantitative and Qualitative Research

<table>
<thead>
<tr>
<th>ASPECTS</th>
<th>QUANTITATIVE</th>
<th>QUALITATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Views on the world</td>
<td>• Assumed social facts have objective truth, removed from individual beliefs.</td>
<td>• Assumed that truth is constructed from social, individual or group definition of a situation.</td>
</tr>
<tr>
<td>Research Purpose</td>
<td>• Describe reason for change in social facts through measurement and objective analysis.</td>
<td>• Emphasize more on understanding social phenomena from the perspective of the actor based on his/her participation.</td>
</tr>
<tr>
<td>Approach</td>
<td>• Use approach such as experimental or correlation that distant a person from clearly understanding social facts.</td>
<td>• Use approach such as ethnography that can help in understanding a research situation clearly.</td>
</tr>
<tr>
<td>Researcher’s role</td>
<td>• Researcher removes self from the subject to avoid bias.</td>
<td>• Researchers immerse self in the research phenomena.</td>
</tr>
</tbody>
</table>
**Exercise:**
Get a copy of a published research article. Identify the type of research used and describe how it was used.

Article title: 

Research type: 

Description: 

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SUMMARY

- Research is an activity that search answers for questions and/or finding solutions to problem(s).
- Research must be done systematically and scientifically.
- In the inductive reasoning, research is designed to identify components that eventually lead to a conclusion or generalization.
- In the deductive reasoning, the conclusion is stated first before the research is done.
- Research can be divided based on its purpose, design and approach.
UNIT 2
RESEARCH PROCESS

Research is considered as a process since it is conducted based on several activities that are orderly arranged from beginning to the end. Generally, there are five steps in research process:

(i) Identifying problem,
(ii) Developing hypothesis,
(iii) Data collection
(iv) Data analysis
(v) Report writing

This Unit described for you the processes involve in conducting research, which are from identifying problem to reporting your research report. Specifically, the objective and content of this unit follow:

Objective of Unit

After learning this unit you will be able to:

1. Describe the process for identifying problem
2. Describe the process for developing hypothesis
3. Describe the process for collecting and analysing data
4. Describe the process for reporting research report.

Read related chapter in your main references.
Content

2.1 Identifying Problem
2.2 Developing Hypothesis
2.3 Data Collection
2.4 Data Analysis
2.5 Research Report
2.7 Conclusion

2.1 Identifying Problem

The first step in conducting research is identifying the problem to be studied. This is really not a difficult process to do since we are faced with all kinds of problems almost everyday in our life. Nonetheless, scientific research is not interested in trivial and personal problem (such as losing your wallet, keys, stomach ache, or breaking up with your lover). Identifying solution to problem that is of interest to research typically goes beyond the everyday problem faced by a small group of people. Problem experience by a large group of individuals or members of the society is usually the focus of research. For example, there is no need to conduct a research of only a small group of school children is involved with deviant behavior however; if a huge proportion of the students in school is involved then misconduct can be a research problem. Thus, problem that calls for research has greater complexity and scope.

Problems that can be solved in research are concrete, observable and measureable in nature. Vague, invisible or unmeasureable problems are not appropriate to be studied.
Which problem do you think can be easily research, obesity or beliefs in ghost?

Yes, of course problem related to obesity is easier to measure because it is a more objective and concrete problem. Further, it is a problem faced by quite a large proportion of people in the population. Discovering solutions to obesity will bring a lot of benefits to the society in general.

Problems that are appropriate to study are also problems that can be specifically defined. If it is not possible for you to define the problem, there is a possibility that the problem is too general or not important to be studied. The specificity and importance of the problem must be outlined before you decide to research on the problem.

A researcher's commitment in term of time, energy and money are also important consideration in studying a selected problem. The feasibility of the research is greatly influenced by the availability of these resources. The effort of solving a research problem is considered appropriate when its demands a reasonable time and money, and produces beneficial and practical results. Solution to the research problem is greatly meaningful when it can contribute to development or refining knowledge in the related fields.

In addition to the above, the following steps can facilitate your effort in identifying problems for research. Figure 5 further illustrate the processes for you.

1. Choose a problem that is of interest to you and can attract attention.
2. Choose a problem that call for solution.
3. Collect information that is relevant to the problem.
4. Analyze the relationships between the information to enable you to identify the main source of the problem.
5. Suggest various explanation or hypothesis that can possibly help you in identifying the root of the problem.
6. Analyze the explaination/hypothesis to determine its relevancy to the problem that you like to study.
7. Analyze the relationships between the information and the explaination.
8. Provide assumptions and identify relevant theory or theories.
9. Finalize the topic of the problem you want to study.
Figure 5: Procedure for Identifying Problem
Source of Problem

Ideas for research can come from many different sources. Some of which can come from any of the following:

- Experiences
- Needs/Current event
- Print/Electronic media
- Internet/Web
- Academic book
- Past research
- Research report/article
- Deduction from theory
- Course/seminar/conference/workshop
- Area of study
- etc.

Exercise:
Find other sources that can help you identify research problem.
Let’s assume that you have decided to study conduct problem among school children. For this study you will probably ask why there are so many school children involved in deviant activities. The question that you put forward to study the problem is known as Research Question. Based on your research questions you will make an assumptions that several factors that can cause student to misbehave. You will perhaps assume that some students are involved in deviant behaviors because there are influenced by factors such as family dysfunction, peers, media, and school characteristics. Your assumption is called hypothesis. In your views the number of violence shows on television influence many students to behave in ways that are against the rules and societal norms. The number of such aggressive shows can be labeled as X factor and the misconduct as Y factor. The X factors can also be called as independent variable and Y as dependent variable. What you are trying to do here is to suggest that there is a relationship between X (independent variable) and Y (dependent variable) or that X is influencing Y. In other words you have developed a hypothesis that the the number of violent shows seen on TV is related to the number of students involved in deviant behavior.

Definition of Hypothesis

Hypothesis can be defined as a tentative statement on the relationship or association between two (or more) variables. Simply put, hypothesis is an educated guess and the expected answer to the research questions outline in a study.
Characteristics of Hypothesis

Generally, a hypothesis is characterise as follows:

1. contains at least 2 variables.
2. states the relationship between 2 variables.
3. stated in a simple, clear, accurate and specific form.
4. present the study variable in an operational term.
5. can be tested to determine the extend to which it can be supported or rejected.
6. can predict the direction of the phenomena under study.
7. can be deduced from theory, past research or observation, thus, it must be consistent with the existing knowledge or what is already known.
8. is free the influence of value, i.e., value-free. Words such as ‘must’ or ‘should’ must be avoided.
9. is stated before data collection especially in quantitative research.
10. provides the guide for which research strategy to use.
11. help to identify the type of data to be collected.
12. help to identify which statistic to use in analyzing data.
13. facilitate in how to reach a conclusion in solving the research problem.

Forms and Classes of Hypothesis

Hypothesis can be stated in 2 forms and classes:

Forms of Hypothesis:  
1) Null  
2) Alternative

Classes of Hypothesis:  
1) Directional  
2) Non-directional

Null Hypothesis is also known as statistical hypothesis or zero hypothesis. The label $H_0$ is use to represent this hypothesis. The null hypothesis null states that there is no difference or relationship between the groups or variables measured. Hypothesis is typically stated
in a negative form to the expected results. Researchers always hope to successfully reject the null hypothesis.

Example: *There is no significant relationship between the total hours of doing revision and the score obtained in the examination.*

**Alternative Hypothesis** is also known as the research hypothesis or working hypothesis. This hypothesis is label as $H_a$. This hypothesis states that there is a difference or relationships between groups or variables that are being measured. The statement for this hypothesis is consistent with the expected results and contradictory to the null hypothesis. The null hypothesis relates to the statement being tested, whereas the alternative hypothesis relates to the statement to be accepted if/when the null is rejected.

Example: *There is a significant relationship between the total hours of doing revision and the students' score in their examination.*

**Directional Hypothesis** is a hypothesis that specifies the direction of the predicted relationship that is whether the predicted relationship will be positive or negative. Directional hypotheses always express the effect of an independent on a dependent variable. This hypothesis is formulated when the researcher has enough evidence to deduce for the direction of the expected results.

Example: *Students spending more hours in revision will achieve higher scores in their examination.*

**Non-directional hypothesis** is a hypothesis that does not indicate the direction of the expected research results. Positive or negative results of the investigation will not be stated in this hypothesis.

Example: *The amount of time spent on revision will have an impact on the scores that will be obtained by the students in their examination.*
2.3: Data Collection

The method used in collecting data can influence the quality of an investigation. Before engaging in data collection, you would therefore want to identify the procedure that is consistent with the objective of the study. There are various procedures that we can use for data collection. Some of the popular procedures include test and measurement scale, observation, questionnaire and interviews. The strengths and limitations of these procedures are discussed in Unit 6.

2.4: Data Analysis

When you have gathered data for your study, you are ready to analyze them. Typically as in the data collection process, how the data will be analyzed must be thought of in the early planning stage of the research especially during the process of identifying the problem and development of objective or hypothesis. This early thinking is important as it will help you plan on what analytical technique to use in the analysis.

At the beginning state of your data analysis, you need to examine all the data that you have collected. This process is called data editing. In the quantitative research process this will include cleaning the data, recoding or developing category and code for open-ended questions you have in your research questionnaire. The next task you will do is to conduct the data analysis using descriptive statistics (i.e., describing the data) and inferential statistics (making conclusions), if necessary. These two types of analysis will be further described in Unit 7 of this module. After these analyses have completed, you will interpret the results of the analyses and make empirical conclusions.
2.6: Writing Research Report

Writing the report is the last process in all research activity. A research is considered not complete when it is not published. A research report contains a description of the research that you have conducted that encompass the results, summary, conclusion and suggestions. In the presentations, you have to note what you wrote are your research results or merely your opinions. Research report is typically written in an objective and technical form. Objective means you do not include your personal feelings or values. Technical means your style of writing is different from the normal 'layman' writing. Your writing not only must be very factual based on your research results; it must also be scholarly written and formatted according to some required scientific standards such as the American Psychological Association (APA). On the other hand an ordinary article is normally written based more on the opinion of the writer than on factual considerations; however, this does not mean that the writer is not at all allowed to put forward their opinions or views. As a researcher you can give your opinion based on your research findings and not on your own individual views.

Exercise:

Choose any of the research process and briefly discuss in what way it is an important research step.
SUMMARY

- Research can be divided according to types and categories based on its objective, application and design.
- Research must be conducted according to certain processes.
- Five research processes have been described in this Unit, beginning from identifying problem, developing hypothesis, data collection, data analysis and report writing.
UNIT 3
RESEARCH DESIGN

How to solve an identified problem is an important question for every researcher. This means from the beginning to the last stage of the research the researcher needs a plan that can help find answers to the problem which he or she is interested. This process is similar to planning an action or strategy to achieve a desired goal. This action plan is referred to as research design.

This Unit describes to you what design is and its purposes. You will also be introduced to two categories of research designs, which are: 1) Non-experimental and 2) Experimental. Specifically the objective and contents of this Unit is as listed.

Objectives of Unit

At the end of this unit you will be able to:

1. Explain the meaning and purpose of research design.
2. Describe the different types of non-experimental research.
3. Describe the difference between true experimental and quasi experimental research.

Read related chapter in your main references
Content

3.1 Meaning and Purpose of Research Design
3.2 Non-experimental
3.3 True Experimental and Quasi Experimental
3.4 Summary

3.1: Meaning and Purpose of Research Design

Research design is a detail plan outline by researchers to answer their research questions. Kerlinger (1973, pg. 300) described research design as:

"...a plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance.

The plan is the overall scheme or program of the research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of data.

The structure of the research is more specific. It is the outline, the scheme, the paradigm of the operation of the variables. When we draw diagrams that outline the variables and their relation and juxtaposition, we built structural schemes for accomplishing operational research purposes.

Strategy, as is used here, is also more specific than plan. It includes the methods to be used to gather and analyze the data. In other words, strategy implies how the research objectives will be reached and how the problems encountered in the research will be tackled."
2. assist researchers to identify research variable and how to operationalize it.
3. assist researchers in conducting a robust and objective research.
4. assist researchers in identifying the most economical method in conducting the research.
5. assist researchers to answer questions and make decisions related to aspects such as research purpose, information/data source, location and appropriate time to conduct the research.

3.2 Non-Experimental Research

In Unit I you have been introduced to several research non-experimental designs as follows:

a). Historical
b). Descriptive
c). Developmental
d). Correlational

a) Historical Research

As describe in Unit 1, historical research design describes and interprets events that have taken place in the past. The purpose of this design is to study the past to understand the present, and maybe to plan for the future. The scope of this design is broad and analyzes both previous and current events.

Data available for historical research is typically very detail, however the data is often to difficult to get hold of. When available, it is often secondary data rather than primary data. As such, the validity and source of the data must be determined.

The process involved in conducting historical research is the same as other types of research. The main difference would only be in term of the procedure in acquiring data as noted earlier.

The first process in historical research is to identify the topic that you wish to investigate. At the second stage, you will outline your research question or formulate hypothesis. The formulation of hypothesis in historical research is more flexible as
you do not have to follow the specific scientific procedure such as having to declare
the statistical correlation between variables. Third, using different sources of
information to collect data. Among the sources of historical data are documents,
notes, or artifacts. Fourth, the data gathered must be evaluated in terms of its
authenticity and validity. Fifth, the data gathered must be synthesized and integrate
to ensure that the information is consistent and logical. At the sixth stage, you will
need to interpret the data so that the research questions that you addressed at the
beginning of the study could be answered.

Like other research design, historical research also has several limitations:

(1). Conclusion or generalization maybe limited since
the data is beyond the control of the researcher.

(2). Information collected was based on observation
done by others, not the researcher him/herself, thus
the potential to explain the phenomena in detail
may not be possible.

(3). The time and patience needed to complete the
study may be too demanding particularly when the
researcher needs to locate past documents that
may be difficult to find.

(4). Reliability and validity tests on the information
gathered are not possible.

b) Descriptive Research

Descriptive research focuses on events that are currently happening. For example,
you may want to study how many PJJ students are using the internet to locate
additional reference materials for the courses in which they enrolled. What you would
most likely do is to distribute your questionnaires to a group of PJJ students to
measure the phenomenon (i.e., internet use) that is presently happening. Results of
your study will describe how many PJJ students are using the internet as their source
of reference.
Results of descriptive research will reveal the present patterns of the events under studied according to contexts. The patterns revealed are typically extensive on the related event. The section that follows will focus on two approaches that can be used in descriptive research.

a). Case study
b). Survey research

a) Case study

Case study is a method use to study individual or institution in depth and details within its own context. The subject for case study can be individual, a small group, object, an organization or process. Basically this study uses observation or interview; however, if the unit studied is a group for example, a class or school, questionnaires or standardized tests is possibly used.

Case study method has its own strengths and limitations:

Strengths:

i. focuses on an individual or one aspect only which can allow for indepth and detail observation.
ii. Use various techniques of data collection including personal observation, interview and record/document related to aspects focus on in the study.
iii. an easy way to collect ‘rich’ data.

Weaknesses:

i. needs plenty of time even though easy. You need to collect data from a variety of sources which can be difficult to control.
ii. data gathered maybe influenced by researcher’s bias
iii. although it allows indepth data gathering, the scope is not broad.
iv. Unable to determine the associations among variables.
v. Conclusion or generalization is limited to the case only.
c) Survey Research

This research that involves a bigger sample size than the case study is more popular among social scientists. In general, survey research focuses on characteristics of the population in particular on the frequency and associations among variables related to human behavior including those that are difficult to measure such as attitude, beliefs, and opinion. For example, you can conduct a survey research on the following issues:

- Knowledge, attitude and practices of fathers on their children’s education.
- Perception of PIJ students towards the quality of managing the PIJ programmes.
- Truancy amongst secondary school pupils.

Questionnaire is usually use as a tool for data collection in survey research. The questionnaire could be administered in two ways: 1). Self-administered by the respondents, and 2). Interview. For questionnaire administered by the respondents themselves, you as the researcher will only need to arrange how to send, administer, and collect the questionnaire. For example, you can send the questionnaire by mail to the respondent; ask the respondent to answer the questionnaire on their own, and when completed the respondent is requested to return the questionnaire by mail using a self-addressed envelope.

Interview using questionnaire can be conducted formally or informally. In this case, you will personally meet the respondent face-to-face or using a medium such as telephone or computer. If the interview is done informally, you will talk freely or spontaneously with the respondents. Conversely in a formal situation, the interview conducted is more structured and controlled in terms of the how and what can be said by the researcher.

Similar to the case study, survey research comprise several strength and weaknesses.

**Strengths:**

1. Focus broadly on the study phenomena
ii. Process is more efficient because the data collection finished immediately after meeting with the respondents.

iii. Facilities needed are minimum, perhaps only the questionnaire and a file.

iv. High representativeness and low error which can produce accurate findings.

**Weaknesses:**

i. Bias may easily crop up especially when preparing the questionnaire and during interviews. Questions or interview style may lead respondents to a certain answer.

ii. Respondents could refuse to answer particularly when the questionnaire is administered by mail.

iii. Sampling frame is difficult to build notably in situations where the population size is unknown.

iv. More in the form of exploratory which can limit conclusion that can be made.

---

d) **Developmental Research**

The purpose of developmental research is to understand changes that take place from one period of time to another. Two types of developmental research are 1) longitudinal research and, 2) cross-sectional research.

**Longitudinal research** is done to examine changes that take place for an extended period of time. This is the strength of longitudinal research especially when the same case or respondent is involved and the differences between individuals could be minimized. Nonetheless, this methodology has several disadvantages such as it tends to be more expensive to conduct and attrition of respondents may easily occur.

**Cross-sectional research** focuses on several groups of individual at a specific time in point. In contrast to longitudinal research which analyzes change in respondent’s behaviour as a function of time, cross-sectional research focuses its analysis based on age. This means that in cross-sectional research respondents involve in the study may be in different age categories, whilst in longitudinal research the same respondents are included as they increase in age. The strength of cross-sectional research is in its cost which is cheaper because data collection or test is done in a shorter time frame.
Additionally respondents in the study may be in the same place or in close proximity which can make data collection easier and cheaper. The number of respondents dropping from the study is also low as compared to the longitudinal research design.

An obvious weakness of cross-sectional research is the limited similarity among the respondents. The difference among respondents is mainly in terms of age that can create differences in their level of maturity. The development or change in respondent’s behavior from one level to another cannot be analyzed in this type of research design.

c) Correlation Research

Correlational research attempts to determine how the extent of change of one variable is related to the change in another variable. In other words, this research design determines the linear relationship between two or more variables. The focus of this design is on the element or variant that is shared between two variables rather than the effect of one variable on another variable.

The degree of relation between variables in this design is expressed as a correlation coefficient. The correlation coefficient is stated in numeric index from -1.00 to +1.00. The degree of correlation is stronger when the variants shared between the variables increases. In other words, as more variants shared between two variables increase the correlation between the variables gets larger.

In your opinion which of the following pairs of variables are possibly related or sharing variants?

a) Total number of hours study (independent variable) and your academic achievement score (dependent variable).

b) Total number of hours study (independent variable) and colour of your favorite dress (dependent variable)

c) Parental involvement (independent variable) and children’s academic achievement (dependent variable)
d) Students’ achievement score in FEM 3002 (independent variable) and their physical strength (dependent variable).

The value of correlation coefficient can be linear and positive in form. This means when the value of one variable change, the value of the variable sharing the variant will also change. For example, the more hours you spend for studying FEM 3002 the higher the score you will achieve in FEM 3002 your mid-semester test. On the other hand, if you spend less amount of time studying for the course you will achieve lower score.

In addition, the value of the correlation coefficient can be negative and in the reverse form. This refers to condition when one variable change in value in a specific direction, the other variable will also change in the opposing direction. For example, the faster you answer your FEM 3002 test paper, the lower the score you achieve (since you are too fast you were last careful in answering the questions thus making many more mistakes).

The strength of the correlation coefficient does not depend on its form or direction. The coefficient value of -.80 is stronger than +.68. Although +.68 is positive it is weaker than -.80.
Exercise:

What is the meaning of research design? Try getting a copy of a research report and identify the research design used in the report.

Exercise:

What research design will you use to conduct your study? Describe why you have decided to use the chosen design.
3.3 Experimental Research and Experimental Quasi

Experimental research design and quasi experimental were already introduced to you in Unit 1. In present Unit you will learn more about these two designs in greater details.

Experimental research focuses on analyzing the cause and effects of a phenomenon. Based on the scientific technique used, experimental research demonstrates its own strength in explaining the relationships of cause and effect between variables present within the psychology and social contexts.

**True Experimental Research**

True experimental design is a type of research design that is considered expensive, but it possesses the highest level of strength. This design delineates several procedures that must be followed by researchers, as follows:

- Determines control group randomly which, based on statistically characteristics is similar to the experimental or treatment group (similar or equal in statistic refers to the characteristics of the population used so that the subjects of the study are comparable and not extreme, for example, heights not exceeding 7 feet, between the two groups)
- Control and experimental groups originate from the same population (this will help to determine similarities in terms of statistics)
- Subjects in the control group are not exposed to the treatment, intervention or changes or variable(s) that will be manipulated.
- Both groups must comprise equal numbers of subjects.
- Conduct pre-test for the dependent variable for both control and experimental groups.
- Conduct post-test for the dependent variable for both control and experimental groups.
Your study is considered complete after the post-test. You can conduct the post-test as many times as needed even when the experiment is taking place. Your research results are interpreted based on the differences in the post-tests between the experimental and control groups.

*Hawthorne and Placebo* effects are two important issues that need to be given attention in experimental research. *Hawthorne* effect refers to the inclination of the research subjects to behave differently when they realized that they are being studied. On the other hand, the *Placebo* effect refers to the tendency of the subjects to feel themselves to be ‘better-off’ when they know that they are being treated. To ensure that the effects of both *Hawthorne* and *Placebo* can be controlled, you need to make certain that the subjects have no knowledge of their positions in the experiment (i.e., whether in the control or experimental group).

Quasi Experiment

Quasi experiment is designed to parallel true experiment. However, this does not mean that quasi experiment is lower in value than true experiment. There are instances when quasi experimental design is better and more realistic than the true experiment. Imagine how you would conduct an experimental research to determine the effects of preventing students from taking their breakfast. Could you assign breakfast to be served for the experimental group and none for the control group? Similarly could you possibly examine the effects of cigarette smokes on unborn child? Are you going to place a group of pregnant mothers in a room filled with cigarette smokes, and another group in a room that is not polluted with smokes? Where is the ethic of such a research? However, it is possible to design a study that could response to the smoking issue.

What is the ethical value of such a research? In an experimental research such questions could be examined since the research respondents are naturally present in the real situation. Your task is only to collect data from the respondents after they have gone
through the experience themselves. This is the reason why quasi experiment is sometimes known as expo-facto research since research is done after phenomena took place.

The independent variable in quasi experimental research is difficult to manipulate as compared to the true experiment. Furthermore, quasi experimental research does not emphasize the element of randomness as in the true experiment. The subject of the research is not randomly selected to be in any kind of situation. Subjects are chosen based on the independents variables (such as, age & sex). Compared to the true experimental research, the validity for the quasi experimental research is lower.

Quasi experimental research can be classified according to three categories:

1. Quasi experiment using ‘subject variables’
   - Comparison between different subjects
   - Pre-test and post-test measurements of the dependent variables

2. Quasi experiment using ‘environmental variable’ (time – series design)
   - Comparison smong the same subjects
   - Several observations made on the same subject for a period of time

3. Quasi experiment involving time panel/cohort:
   - Testing for developmental change. For example, comparing the academic achievement of PJJ students cohort of May 2003/04 with those of May 2005/6
KESIMPULAN

- Research design refers to the detail plan of a research.
- Research design can be categorized into non-experimental and experimental.
- Non-experimental research can be divided into 4 types, which are historical research, descriptive, developmental and correlation.
- Experimental research can be classified according to two types, which are true experiment and quasi experiment.
UNIT 4
PREPARING RESEARCH PROPOSAL

Writing a research proposal is an important component of a research activity. Typically, every research requires the potential researcher to prepare a research proposal. A research proposal may be written to conduct a research that fulfills an academic requirement. It may also be prepared to apply for some funding from a certain sponsor. For the academic purpose, your research proposal needs to be presented to a committee for approval to conduct a study related to your area of expertise.

In preparing the research proposal it is very important for you to be committed and understand what will need to do for the intended research. If you have seen an academic research report or a thesis, you will realize that Chapters 1 to 3, which are the introduction, literature review and methodology are contents of a research proposal. Thus if you have successfully prepared a complete research proposal, you have actually completed part of your final report of your research.

This Unit will help you to understand the step by step process of preparing a research proposal. You will learn how to develop a ‘good’ proposal that has strong potential to
gain approval from your research committee, and understand what is considered as a weak proposal.

Unit Objective

At the end of this unit you will be able to:

1. Explain the basic components of a research proposal.
2. Write a research proposal.

Reference:


Contents

4.1 : Format of a Research Proposal
4.2 : Summary of a Research Proposal
4.1: Format of a Research Proposal

The format of a research proposal discusses in this unit comprises of 8 components. You need to refer to this format as a guide in writing your research proposal assignment. The eight components that are typically found in a research proposal are as shown below:

1. Title
2. Introduction
3. Literature Review
4. Methodology
5. Work Schedule
6. Bibliography
7. Budget
8. Appendixes – Letters and Questionnaire

Each of this components are shown accordingly based on the following research proposal format (please refer Figure 4.1) and its descriptions follow next.
Figure 4.1: Proposal Framework
1. Title

The title refers to the issue focus on in the study. The selection of the title is based on what you are interested to study. A ‘good’ title has the following characteristics:

- contains less than 15 words
- describe the subject (e.g., adolescent, male adolescent, female adolescent, secondary school students, primary school students, preschool children, working women, dual-earner couples)
- identify location (e.g., urban, rural, name of district, name of state)
- contains statistic words (e.g., relationship, comparison, predictor)

The title is more of a label for the research and not written in a complete sentence, thus you will not put a period for a title.

Example 1:

Mobile Phone Use amongst On-Campus Students in Universiti Putra Malaysia: Its Correlates and Impact on Psychological Health and Academic Achievement

Example 2:

Relationship between Parenting Behavior and Psychosocial Functioning of School-going Adolescents in Bandar Baru Bangi

Example 3:

Parenting Behavior of Mothers and Fathers of Children with Mental Disorders in Selayang Hospital

In the examples, can you identify what elements you saw in the title? For example, what are the study variables, who are the respondents, and where will the research be conducted? Could you also trace any statistic words?
2. Introduction

Introduction
This section gives the general picture of what you want to study. You need to give
genral description of the purpose of the study, its relationship to the current
phenomena, problems related to it and why it needs to be investigated. In general
this section gives answer to basic questions including ‘what’ and ‘why’ a study
needs to be conducted.

Statement of the Problem
In this section you need to declare in clear terms the specific problem you want to
focus. In other words, tell exactly what you want to study. It must be stated in a
‘logico-empirical’ way, i.e., the problem must be concrete/tangible and can be
measured. You want to address the questions that you are interested in, and which
are appealing to your reader so that they too would agree with you that the study
needs to be conducted. Describe briefly the background of the problem that you
intent to study and how it can help you to answer ‘what’ you plan to study.

Kepentingan kajian
This section explains to your reader or assessor the potential benefits of the
research that you are going to conduct. You may describe how the results can be
useful to a specific population or organization.
Study Objective

The objective of a study can be classify into two, i.e., 1). General objective and 2). Specific objective. This section discusses the two types of objectives.

General Objective

Akin to its name this objective broadly describes the aim of the study. Words that can be used for this objective must be measurable, such as:

- Describe
- Explain
- Evaluate
- Examine
- Identify
- Determine
- Study

Example:

This study aims to determine the relationships between the level of problematic mobile phone use and psychological health of college students.
Specific Objective

This objective is more explicit, precise and related to the general objective. The purpose of this objective is to reflect on the method that will be used to achieve the objective of the study. When reporting your research results in your final report, you would definitely need to refer or relate them back to your objectives. Research objectives have direct relationships with the results that you will obtain.

Like the general objective, words that can be used in writing your specific objectives must be measurable, such as:

- identify
- determine
- examine
- evaluate
- compare

You must avoid using unmeasurable words in writing your specific objectives, such as:

- to ‘see’
- to ‘understand’
- to ‘know’

Hypothesis

Hypothesis refers to an educated guess that is developed to guide you on what the expected outcome of your research. It is a prediction that can be tested. However,
students must understand that not all research need hypothesis (e.g., for exploratory and descriptive research). You would only need to write hypothesis when you plan to use inferential statistics.

There are two types of hypothesis: 1). Null hypothesis, and 2). Alternative hypothesis. The format for writing hypothesis is as follows:

**Null hypothesis**

\[ H_0: \text{There is no significant relationship between an independent variable and a dependent variable} \]

**Example:**

\[ H_{0,1}: \text{There is no significant relationship between level of problematic mobile phone use and the academic performance of the secondary school students.} \]

**Alternative Hypothesis**

\[ H_A: \text{There is a significant relationship between the independent variable and the dependent variable.} \]

**Example:**

\[ H_{A,1}: \text{The level of problematic mobile phone use is related to the academic performance of the secondary school students.} \]

\[ H_{A,2}: \text{Students who are problematic mobile phone users are more likely to be less academically well.} \]
Exercise:

For the following specific objectives, identify which of the objectives need to be tested using a hypothesis.

Specific Objective:

1. To determine the relationship between the total hours of studying and student's academic achievement.
2. To determine the significant differences in self-esteem between male and female students.
3. To describe the academic achievement of school-going adolescents.

Null Hypothesis:

Alternative Hypothesis:
Conceptual Framework:

A conceptual framework refers to the working model for your study. The model outlines your study variables, their positions and directions of effects. A good model is a useful model, that is, one that provides you with a clear direction of your research. Below is an example of a model.

![Example: Conceptual framework](image)

Figure 1: Conceptual framework for a study on “Familial factors related to psychological health and academic achievement amongst secondary school students”
Definition of Terminology

Important terminologies included in your study must be defined conceptually and operationally.

Conceptual definition
This is a general description of all the constructs, terms or variables that you have included in your study. In this definition you will provide an abstract characterization of all your constructs/terms/variables.

Operational definition
For this definition you will give an exact specification of how a concept is measured or manipulated in your study.

Example:

Title: ‘Relationship between level of self-esteem and adolescent’s academic achievement’

Self-esteem
Conceptual: A person’s overall self-evaluation or sense of self worth.

Operational: Respondent’s score on the Rosenberg’s (1979) self-esteem scale.

Limitation of Study
In this section you need to discuss the restriction or drawback of your study with respect to aspects such as:

- Respondent
- Sample size
- Location of study
- Sampling technique used
Example 1:

The current study focused only on factors (i.e., personal & family) associated with mobile phone use and its impacts on psychological health and academic achievement of adolescents. Other factors and impacts of the mobile phone may also be pertinent to focus, but was not the scope of the study.

3. Literature Review

The "literature" of a literature review refers to any collection of materials on a topic. It could be anything from a set of government pamphlets to scholarly published articles. When you conduct a literature review you discuss published information in a particular subject area, and sometimes information in a particular subject area within a certain time period. The review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis. Literature reviews typically contain three basic elements:

1) A introduction or background information section  
   - Provides a quick opening of your topic, including its central theme and organizational pattern.

2) The body of the review  
   - Contains your discussion of sources and is organized chronologically, thematically, or methodologically.
and, 3) a conclusion and/or recommendations section to end the paper.

- Discuss what you have drawn from reviewing literature, and where might proceed.

4. Methodology

The methodology presents the reader with your research design. There are at least four sections you will discuss here:

1). Study location

- Indicate where you want to conduct your study

2). Population and Sampel selection

- Indicate which group of people you want to study
- Discuss whom you would include in your sampling frame, which would you select as your respondents, and what would be your sampling technique?

3). Data collection

- Discuss your measurements for both independent and dependent variables
- Discuss the tool you would use for your data collection – e.g., questionnaire, observation scale?
- Discuss what method you would use to collect your data – e.g., survey, case study? What technique would you use – e.g., face-to-face interview, mail interview, telephone interview?

4). Data analysis

- Discuss what statistics you would use to describe data and test your hypothesis.
- Discuss the results that you expected, you may want to present these using dummy tables.
5. Work Schedule

Work schedule is important for you to plan and present the processes that possibly may take place in your research. The expected time frame you need to complete your research depends very much on the scope of your research.

Example of work schedule:

<table>
<thead>
<tr>
<th>Items</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>January</td>
</tr>
<tr>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td>Questionnaire development</td>
<td></td>
</tr>
<tr>
<td>Identify location</td>
<td></td>
</tr>
<tr>
<td>Sample selection</td>
<td></td>
</tr>
<tr>
<td>Training of enumerators</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
</tr>
<tr>
<td>Finalizing instruments/questionnaire</td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
</tr>
<tr>
<td>Data management</td>
<td></td>
</tr>
<tr>
<td>Data analysis</td>
<td></td>
</tr>
<tr>
<td>First draft of report</td>
<td></td>
</tr>
<tr>
<td>Final report</td>
<td></td>
</tr>
</tbody>
</table>
6. Bibliography

At the end of your proposal/thesis report you will need to list down all the references that you have cited in the text. The bibliography may be written using the format/style provided by the American Psychological Association (APA). For example:

Author. (year). Title of article. Source, Volume (issue), page number.


7. Budget

In your proposal, you will include a section where you would indicate the estimated amount of money you need to conduct your research. This section is very important especially when you are planning to apply for funds/grants from any institution or organization.

8. Appendix

At the end of your proposal, you would attach an appendix or appendixes containing materials related to your research project such as:

- Letters
- Questionnaire
- Instruments
- Newspaper clipping

4.2: Summary of Proposal

Your proposal can be summarized in a table form in about one to two pages. This table will present a brief summary of your whole research proposal. You can circulate this brief summary during your proposal presentation.
### SUMMARY OF RESEARCH PROPOSAL

<table>
<thead>
<tr>
<th>Specific Objective/Research Question</th>
<th>Hypothesis</th>
<th>Independent &amp; Dependent Variables</th>
<th>Instruments</th>
<th>Respondents</th>
<th>Data Analysis</th>
<th>Expected Results</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

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Page 68 of 159
Propose a research topic that is related to your area of specialization feel in the table above. You can use a bigger piece of paper or split the table accordingly.

**Conclusion**

- Preparing a research proposal is an important step in research as an effort to gain approval from your research assessor or committee. It is also an important document for you to submit in applying for research funding.

- There are several important elements in a research proposal including the title, introduction, and statement of problem, significance of study, objective of study, hypothesis, and methodology (location, sampling, data collection, & data analysis). Students must follow the research proposal guideline provided by their academic discipline or faculty underwhich they pursue their degree.

- A well-prepared proposal is important in guiding to complete a successful research.
Everyday in our live we tend to evaluate or measure every object or thing we see around us. Most of the time we will make such measurement informally such as, “She is a smart student”. However in research, measurement is typically done in a formal manner as in the example, “She achieved As in 80% of the courses she took last semester. In both examples, the aspect of measurement focuses on a conclusion or effect/result/output from an observation. Such conclusion is achieved through the process of measurement and in research this activity is very important. A researcher’s effort is considered successful when she could solve her research problem using a measurement technique that gives appropriate meaning.

This Unit introduces you to the meaning of measurement and several important concepts related to measurement including levels of measurement and reliability and validity of measurement. Specifically, the objective and contents of this unit are as listed.

Objective of Unit

At the end of this unit you will be able to:

1. Describe what measurement means in research.
2. Discuss the different levels of measurement: nominal, ordinal, interval and ratio.
3. Describe the concept of reliability and types of reliability.
4. Describe the concept of validity an types of validity.
5.1: Measurement

The word ‘measurement’ was first defined by S. S. Stevens (1951), a psychologist. According to Stevens, measurement is an activity that puts values or numbers on an object or event according to certain rules. What Stevens is saying is in measurement we put values on object, events or effects/results of an event. Values refered by Stevens can exist in number form such as 10, 20, 30 or words such as social class (high or low). This means that in research any variable studied need to have measurable characteristics and values. This characteristic is what is always discuss in the measurement process.

5.1.1: Variable and Measurement
...Before you conduct any measurement activity, you need to understand the type of variable that you plan to measurement. Variabel is a construct that has values that vary. What do we mean by ‘construct’? Construct is an abstract concept which is more often found in theory, including social status and power. Variable is the concrete concept of an abstract construct. Income for example, can be used to measure the abstract concept of social status. Following are several descriptions related to variables:

- A way of measuring construct.
- Characteristic or trait that describe an individual or object.
- Characteristic that change and put individual on a continuum or spectrum.
- Characteristic that can change from time to time for an individual or object, or changes from person to person or object to object.
- Must have more than one level.

In addition to the above description, variable can be explained using statistics adjective. Two of the adjectives are discrete and continuous.

**Discrete variable:**

- This variable is also known as categorical or nomimal variable.
- It can only take a specific value.
- Among the examples of this variable are marital status, hair colour, and sex.

**Continuous variable:**

- This variable can take any value
- Examples of this variable include age, height, and weight.

Both of these variables can exist as independent or dependent variable. What do we mean by independent and dependent variable? The table below briefly describe the meaning of both variables.
### Table 5.1: Differences between independent and dependent variable

<table>
<thead>
<tr>
<th>INDEPENDENT</th>
<th>DEPENDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>Effect</td>
</tr>
<tr>
<td>Antecedent</td>
<td>Result</td>
</tr>
<tr>
<td>Label as X</td>
<td>Label as Y</td>
</tr>
<tr>
<td>Item that is assumed to produce the</td>
<td>Item that should be changed.</td>
</tr>
<tr>
<td>difference and typically manipulated in</td>
<td>Item that should be influenced.</td>
</tr>
<tr>
<td>experiment.</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Criterion</td>
</tr>
<tr>
<td>Factor</td>
<td>Observation</td>
</tr>
</tbody>
</table>

Besides the above comparison, independent variable has two characteristics as follows:

- Can be manipulated

  In an experimental study, the independent variable is typically manipulated, that is the subject or unit of experiment is divided according to independent variable selected.

- Can be manipulated

  Characteristics such as gender, socio-economic status and IQ score cannot however, be manipulated.

In most cases independent variable are found in *Ex-Post Facto* research and existed naturally. In this type of research design, the subject or unit studied is taken in it natural state.
Exercise 12:
Describe the differences between independent and dependent variables. Between the variables, which one existed first in the event that you want to study?

There are four levels of measuring variable. According to their hierarchy the four levels are nominal, ordinal, interval and ratio. The following discusses each of these levels.

5. 1. 1. Level of Measurement
a). Nominal
The nominal scale describe variables are categorical in nature and different in term of quality and quantity. This means that the object or individual that you want to study are divided into categories. The order of the categories are however, arbitrary and not important. Thus, respondents that are involved in your study may be categorized into male or female. You can code the male category with a value of 1, while 2 for female. The value of 1 or 2 will not reflect the level of importance between the two categories. These two numbers are just labels that differentiate the two categories. Numbers when use in nominal scale will not give any description on size or characteristics measured. This means that no
category has a value that is more or less from another category. A category in a nominal measurement cannot appear twice and must be mutually exclusive.

An example for nominal scale:

Sex

(Rozumah) (Zulkefly)
female male

b). Ordinal
An ordinal scale gives more information as compared to the nominal scale. This scale is higher in position than the nominal scale. It measures variable with values in ranking order. The values are arranged orderly and provide descriptions on their positions as more or less in characteristic from another variable. However, the value of 0 is arbitrary and does not bring any meaning. Respondents are given answer choices in ranking order, for example, 1 = most agree, 2 = agree, 3 = do not agree, and 4 = most disagree. If two respondents choose different answer from one another (such as, A choose 1 = most agree, B choose 3 = do not agree), this indicate that the two respondents have different rating or evaluation on the particular variable. Nonetheless, the different evaluations do not reflect that A is better than B. Scale measured at the ordinal level does not allow for any mathematical operations such as add (+), subtract (-), multiply (x) and divide (÷).
An example for Ordinal scale

Question:

To what extend is parenting skills important to you?

1 = not important at all
2 = not important
3 = important
4 = very important

c). Interval

Interval scale is rated at a higher level than nominal and ordinal scales. This scale incorporated the characteristics that are present in both the nominal and ordinal scales. In an interval scale the distance between two numbers that are continuum nature are the same. For example, the temperature recorded for an area for three days consecutively, are F10°F, F20°F, dan F30°F. As you can see, the difference between day one and day two is the same as for day two and three; that is 10°F. In an interval scale it is wrong to say that the temperature on day two is twice as high as day one, and on day three the temperature is three times higher than day one. As in nominal and ordinal scale, the value of 0 is arbitrary.

An example for interval scale

Level of IQ

<table>
<thead>
<tr>
<th>Aini</th>
<th>Ahmad</th>
<th>Atiqah</th>
<th>Abu</th>
<th>Aminah</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>100</td>
<td>105</td>
<td>110</td>
<td>115</td>
</tr>
</tbody>
</table>

d). Ratio

Ratio scale combines the characteristics of all the three scales (nominal, ordinal, & interval) that we have discussed above. The level of measurement for ratio scale is higher in value than the three scales. A ratio scale describes the distance between two numbers as similar and the value
0 is not arbitrary but, has actual value. A person with RM0 income per month, really indicates that he or she does not earn any money. In a study, a researcher found that 30 of the respondents reported that their income as RM0 per month. Looking closely at the data, the researcher found that these respondents are full-time housewives who are not in any paid employment.

**An example for ratio scale**

*Monthly income for 5 respondents*

<table>
<thead>
<tr>
<th>Aini</th>
<th>Ahmad</th>
<th>Atiqah</th>
<th>Abu</th>
<th>Aminah</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM0</td>
<td>RM500</td>
<td>RM1,000</td>
<td>RM1,500</td>
<td>RM2,000</td>
</tr>
</tbody>
</table>
Exercise:

Gives the characteristics and examples of as many variables that you can identify for the following scales:

1. Nominal:
   Characteristics:
   Example:

2. Ordinal:
   Characteristics:
   Example:

3. Interval:
   Characteristics:
   Example:

4. Ratio:
   Characteristics:
   Example:
5.2: Reliability and Validity

It is important for each instrument that you use in your measurement to have high reliability and validity. If this is not achieved then your research could be considered as unreliable and invalid. You may also be running a risk of wrongly rejecting your research hypothesis. Reliability and validity are the hallmark of measurements. Both are very important to establish in any research endeavors.

Reliability

Generally, reliability can be defined as consistent, reliable, stable, accurate and predictable. A test is considered reliable when everytime you measure the same thing, the result yield is the same.

Reliability index can be used to determine the reliability of a measure using the correlation method, that is, by correlating the two sets of scores obtained from subjects responding to items in the measure. The value of reliability in an analysis using the Statistical Package for The Social Science (SPSS) is read as the Cronbach Alpha. The higher the reliability value for an instrument, will indicate that the instrument is good and with small error present. Below are guidelines for interpreting reliability values:

- **Cronbach Alpha** is larger than .30 → acceptable
- **Cronbach Alpha** is larger than .50 → good
- **Cronbach Alpha** is larger than .70 → strong
Reliability coefficient of greater than .60 is typically use in social science research (Kerlinger, 1973)

Types of Reliability
There are three types of reliability which are use for different purposes: 1). Test-retest, 2). Parallel test, dan 3). Split-half test.. This section describes and explain how these three types of reliability measures are being used.

1). Test-retest
Test retest is used to measure the stability or consistency of a measure. In a study the same test is given to the same experimental group at two different time series; that is at Time 1 and Time 2. The question address in the study is: Does an individual score on the measure the same in the first test and the second test? The time period between the first and second test is an important factor to consider in determining the reliability of a measure.

2). Parallel test
Parallel test is different in technique than the test-retest. In test-retest you use the same experimental group in two time periods, however, in parallel test you use two different experimental groups. The total scores in the two groups will be correlated with each other. The test is parallel if the correlation value obtained statistically is significant. The question that you will to answer in a parallel test is: Will an individual score the same on the two tests that measure the same phenomenon?
3). Split-half test
In determining reliability using this method, you will divide the test into two. If there are 50 questions in the test, the researcher will divide them into two sections: Section A comprises 25 questions, and Section B, another 25. You can divide the questions based on a certain decision, for example, all odd number items will be in Section A, and those in even numbers will be in Section B. These two sections must measure the same phenomenon. For example, if Section A measures on knowledge related to biology, Section B should also do the same. The reliability of a measure is considered high and measuring similar phenomenon when the correlation value obtained is high. The question of interest for this test is, "Will an individual achieve the same score on the two sections of the same test?"

**Validity**

Validity means the extend to which a test is valid in the way it measures. It can also refer to the extent the test measures what it is supposed to measure. The validity of a test is influenced by the type of variable. If the variable is quantitative such as, body weight and height, the determination for the validity of the instrument is rather easy. However, if it involves a variable that is qualitative in nature such as intelligent and attitude, its validity maybe more difficult to calculate. Nonetheless, you still need to determine the validity of qualitative variable since it exist and can be measured using a construct that represent it.

**Types of Validity**
There are three different types of validity measures: 1). Face validity, 2). Criterion validity (parallel or predictive), and 3). Construct validity.

1). Face validity
Face validity refers to the extend an instrument seems to measure what it is suppose to measure. This is an easy validity test for you to perform. Just by looking you can tell
whether a test is valid or not. If I show you a test which I call a mathematic test, you would expect to see questions to items such as algebra, geometry, or calculations. When a researcher conduct a study on mass-media, questions that would be included in his or her questionnaire would include radio, newspaper, magazine, TV, internet, etc. A question that you would ask in determing face validity is: "Is the instrument seems to measure the variable that it intends to study?"

2) Criterion validity
Criterion validity refers to the extent to which an instrument can assess a certain behavior. A person who have passed a driving is expected to be able to drive well. There are two types of criterion validity: 1) Parallel, and 2) Predictive validity.

Parallel validity refers to the ability of an instrument to measure a phenomenon that is currently happening. A student is expected to score high in her test as reported by her lecturer. Here the student’s score is parallel to her performance as reported by the lecturer.

Predictive validity refers to the ability of an instrument to predict or foretell what phenomenon will happen in the future. For example, students selected for college entrance based on their merits are expected to do graduate successfully. Using correlational statistical procedure you can expect to find a high correlation between the students entrance score and their academic performance. The question address in criterion validity test is: 1) Does an individual score in a test consistent with the present report on his behavior? 2) Does an individual score on a test can predict his or her behavior in a similar situation.

3) Construct validity
Construct validity is the most difficult type of validity to achieve, but most desirable by most researchers. Construct validity refers to the extend to which the result of a test is related to the concept in the study. In this type of validity, the researcher attempts to verify the theory that is incorporated in the test or instrument (Kerlinger, 1973). There
are three important aspects that you want to keep in mind about construct validity (Syed Arabi, 1992): 1) A test with high validity has relationship with the same concept; 2) A relationship must exist between the concept and indicator that is being tested; 3) Evidence obtained in a study can further describe the concept in the study. The central question address in construct validity is: Does the instrument seems to measure the general construct that it intends to measure?

5.3 CONCLUSION

- Measurement is an activity that place value on an element or variable focus in a study.
- There are four levels of measuring a variable, and according to their complexities of hierarchy the levels are as follows: nominal, ordinal, interval and ratio.
- Reliability refers to the extend to which a study or an instrument is consistent, reliable and accurate. Reliability can be determined in three ways, which are test-retest, parallel test and split-half.
- Validity refers to the extend to which an instrument measures what it should measure. Validity can be determined in three ways, i.e., face validity, criterion validity (parallel or predictive) and construct validity.
Research is generally done to formulate a conclusion on certain population. This means that the results of any research will be used to infer on the characteristics of the population under study. Due to limited resources such as time, energy and money, we will only have the ability to study a small proportion of individuals in the population. This small collection of individuals is known as sample. Information gathered from a studied sample is usually used to describe what is in the population. Why do we only study sample and not the population? If we study all members in a population, we are actually doing a census.

Why do we focus our study only on a sample and not on the population? If we study all members of the population, we are actually conducting a census. You are probably familiar with census activity, such as the population census conducting by the government. In the population census, every single citizen in this country are interviewed to gather information related to the characteristics of the every Malaysian citizen.

This Unit introduces to you the meaning of population and sample. You will learn two major techniques of sampling, which are probability sampling and non-probability sampling. For each sampling technique you can choose several different types of sampling to use. Specifically the objective and contents of this unit are as follows:

**Objective of Unit**

After learning about this unit, students will be able to:

5. Describe the meaning of population and sample.
6. Discuss probability sampling and non-probability sampling.
7. Describe the different types of sampling included under each major sampling technique.
8. Compares the advantages and disadvantages of each sampling technique.

**Read:** Read related chapters in your reference list

**Contents of Unit**
- 6.1: Population and sample
- 6.2: Probability sampling
- 6.3: Non-probability sampling
- 6.4 Conclusion

### 6.1: Population and sample

Population refers to all the cases that we are interested to study. The case in this instance can include people, animal, object, things or concept. Population that contains people can include cases such as all long distance learning students or all Universiti Putra Students. Given that large number of people, we need to ask can we afford to study so many individuals? Off course that would be difficult for us to handle. In addition to its extensive scope, we may hindered by constrains such as time, energy, and money. To overcome such problems researchers would therefore prefer to use sample rather than population.

Sample is part of a population. Ahmad Mahdzan (1992) define sample as:

A group of entity, elements, things or objects (living or otherwise) that become the subject of a study (or aspect that
being studied) of a researcher (translated by Rozumah Baharudin)

From the definition we can realize that a sample is a subset of the whole entity what we focus to study. How do we identify a subset of a population? To enable us to do that we would usually built a sampling frame.

Sampling frame contains complete data on a population. To make an accurate generalization of a population, you need to ensure that your sample is representative of your population. The ability to draw a conclusion or generalization is very important in research.

When the results of a study can be generalized from a sample to the population, the results is considered meaningful beyond the studied sample. In such a situation the results can also provide descriptions to other population with similar characteristics.

If the results of a study cannot be generalized, i.e., when the sample was not selected to represent the population, the results of the study can only be concluded for the individuals in the sample but, not for others beyond the sample. In other words, the results are not applicable to others in the population.

Try to identify (mark with) which of the following examples refers to population (P) and which does refer to dan sample (S)?

<table>
<thead>
<tr>
<th>Study</th>
<th>P</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. IDEAL conducted a survey on all PJJ students to identify their problems.</td>
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<td></td>
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<tr>
<td>b. IDEAL conducted a teaching evaluation of lecturers by 50 of 200 students in the long distance (PJJ) learning program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. A total of 500 of the 3000 PJJ students are involved in the effective teaching-learning process and the results will be generalized to other students.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
d. The IDEAL management office is conducting a study on the effectiveness of every of its centres in managing courses for PJJ students.

Exercise:

1. In your own words, state the difference between population and sample.

2. What is meant by sampling frame?

3. Why is generalization very important in research?
6.2 Probability Sampling

Sampling can be done in two ways: 1) Probability sampling and, 2) Non-probability sampling. This section will first describe to you what is meant by probability sampling and how we can perform it. In the next section, we will discuss about no-non-probability.

Definition of Probability Sampling:

Every element in a population has an equal chance to be selected as sample; such that it can determine representative that portray the population and deter bias (Ahmad Mahdzan, 1992)(translated by RozumahBaharudin)

Probability sampling is a method that is very popular among the social scientist. In this method the probability of selecting an individual is determine by chance. This random technique can allow for the sample to be highly representative of the population.

There are several types of probability sampling that you can choose. The following are some of the ways:

1. Simple Random Sampling
2. Systematic Sampling
3. Stratified Sampling
4. Cluster Sampling

1. Simple Random Sampling

Sampling random sampling is a type of sampling that is most frequently use by researchers. In this method, every one in the population has an equal and independent chance of being selected as the study sample. This method allows you to avoid having special preference on someone over another. In such a way there is no favoritism or bias towards certain individual in your selection. The main advantage of this sampling
technique is the characteristics of the sample will be almost similar to the characteristics of the population.

Simple random sampling can be done in 5 stages:

i. Obtain a complete sampling frame.

ii. Give every sample in the frame a number.

iii. Determine the sample size that you want.

iv. Select members according to size based on the Table of Random Numbers.

v. Choose members from the sampling frame.

Table of Random Numbers

An easy way to choose sample from a sampling frame is using the Table of Random Numbers. You can get hold of this table from any statistic books or through the computer or even generating it via the computer.

The table below is part of a Table of Random Numbers.

<table>
<thead>
<tr>
<th>Table of Random Numbers</th>
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</thead>
<tbody>
<tr>
<td>21357</td>
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<tr>
<td>05545</td>
</tr>
<tr>
<td>14871</td>
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<tr>
<td>38976</td>
</tr>
<tr>
<td>97312</td>
</tr>
<tr>
<td>11742</td>
</tr>
<tr>
<td>43561</td>
</tr>
<tr>
<td>93806</td>
</tr>
<tr>
<td>49540</td>
</tr>
<tr>
<td>36768</td>
</tr>
</tbody>
</table>

Source: Salkind, N.J. (2000), pg. 88

You may want to observe the distribution of numbers from the Table of Random Numbers above. Surely you will find that there is an equal distribution of numbers for every number (1, 2, 3, 4, 5 and on). Hence the chance of choosing a number ending with 1, 2, 3, 4, and 5 is equal.
Say for example you want to choose sample comprising 10 people from a population 50 PJJ students. You will label everyone in the sampling frame beginning with number 1 to 50. Since 50 is the largest number, you will start to read your Table of Random Numbers using the 2 column numbers only. You can begin from any line or row that you like.

If you start from the first row downward, you can continue to the second row down if the numbers the first row is not enough. For a sampel of 10 people, the individuals chosen are those with numbers that are not more than 50. Using the Table of Random Numbers above the individuals selected are as follows: 21, 05, 14, 38, 11, 43, 49, 36, 48, and 50. Now, you have successfully chosen 10 people randomly from a population of 50 people.

Using Table of Random Numbers to identify respondents is an easy, systematic and accurate way especially when the sample size and population is bigger that the example given above. Besides using the Table of Random Numbers you can also identify respondents by casting a ballot. This means you can number all 50 people in the population and put those numbers in a hat. Mix those numbers well and pick one number at a time until you reach your desired sample size. If you want 10 people, mix and pick those numbers 10 times.

2. Systematic Sampling
In systematic sampling, every $X^k$ is an element the total population. $X^k$ here refers to the number 0 to sample size that you want. This type of sampling is much easier to perform compared to simple random sampling. However, systematic sampling is not as accurate or representative as simple random sampling. This is due to the fact that the equal chance of being selected may not happen as easily in this sampling compare to the sample random sampling. You would not use the Table of Random Numbers in performing the systematic sampling.

Let's say that the size of the population is 50 people and you want to identify only 10 people for your study. You would conduct the following steps to achieve the size:
1. Arrange the population by labeling them 1 to 50.
2. Divide the population by 10. You will get 5 people.
3. Choose any number from the name list that you have done (e.g., number 1). Select the number randomly, i.e., you do not want to choose a number or a name you like. To avoid bias, you can close your eyes and point to any number on the list, or throw a dice and follow the number that came up. From the selected number, choose for example, every 5th number, that is you stride 5 steps from the first number selected to select the second number, and so on.

2. **Stratified Sampling**

In contrast to simple random sampling and systematic sampling, stratified sampling takes into account the characteristics that exist in the population. This type of sampling categorizes individual in the population based on their basic characteristics such as, sex and race. Let's take the example above on the 50 people in the population that we have discussed. Who are the individual in the population? How many are males and how many are females? If we have such information, it is wise that we divide the population into two layers; one comprising only males and another, only females. From each layer, you will choose randomly the number of males and females that you wish to include as the study sample. Normally to determine how many males and females that can be selected from each layer, you can do that based on the total or percentage of their present in the population. Say there are 40% males and 60% females. For a sample size of 10 people, you will take 4 males and 6 females (you can use the Table of Random Numbers to identify them). What you are doing here is selecting the number of males and females according to their rate or total number in the population. So, you have completed your task of selecting a sample using proportionate stratified random sampling. Nonetheless if you are unable to determine who are present in the population or their total numbers, you will select your sample using the proportionate stratified random sampling method. In this case, the number of males and females whom you selected are equal in number (e.g., 4 males, 4 females).
The purpose of isolating into a specific layer of the population characteristic in stratified random sampling is to ensure that the sample characteristic closely approximate the population characteristic. In such a way the results obtained from the study sample will accurately reflect the study population. The example on dividing individuals in the population given in this section is a simple case. In reality you may need to categorize or isolate individuals in the population based on several elements such as race, religion, social class and location.

4. Cluster sampling
Cluster sampling is done when you are unable to obtain a listing of the individuals in the population. Since you are unable to select your sample based on individual, you will do your sample selection according to the group in which the individual belongs. After you have identified the cluster, all individuals in that cluster will be included as the study sample.

As an example you may wish to conduct a survey on PJJ students, you will need to cluster the students based on the courses they are enrolled. The courses are the cluster that contains students. Next you select randomly the courses from the cluster. Students selected from each course are the individuals that will answer your survey questionnaire.

Cluster sampling is sometimes preferable by researchers not only due to their inability to directly choose individuals, but also it is more time saving. One important point that researcher must remember is that members of each cluster must possess almost similar characteristics or homogenous. Thus if there is an individual in a certain course cluster who is not taking any PJJ course, then bias will occur and the results if the survey will not accurately represent PJJ students.
**Exercise:**

Briefly list down the major aspects of the following probability sampling below and indicate two strengths and weaknesses:

<table>
<thead>
<tr>
<th>Sampling</th>
<th>Major Aspect</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Random</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3 Non-Probability Sampling

Non-Probability Sampling refers to the type of sampling that does not give equal chance to individual in the population to be selected. This could happen in situation when the probability of choosing an individual in the population is unknown. Two non-probability sampling that will be discussed in this section are:

1. Convenient sampling
2. Quota sampling

Convenient Sampling:

As we can tell from the name, convenient sampling takes anyone available to be included as respondent of a study. A lecturer for example, takes PJJ students in her class as her study subject. This lecturer conveniently takes students present in her class without any interest of ensuring that the students can represent the total PJJ students. Convenient sampling is very easy to do but, there is no randomness involve that could make the results of the study goes beyond the study sample.

Quota sampling:

You may be in a situation where you need to isolate members in a population but, due to certain reasons you are not able to use the stratified random sampling technique. Thus you will use quota sampling that will allow you to choose individual in the population based on certain characteristics that you want, nonetheless in a non-random way. Take for example you need to choose 50 PJJ students aged 40 and residing in Negeri Selangor. You will choose PJJ students that posses such characteristics and list each students until you reach the quota of 50. Given that this sampling technique is non-random, the results of the study are limited to the sample that is included in the study.
Exercise:

Briefly discuss two non-probability sampling methods which you have learned. What are their weaknesses as compared to the probability sampling?
6.4 Sampling Error

**Sampling Error**

Sampling error occurs when there is a different between the sample and population characteristics. This situation occurs quite frequently although most researchers work hard to ensure that the characteristics of the sample match those in the study population. If you conduct a survey on body weight of all 4000 PJJ students, you would probably obtain accurate information (e.g., average of 60 kg.), because the sample size is very big and involve the whole population. What if you are unable to conduct such a survey?

You may take a small number (say 40 students) from 4000 PJJ students, while another researcher takes sample size according to their needs such as 70, 80, 100, or 500 students. What would be the average weight of the PJJ students in studied in such a way? You may be getting an average weight of 63.5 kg., the other researchers will probably be getting 62, 59.8, 64.2, or 65.3 kg.). These differences indicate variability or distribution values of the sampling error that occur. Generally, the bigger difference in the number of the sample, the bigger the sampling error that will be produced, and this will reduce the accuracy and representativeness of the sample towards the population. Therefore, bigger sample size, in addition to appropriate sampling technique will help to minimize sampling error.
6.5 Sample Size

How many individuals you need to include in a study? This kind of question typically haunts some students especially those who are doing research for the first time? Why choose 100 students? 50 students are insufficient? Why do you not take 500 of the 1000 available?

Up to this section, you would already understood that taking too small a sample will not allow you to accurately describe the population of the study. How can 10 students precisely 5000 PJJ students? Nevertheless, we could not afford to study 500 or 1000 of the students. Although we understood that too small a sample may not adequately represent a population, too big on the other hand, may not be appropriate and economical. Thus, how do you determine sample size?

Generally, a sample of 30 people is considered appropriate for any study. However, we want a bigger sample size to enable us to accurately determine the characteristics of the population. A simple guide in determining sample size according to Jacob Cohen (1988) is to examine the difference or variability between the groups that you wish to study. The bigger the difference between two groups, the bigger the size of the sample that you need. For example, if the CGPA of 3rd year PJJ students is greater than the 1st year students, than you will take more number students in each year. We will do just the opposite if the difference between the two group is small.

Accordingly, if the population is homogenous (i.e., possess similar characteristics such as, a test-tube of blood or a group of single mothers), the size of the sample need not be large. In contrast if the group is heterogenous (i.e., members in the group possess different characteristics such as high vs. low social class), the sample must be large enough.
The following factors can be used as a guide in determining sample size:

- Ensure that the sample size is large enough so that sampling error is small.
- If the population has almost similar characteristics, sample size is small (e.g., the difference in CGPA is small or almost similar).
- If the population has different characteristics, sample size must be large (e.g., difference in CGPA is big or CGPA scores of third-year students is greater than those of the first year) in order that the characteristics obtained could represent the population characteristics.
- If you decide to mail your survey questionnaire, there is a possibility that some respondents will not return your questionnaire; so you need to increase your sample size at least 40% to 50%.
- Although a bigger sample size is preferable, think of its appropriateness. An appropriate size that matches the studied population and economical is even more desirable.
Exercise:

1. Using your own words, explain what is meant by sampling error?

2. Your friend is interested to conduct a study on PIJ students. List some tips that you can provide to him on how to determine sample size.
6.4 SUMMARY

- Sampling can be done in two ways, which are probability sampling and non-probability sampling.

- In probability sampling, every element or individual in the population is chosen randomly. Thus, every element or individual has an equal chance of being selected. Four methods of doing probability sampling are simple random sampling, systematic sampling, stratified random sampling and cluster sampling.

- In non-probability sampling, element or individual is selected purposively; using convenient or quota sampling.

- Sampling error can happen due to sampling technique or sampling size.

- Sampling size can be determined by many factors such as, the size of sampling error that can be accepted, population characteristics, and the data collection method including the cost that the researcher can afford.
UNIT 7
DATA COLLECTION

Data collection is an important process in any research. Without data, what you expect and assume could not be revealed as valid. Data collection is a critical process and need to be done with proper planning beginning from drafting the questionnaire to collecting the data itself.

Objective of Unit
At the end of this Unit students be able to:
1. Explain the steps involve in data collection.
2. Discuss important concept in all the basic components.
3. Conduct data collection in the class laboratory.

Contents of Unit:
7.1 Construct a data collection form -- instrumentation
7.2 Data Collection Procedure
7.3 Summary

Read:
7.1 Construct Data Collection Form -- Instrumentation

When preparing your proposal, you have proposed what information or facts that you wish to gather and how to gather them. The next step is to determine how to conduct the data collection process. Constructing a scheme of how to collect the data is a brilliant step to planning your work. For most research at this stage, you will typically use a questionnaire.

Questionnaire
Questionnaire is a form that comprises questions that you want to ask your respondents. The questionnaire therefore, allows your to gain the information that you need for your study. All the questions that you include in your questionnaire must be consistent with your study objective.

Arrangement of Questions in the Questionnaire

1. Start with an introduction in the front page of the questionnaire that includes title and objective of the study.

2. State the name of your organization (this will provide your credibility and allow you to establish your respondents’ trust on you)

3. Arrange simple questions first (to allow you to establish rapport with the respondent)

4. Ask opinion questions after simple or factual questions.
Characteristics of a good questionnaire:

- Able to achieve the study objective (can measure concept that you wish to test in the hypothesis)
- Collect accurate and complete information
- Help to achieve study objective with minimum cost.

Type of Question

There are three types of questions that can be used in a questionnaire, which are:

1. Structured (closed)
2. Unstructured (opened)
3. Mixed

Close-ended question

Closed or structured questions are clear, focused, and easy to understand, as well as with obvious answer. For example, “At what age did you start smoking?”, “How many are your children below 12 years old?” Close-ended question has its own strengths and weaknesses, which are:

- Strengths:
  - Answers are more standard
  - Answers are easier to analyze (save time, energy, & money)
o Answer are more complete
o Easier for respondent to answer
o Appropriate for sensitive questions such as age and income

• Weaknesses:
  o Respondents tend to guess the answer provided
  o Respondents tend to answer although they do not know the right answer
  o Limits respondents answer to those provided
  o Respondents could feel that their involvement in the research is limited (they can explain their responses)

Open-ended Question
Open-ended question is an unstructured question that allow respondents to explain their answers in detail. For example: What is your opinion on polygamy?

In an open-ended question, an interviewer can add related question to elicit further information during the face-to-face interview. Like the close-ended question, open-ended question has its strengths and weaknesses:

• Strength:
  o Respondent is free to give his/her own answer
  o Useful especially in exploratory or pilot study
  o Could avoid categorizing numerous answer.

• Weaknesses:
  o Respondent is free to give his/her answer but, you may end up having difficulty determining the appropriate answer.
Developing Questions

In developing questions, the following are among the factors that need to be considered:

1. Construct specific question, avoid general question.
2. Question must be simple (although it may be difficult to answer)
3. Avoid ambiguous question:
   a. Contains double meaning
   b. Contains two questions in one
   c. Raise confusion or uncertainty in responding
4. Construct simple question; respondent may not remember what was asked in lengthy question.
5. Avoid leading question:
   a. Do not suggest the answer
   b. Do not force to give a certain answer
6. Ensure that the question is appropriate for any statistical procedure you intend to use:
   a. For categorical and nominal answers use non-parametric statistic
   b. For ordinal answer use non-parametric statistic
   c. For interval answer use parametric statistic or inferential statistics
Using Standardized Instrument

In certain conditions, you may need to use a available test or instrument to measure a variable. There are several standardized tests available that have been developed by past researchers, especially those from the Western countries. Tests here refer to method use to measure nature and extent of individual differences. The following examples of some test and how they could be appropriately used:

<table>
<thead>
<tr>
<th>Test objective</th>
<th>How test is used</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>To determine outcome needed by the researcher</td>
<td>Test is used as dependent variable</td>
<td>Researcher wants to test self-esteem among adolescent (i.e Rosenberg Self-Esteem)</td>
</tr>
<tr>
<td>To give initial information for screening or diagnostic</td>
<td>Test is administered at the beginning to identify respondent’s status</td>
<td>Researcher wish to identify the level of reading ability of children (School Readiness Scale)</td>
</tr>
<tr>
<td>To help in placement process</td>
<td>Test help in placing individual at certain level depending on the criteria set</td>
<td>Researcher wish to determine if respondent need to be enrolled in any pre-requisite course before enrolling in the required course (MUET)</td>
</tr>
<tr>
<td>To help in making selection or decision</td>
<td>Test differentiate respondents that are qualified to be accepted in certain program</td>
<td>Tests such as TOEFL, IELTS, or GRE require respondents to achieve certain level of score before they can accepted into any graduate programme</td>
</tr>
<tr>
<td>Evaluating research outcome or result</td>
<td>Test to determine if research goal has been achieved or otherwise</td>
<td>Researcher wants to determine the effect of attending a one month IT skills course among lecturers.</td>
</tr>
</tbody>
</table>
Although you will find some advantages of using available standardized test or instrument, there are several issues that you need to consider before making decision to use the test or instrument. Among those issues are:

1. Ensure that your context is similar to the study’s norms (e.g., if the instrument is meant for adult, it is not appropriate for you to use it for children)
2. Be careful in translating. You want to translate and back translate so that the discussion of your findings can be parallel or match to the original instrument.
3. Take into account the different socio-cultural context. For example, if there are sensitive questions that may be appropriate for Malaysian’s respondent. Questions that ask matters relating to husband-wife sexual relationship for example, may be inappropriate for our culture.
4. If you decide to adapt an instrument, give credit to the original item and explain why you need to do so.

There are several versions of tests or instruments that you can find:

1. Available standardized test such as the Dyadic Adjustment Scale, and the Kansas Marital Satisfaction Scale. Standardized means that there is a general standard method in administering the test.
2. Test developed by the researcher or self-developed test based on available or standardized test or literature reviewed.

Although standardized instrument is readily available, it’s used is usually controlled. You need to obtain permission and pay some fees to those who produced or develop instrument. However, there are numerous instruments that you can get for free, either through the internet or books.
Likert scale

Likert scale is a type of scale that is simple to use and popular amongst the social scientists. Steps involve in developing a Likert scale are as follows:

- Statements/items are written about opinion, feelings, or perception about certain events, subjects, or people.
- Statements or items developed can have positive or negative value.
- At one end of the statements, choices on the extend of agreement or disagreement are listed. Typically, Likert scale provides 5 points rating scale as follows:
  1. Disagree totally
  2. Disagree
  3. Not sure
  4. Agree
  5. Totally agree

Respondents are required to tick or circle their choice of answer based on the rating scale. The total score achieved by the respondents will be the sum of scores on all the items on the scale. If there are negative items on your scale, ensure that you recode those items first (see the Unit on Data Analysis).

7.2 Data Collection Procedure

Data can be collected through:

1. Face-to-face Interview
2. Mail
3. Telephone
4. Self-administration
5. Observation
## Strength and Weaknesses of Data Collection Procedure

<table>
<thead>
<tr>
<th>Method</th>
<th>Strength</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Face-to-Face:</strong></td>
<td>- Control on sample &lt;br&gt; - High response rate &lt;br&gt; - Response could be observe &lt;br&gt; - Condition of respondent can be determine &lt;br&gt; - Respondent can be encourage to talk</td>
<td>- Costly &lt;br&gt; - Interviewer can influence respondent’s answer through for example: - style of questioning - tone of voice &lt;br&gt; - Characteristics/Personality of interviewer - sex - race - age - economic status &lt;br&gt; - Condition of Interviewer - tired - unwell - 'moody' - bored &lt;br&gt; - Takes time to find respondent - wrong address - respondent not at home - remote distance between respondent &lt;br&gt; - Confidentiality not 100% guaranteed.</td>
</tr>
<tr>
<td><strong>Interview via</strong></td>
<td>- Save cost (time, money) &lt;br&gt; - Response is greater for sensitive question &lt;br&gt; - Respondents do not feel threaten</td>
<td>- Limited to telephone users only &lt;br&gt; - Short interview process &lt;br&gt; - Props or audio visual materials such as cards cannot be used</td>
</tr>
<tr>
<td>telephone: Interview conducted using the telephone</td>
<td>Survey by mail Questionnaire is mailed to the respondent</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>• Could limit respondent by determining an area based on telephone numbers</td>
<td>• Could survey remote areas on condition there is a good postal system.</td>
<td></td>
</tr>
<tr>
<td>• Could get quick information</td>
<td>• Less costly.</td>
<td></td>
</tr>
<tr>
<td>• Could telephone respondent for missing or overlook question</td>
<td>• No bias; the respondent is not in front of the interview.</td>
<td></td>
</tr>
<tr>
<td>• Refusal rate of response is low, i.e., between 1% to 33%</td>
<td>• Respondent can think before answering.</td>
<td></td>
</tr>
<tr>
<td>• Better than mailing, but not so compared to face-to-face interview</td>
<td>• Appropriate for a shy respondent.</td>
<td></td>
</tr>
<tr>
<td>• Could not trace if the real respondent is answering the questionnaire</td>
<td>• Possibility of questionnaire reaching respondent is high if the address is correct.</td>
<td></td>
</tr>
<tr>
<td>• Respondent worries about interviewer’s sincerity</td>
<td>• Could not do any probing on respondent answer.</td>
<td></td>
</tr>
<tr>
<td>o – thief</td>
<td>• Respondents could read the whole questionnaire before answering, which could influence their answer.</td>
<td></td>
</tr>
<tr>
<td>o – con man, etc.</td>
<td>• Researcher could not ensure who is actually answering the questionnaire.</td>
<td></td>
</tr>
<tr>
<td>• Could not trace non-verbal response</td>
<td>• Respondent may ask someone else to help answer the questionnaire.</td>
<td></td>
</tr>
<tr>
<td>• Unsufficient time for respondent to answer</td>
<td>• Respondent could not return the questionnaire.</td>
<td></td>
</tr>
<tr>
<td>• Quality of data may be easily affected compared to face-to-face interview</td>
<td>• Rate of refusal in answering the questionnaire is high, i.e., between 25-35%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Limited to easy question.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Probably difficult to obtain respondent’s complete address.</td>
<td></td>
</tr>
<tr>
<td>Self-administer</td>
<td>Observation</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Questionnaire is given to the respondent to answer by him or herself</td>
<td>Researcher actively record information needed in the research</td>
<td></td>
</tr>
<tr>
<td>Can distribute large number of questionnaire</td>
<td>Researcher takes notes, record or video-tape respondents behavior; evidence available directly</td>
<td></td>
</tr>
<tr>
<td>Save cost (time, energy, money)</td>
<td>May observe without involvement, or partly involve, or totally involve as part of the respondents</td>
<td></td>
</tr>
<tr>
<td>Avoid bias due to the present of interviewer</td>
<td>Observation is done in natural setting</td>
<td></td>
</tr>
<tr>
<td>Appropriate for shy respondent</td>
<td>The present of researcher may disturb respondent’s natural characteristics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Researcher’s could cause data bias toward a certain perspective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Researcher may be bored or tired or too excited to participate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Definition of event or behavior observed may changed according to situation depending on the duration the researcher is doing the observation</td>
<td></td>
</tr>
<tr>
<td>Unable to probe on respondent’s answer</td>
<td>Respondent can read the whole questionnaire before filling up the answer</td>
<td></td>
</tr>
<tr>
<td>Respondent is unable to ensure who had actually responded to the questionnaire.</td>
<td>Respondent may ask someone else to help answer the questionnaire</td>
<td></td>
</tr>
</tbody>
</table>
Preparations involve in mailing a questionnaire:

1. A letter of introduction stating
   - purpose of study
   - who should be contacted
   - address
   - telephone
   - declaration letter

2. Self addressed envelope.
   - sufficient stamp value
   (avoid troubling the respondent)

3. Easy to read (legible) and understand questionnaire.

4. Be ready with a follow-up letter in cases where you did not receive answer from
   the respondents.

PRETESTING

- Before a real study is conducted, it is advisable for the researcher to
  conduct a pilot study or a pretest.

- Choose as many respondent from the population that possess characteristics
  similar to the respondents in the real study. Typical for statistical purposes
  select not less than 30 respondents.

Purpose of Pretesting

1. To ensure that the questions are appropriate and easy to understand.

2. To verify work plan.

3. To estimate number of questionnaire for each enumerators and number of
   enumerators needed.
7.3 CONCLUSION

- Data collection process is a critical step in any research. You need to plan carefully so that the data collected are appropriate and meet the study objective.

- Research instrument is typically used in data collection. You usually use a questionnaire in your survey research.

- Research procedure comprises face-to-face interview, telephone interview, mail survey, self-administration and also observation. Each procedure has its own strengths and weaknesses.

EXERCISE

Identify an available research instrument. Analyze the appropriateness of its content, and state your recommendation if this instrument can or cannot be used for a certain study.
UNIT 8
DATA ANALYSIS

Data analysis is a step in the research process that must be well-planned. You need to plan at the beginning of your research on what statistic can be used for your study before engaging in data collection activity. This is important because a well-planned statistical method will help you to easily analyze your data and eventually interpret your data correctly.

You will begin to analyze your data after you have completed your data collection. The raw data that you have collected using your questionnaire need to be analyzed in order for you to obtain the information that you need for writing your research report. This Unit will explain to you how you would conduct quantitative data analysis. A licensed software that is typically used for analyzing quantitative data is the Statistical Package for Social Science (SPSS). The manual included in this unit is based on version 10 and beyong of the (SPSS 10.0, SPSS 11.0). You are advise to increase your knowledge in statistics to enhance your understanding in using the statistics. Without good comprehension of the statistics, you may find it very difficult to interpret your SPSS output. You may also be unable to identify alternative methods of analyzing your data if such understanding is absent.

Objective of Unit

At the end of this unit you will be able to:

1. Plan for quantitative data processing.
2. Utilize the *Statistical Package for the Social Sciences* (SPSS) for analyzing quantitative data.

3. Discuss the use of descriptive and inferential statistics.

**Read:**


### Content

- 8.1: Types of Statistical Test
- 8.2: Introduction to SPSS
- 8.3: Data Management
- 8.4: Testing for Reliability Value
- 8.5: Descriptive Statistic
- 8.6: Inferential Statistic
- 8.7: Summary

### 8.1: Types of Statistical Test

Before you begin analyzing your data, you need to know the scale of the measurement you use in your study. In addition, you need to determine what statistic you will use to analyze the data in your study.
You would surely still remember our discussions on the measurement scales in Unit 5. Tables 8.1.1 and 8.1.2 present a summary of the different statistical tests appropriate for different types of data.

Table 8.1.1: Types of statistics for categorical, nominal and ordinal scales

<table>
<thead>
<tr>
<th>Measurement scale</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Categorical, nominal, and ordinal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chi Square Test on</td>
</tr>
<tr>
<td></td>
<td>independent variables</td>
</tr>
<tr>
<td></td>
<td>Chi Square Test on</td>
</tr>
<tr>
<td></td>
<td>homogeneity</td>
</tr>
</tbody>
</table>

Table 8.1.2: Types of statistic for continuos or ratio scale

<table>
<thead>
<tr>
<th>Types of data</th>
<th>Test according to Hypothesis</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 variables</td>
<td>More than 2 variables</td>
</tr>
<tr>
<td>Ratio or Continuous</td>
<td>Relationship</td>
<td>Multiple regression</td>
</tr>
<tr>
<td></td>
<td>Pearson Product-Moment Correlation, Simple Linear Regression</td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>t-test</td>
<td>ANOVA</td>
</tr>
</tbody>
</table>
Exercise 8.1:

What kind of statistics that would be appropriate to analyze the relationship between father's age and quality of parental behavior?

8.2: Introduction to SPSS

SPSS is a program that is consumer friendly. Like any other applications based on Windows® 98, Windows® 2000, Me and XP, the SPSS program is organized at the Start menu.

- Click at Start, then go to Programs.
- Place your mouse to the SPSS icon for Windows, next click at the SPSS 11.0 for Windows icon.
- You will next see a diagram like in Figure 8.2.1 shown on the screen.
Figure 8.2.1: Starting screen for SPSS Program

- **Data View** is the place where you key-in your data that you will analyze.
- **Column** represents variable *row* represents case.
- **Variable View** contains description/definition of the characteristics of variables.
**Toolbar and Status bar in SPSS Program**

Before you venture into other procedures, you need to understand the definition of each icon found in the toolbar. Listed in the table below are some of the icons and their functions:

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open file</td>
<td>Open existing file</td>
</tr>
<tr>
<td>Save</td>
<td>Save new or existing file</td>
</tr>
<tr>
<td>Print</td>
<td>Printing a file</td>
</tr>
<tr>
<td>Dialog recall</td>
<td>Retrieving existing dialog</td>
</tr>
<tr>
<td>Undo/Redo</td>
<td>Cancel or repeat previous action</td>
</tr>
<tr>
<td>GoTo Chart</td>
<td>Go to a chart that has been labeled</td>
</tr>
<tr>
<td>GoTo Case</td>
<td>Go to a case with specific number</td>
</tr>
<tr>
<td>Variables</td>
<td>Cleaning an information related to a certain variable</td>
</tr>
<tr>
<td>Find</td>
<td>Finding a record</td>
</tr>
<tr>
<td>Insert case</td>
<td>Adding case (line) in a data file</td>
</tr>
<tr>
<td>Insert variable</td>
<td>Adding variable (column) in a data file</td>
</tr>
<tr>
<td>Split File</td>
<td>Separate/group case according to a specific criteria</td>
</tr>
<tr>
<td>Weight cases</td>
<td>Compensating case</td>
</tr>
<tr>
<td>Select cases</td>
<td>Choosing a case using a certain criteria</td>
</tr>
<tr>
<td>Value labels</td>
<td>Changing values to labels and vice-versa</td>
</tr>
<tr>
<td>Use sets</td>
<td>Creating different sets of variables</td>
</tr>
</tbody>
</table>
Functions of menu choices in the *Variable View* screen:

<table>
<thead>
<tr>
<th>Menu</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File</strong></td>
<td>Open and save file, retrieve data file, printing file content in <em>Data Editor Box</em></td>
</tr>
<tr>
<td><strong>Edit</strong></td>
<td>Editing, finding data values, changing <em>Options setting</em> etc.</td>
</tr>
<tr>
<td><strong>View</strong></td>
<td>Show or hide status bar, specific toolbar, grid line and variables values</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>Making changes on data file such as variable definition, arranging cases, choosing part of the total case, combing data file, etc.</td>
</tr>
<tr>
<td><strong>Transform</strong></td>
<td>Making changes on the characteristics of selected variables such as recoding the value of original variable to new value, computing mathematical operation on certain variables</td>
</tr>
<tr>
<td><strong>Analyze</strong></td>
<td>Choose and perform various statistical procedures needed.</td>
</tr>
<tr>
<td><strong>Graphs</strong></td>
<td>Producing various statistical charts or graphs such as bar charts, pie charts, scatterplot, etc.</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
<td>Getting information on variables in an active file</td>
</tr>
<tr>
<td><strong>Window</strong></td>
<td>Changing between SPSS windows currently open</td>
</tr>
<tr>
<td><strong>Help</strong></td>
<td>Getting tutorial and other information related to SPSS</td>
</tr>
</tbody>
</table>
8.3: Data Management

Data management comprises the following activities:

i. Building code book
ii. Data entry
iii. Cleaning data

Developing master coding

Developing a code book is a first step in data analysis. There are two ways of developing a master code book:

1. Using the questionnaire
2. In data file form

Function of master code:

- Main reference for data entry process
- Guide for identifying the location of variable and interpreting code in data file during the analysis.

- A code book must be developed before starting the process of data collection.
- In the process of developing a code book, we must give a code or acronym to represent all the variables/items in the questionnaire.
A sample of a questionnaire:

**PART 1: RESPONDENT BACKGROUND**

1. a) Respondent (mother) : __________ year

   b) Spouse age (if present) : __________ year

2. Your marital status?

<table>
<thead>
<tr>
<th>Status</th>
<th>Tick (/)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td></td>
</tr>
<tr>
<td>Divorce</td>
<td></td>
</tr>
<tr>
<td>Single due to death of spouse</td>
<td></td>
</tr>
<tr>
<td>Separate</td>
<td></td>
</tr>
</tbody>
</table>

**PART 2: MARITAL QUALITY**

Choose 1, 2, 3, 4, 5, 6 or 7 for your answer.

1= Extremely unsatisfied  
2= Not at all satisfied  
3= Somewhat satisfied  
4= Sometimes not satisfied  
5= Satisfied  
6= Very satisfied  
7= Extremely satisfied

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extend are you satisfied with your marriage?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. To what extend are you satisfied on your relationship with your spouse?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. To what extend are you satisfied on your relationship with your husband as a spouse?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. To what extend are you satisfied with the expression of love in your marriage?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8.3.1: Code Book Sample

<table>
<thead>
<tr>
<th>Name</th>
<th>Variable/Item (Labels)</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id</td>
<td>Identity</td>
<td></td>
</tr>
<tr>
<td>A01</td>
<td>Respondent’s age</td>
<td></td>
</tr>
<tr>
<td>A02</td>
<td>Spouse age</td>
<td></td>
</tr>
</tbody>
</table>
| A03  | Marital status         | 1= Married  
                                    2= Divorce  
                                    3= Single due to death  
                                    4= Separate |
| B01  | Marital Quality 1      | 1= Extremely not satisfied  
                                    2= Not at all satisfied  
                                    3= Somewhat satisfied  
                                    4= Sometimes not satisfied  
                                    5= Satisfied  
                                    6= Very satisfied  
                                    7= Extremely satisfied |
| B02  | Marital Quality 2      | 1= Extremely not satisfied  
                                    2= Not at all satisfied  
                                    3= Somewhat satisfied  
                                    4= Sometimes not satisfied  
                                    5= Satisfied  
                                    6= Very satisfied  
                                    7= Extremely satisfied |
| B03  | Marital Quality 3      | 1= Extremely not satisfied  
                                    2= Not at all satisfied  
                                    3= Somewhat satisfied  
                                    4= Sometimes not satisfied  
                                    5= Satisfied  
                                    6= Very satisfied  
                                    7= Extremely satisfied |
| B04  | Marital Quality 4      | 1= Extremely not satisfied  
                                    2= Not at all satisfied  
                                    3= Somewhat satisfied  
                                    4= Sometimes not satisfied  
                                    5= Satisfied  
                                    6= Very satisfied  
                                    7= Extremely satisfied |
Figure 8.3.1: Code book in *variable view* window of SPSS program

Figure 8.3.2: Code book in *data view* window of SPSS program
Variable definition

- All variable must be given a code name with not more than 8 characters to enable the SPSS program to function.

- Click at the Variabel View.

- Code name of variable is done in the Variabel View:
  - **NAME** — short name (e.g., identity, a1, d1, c2)
  - **TYPE** — type of data [numbord, coma, period, scientific equation, date, dollar, wordstring)]
  - **DECIMALS** — decimal place
  - **LABEL** — description for variable
  - **VALUE** — value, value label
  - **MISSING** — variable with no data [insert any appropriate value to represent the missing data, e.g., .999]
  - **MEASURES** — type of scale

- Click at the value to obtain the window as shown in Figure 8.3.3.

![Value Labels window](image)

Figure 8.3.3: Value Labels window

- Fill-up a value (in number form) in the value box.
• Type the following information in the value label box.

**Example:**

<table>
<thead>
<tr>
<th>Value</th>
<th>Value label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban</td>
</tr>
<tr>
<td>2</td>
<td>Rural</td>
</tr>
</tbody>
</table>

**Data Entry**

Existing data is entered after the code book is completed as shown in Figure 8.3.2. Insert data based on the response obtain from the respondent in the questionnaire. In this module, 999 is use missing data.

You may recall values for each variable with the following instructions:

- Click **Utilities**
- Next drag mouse to **Variables** from the menu bar to examine the values for all variables that you used.

![Figure 8.3.4: Window display for information on variable](image-url)

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**Figure 8.3.5:** Completed data entry
Data Cleaning

Recode data

- In general, you would recode data for at least 3 purposes:

  1. Changing continuous data to categorical data

      Example, changing age of student to categorical age.

      | Age (year) | Category |
      |------------|----------|
      | ≤15        | 1        |
      | 16-20      | 2        |
      | 21-25      | 3        |
      | ≥26        | 4        |

      Purpose:
      a. Changing data into categories to facilitate distributional characteristics of data.

  2. Reverse scaling of scores

      Example, arrangement of scores 1 = Mostly agree, 2 = agree, 3 = not so agreeable can be changed to 1 = Mostly not agree, 2 = agree and 3 = Mostly agree.

      | Old score | Statement       | New score |
      |-----------|-----------------|-----------|
      | 1         | Mostly agree    | 3         |
      | 2         | Agree           | 2         |
      | 3         | Mostly not agree| 1         |

      Purpose:
      a. Reverse Scaling to change data direction so as scores for positive and negative items accumulate in the same direction.
      b. Positive item
      a. Statement in positive terms.
Example: I feel I am a useful person.

c. Negative item
   a. Statement in negative term
      Example: Sometimes, I feel not useful at all.

d. Sequence of positive and negative items:

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>Direction (not recode)</th>
<th>Direction (after recode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Sometimes, I feel not useful at all.</td>
<td>1=MNA</td>
<td>4=MNA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2=NA</td>
<td>3=NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3=A</td>
<td>2=A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4=MA</td>
<td>1=MA</td>
</tr>
</tbody>
</table>

Recoding is usually done for negative items. By recoding both types of items total scores for the scale will be in the same direction.

3. Changing string data to numeric data

For example:

<table>
<thead>
<tr>
<th>String Data</th>
<th>Changes to numeric data after recoding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>1</td>
</tr>
<tr>
<td>Farmer</td>
<td>2</td>
</tr>
<tr>
<td>Accountant</td>
<td>1</td>
</tr>
</tbody>
</table>

- **RECODE** can be done in the following form
  - Value (1,2,3,...)
  - Value list (1,2, & 8)
  - Value range (1-10, 9-100)
  - String Data to Numeric Data
You are reminded to create a new variable when you do recode so that the original variable will not change.

Procedure in SPSS program for recoding data:

- Click Transform, click recode, then click Into Different Variables

- In the dialog box Recode Into Different Variables (see Figure 7.3.5), click the variable that you want to recode (negative item) (e.g., rb1, rd2, rd3), then click to transfer the variable to the box, Numeric variables-> Output Variable

- Click at variable rb1, then type ‘rb1new’ at the Name (new name) and ‘Self Esteem 1 is recoded at the Label.

- Then click CHANGE

- Click at OLD AND NEW VALUES

- In the OLD VALUES, click at VALUE. Type number 1 at the box in the right.

- Range is used to code continuous data data to category. For example, the variable age from continuous to category.

<table>
<thead>
<tr>
<th>Age (age)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤15</td>
<td>Lowest through 15</td>
</tr>
<tr>
<td>16-20</td>
<td>16 through 20</td>
</tr>
<tr>
<td>21-25</td>
<td>21 through 25</td>
</tr>
<tr>
<td>≥26</td>
<td>26 through highest</td>
</tr>
</tbody>
</table>

- In the NEW VALUES section, click at VALUES. Type the number 4 in the box on the right.

- Click at ADD

- Repeat all the above procedures for the remaining 2 items (change 2 to 3, change3 to 2, and change 4 to 1). Make sure you click ADD after every new value.

- Click CONTINUE

- Click OK
You will find that the new variable for rb1, rb2 and rb3 (that were recoded) displayed at the data view window.

You can also make sure that the recoding process is correct by comparing the score for your old with the new variable.

Compute Data

- Through computing the data you will be able to obtain your respondent total score on the scale that you have administered.
- You need to compute your data before you run your descriptive analysis for statistics such as mean, mode, median, standard deviation.
- Technically, the procedure compute data means
  - Using the available data for creating a new variable in the form of a number.
  - For example, to obtain the total score for the 4 item in the marital satisfaction scale.
- You can get the total score for a scale that you used by using the procedure COMPUTE
- The procedure COMPUTE will enable you to form and adjust a variable that you measure by adding all the values for the variable.
- The mathematical operation that can be used will include:
  - '+' -- add
  - '-' -- minus
  - '/' -- divide
  - '*' -- multiply
- For example, to calculate the total score for the 4 items of the marital satisfaction scale, choose the following menu available in the SPSS program,
  - Transform
    - Compute...
- **Target Variable**: Type the name for the new variable created. For e.g., type marital, which would mean the total score obtained by adding score in item 1 to 4 of the marital satisfaction scale.

- Click the first variable that you will put in the formula and move it into the box, *Numeric Expression*.

- Click the add sign (+) at the calculator.

- Add the rest of the variable using the + sign to sum up all the items. The complete formula is as follows:

  \[ B01 + B02 + B03 + B04 \]

- Click OK. You will find the new variable *marital* is already created in the data set and you can see it in your data view.
Exercise 8.3:
Create a data file based on the questions below:

SECTION 1: RESPONDENT PROFILE

1. Age: ______ year,

2. Sex: □ Male □ Female

3. Race: □ Malay □ Indian □ Chinese □ others (please state:__________)

4. Religion: □ Islam □ Hindu □ Buddha □ Christian □ Others (please state:__________)

5. Job status: □ Student □ Employed □ Unemployed

SECTION 2: MARITAL CONFLICT

1= Never
2= Rarely
3= Sometimes
4= Often
5= So often

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Discuss issue calmly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Find information to support own views.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Bring or try to bring a person to help solve the following problems:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. In your opinion, what would be the quality of marriage to you? (conflict/problem/satisfied)

__________________________________________________________
8.4: Testing for Reliability

To run the reliability test your scale must comprised more than one item. You will run the reliability analysis after you have completed the recoding procedure. The reliability analysis allows you to run the test on different items individually, and this will help you to choose the most appropriate scale to use.

To compute the reliability analysis, choose the following from the menu,
  - **Analyze**
    - **Scale**
      - **Reliability analysis**

Figure 8.4.1 displays how to run the reliability analysis.

![Reliability Analysis Dialog Box](image)

Figure 8.4.1: The dialog box on reliability test

Choose item that you want to run the reliability test from the box on the left, click at the arrow to move it to the box on the right. For example, for the Marital Satisfaction Scale (Schumm, 1996; Rumaya, 1997) (Item mq1 to mq4).
• In the section Reliability Analysis, tick the List item labels to list the descriptions for each items.

• At the box, Model, choose Alpha.

• We expect there will be a positive correlation amongst the items in the scale since all the items basically measure the same phenomenon.

• Click at Statistics... Then tick item and scale if item deleted at the box, Descriptives for. Click Continue to return to Reliability Analysis (see Figure 8.4.2).

![Reliability Analysis: Statistics](image)

Figure 8.4.2: Reliability Analysis: Statistics

• Click at OK to get the result of the analysis at the OUTPUT window that listed the items (average and standard deviation for each item), relationships amongst items in the scale, number of cases/respondents, total item in the scale and the alpha value.

• Table 8.4.1 shows the list of items in the marital satisfaction scale. The interpretations of the output are as follows:
  
  o The marital satisfaction scale consists of 4 items that measure the level of the marital satisfaction of the respondent.
Table 8.4.1: List of items in the Marital Satisfaction Scale

<table>
<thead>
<tr>
<th>RELIABILITY ANALYSIS - SCALE (ALPHA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MQ1 How satisfied are you with your marriage?</td>
</tr>
<tr>
<td>2. MQ2 How satisfied are you with your relationship with your partner?</td>
</tr>
<tr>
<td>3. MQ3 How satisfied are you with your husband as a partner?</td>
</tr>
<tr>
<td>4. MQ4 How satisfied are you with your expression of love in your marriage?</td>
</tr>
</tbody>
</table>

- Table 8.4.2 displays the descriptive statistics for each item, result of the analysis allow you to describe the characteristics of each item (mean and standard deviation).

Table 8.4.2: Descriptive Statistics for Marital Satisfaction Scale

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MQ1</td>
<td>6.0000</td>
<td>1.0828</td>
<td>30.0</td>
</tr>
<tr>
<td>2. MQ2</td>
<td>5.9333</td>
<td>1.0148</td>
<td>30.0</td>
</tr>
<tr>
<td>3. MQ3</td>
<td>5.9333</td>
<td>.9803</td>
<td>30.0</td>
</tr>
<tr>
<td>4. MQ4</td>
<td>5.9333</td>
<td>1.2847</td>
<td>30.0</td>
</tr>
</tbody>
</table>
Interpretation of output in Table 8.4.2,

- Generally, the mean value for the items ranged from 5.93 and beyond. Item MQ4 has the largest standard deviation, i.e., 1.28.

Table 8.4.3: Inter-items correlations for the Marital Satisfaction Scale

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation if Item Deleted</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ1</td>
<td>17.8000</td>
<td>9.3379</td>
<td>.8442</td>
<td>.9151</td>
</tr>
<tr>
<td>MQ2</td>
<td>17.8667</td>
<td>9.3609</td>
<td>.9188</td>
<td>.8937</td>
</tr>
<tr>
<td>MQ3</td>
<td>17.8667</td>
<td>9.9126</td>
<td>.8462</td>
<td>.9170</td>
</tr>
<tr>
<td>MQ4</td>
<td>17.8667</td>
<td>8.3954</td>
<td>.8127</td>
<td>.9348</td>
</tr>
</tbody>
</table>

Reliability Coefficients

N of Cases = 30.0
N of Items = 4
Alpha = .9346

- Table 8.4.3 above displays the relationships amongst items in the scale.
- The first column (scale mean if item deleted) show the mean for the scale if the item is removed from the scale.
- The column 'scale variance if item deleted' shows the variance of the scale if the item is deleted.
- The column 'corrected item-total correlation' is the Pearson Correlation values amongst the individual item with the total item score for the rest of the items in the scale. For example, the correlation for the item, MQ1 with the total item score,
MQ2, MQ3 and MQ4 is 0.84. This shows that the correlation of the item MQ1 with other items in the scale is high.

- The column ‘Alpha if item deleted’ show the Pearson Correlation results if the item in the scale is deleted.
  - Based on the analysis in this row, you can identify which item does not have strong and positive correlation with other items in the scale.
  - In other words, when can you dropped an item to elevate the Cronbach Alpha value for the total scale.
  - For example, in the case of the marital satisfaction scale, if you dropped item MQ4, the alpha value will increase to 0.93 (see Table 14). However, in this case, MQ4 need not be dropped because all the items indicated high correlation.

- **N of cases** is the total case that is being analyze.
- **N of item** is the total item in the scale.
- **Alpha** is the Cronbach Alpha value. The following can be interpreted from the alpha Cronbach value:
  - The Cronbach Alpha value indicates the extend of the correlations between the scale that is being used and any other 4-item scale that measure the same phenomena. All items used in the scale can considered as selected sample from a group of items in the universe.
  - The Cronbach Alpha value typically ranged from 0 to 1. You will get negative value if the item in the scale is not related positively, and the reliability model cannot be used.
  - The level of the correlation based on the Cronbach alpha can be interpreted as follows:

<table>
<thead>
<tr>
<th>Alpha value (α)</th>
<th>Level of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.3</td>
<td>Weak correlation</td>
</tr>
<tr>
<td>0.3 - 0.5</td>
<td>Low correlation</td>
</tr>
<tr>
<td>0.5 - 0.6</td>
<td>Medium correlation</td>
</tr>
<tr>
<td>0.7 - 0.9</td>
<td>High correlation</td>
</tr>
<tr>
<td>0.9 - 1.0</td>
<td>Very high correlation</td>
</tr>
</tbody>
</table>
- The higher the correlation, the higher the reliability. For example, if the $\alpha$ value is 0.90, this means that the scale can predict as much as 90% of the variance in the variable.

- One of the reason for getting low $\alpha$ is due to the too few items in the scale. The more items in the scale, the higher the $\alpha$ value.

- Interpretation of output,
  - The $\alpha$ Cronbach value for the Marital Satisfaction scale is 0.93. This shows that the scale has high internal consistency and is thus, reliable.
8.5: Descriptive Statistic

The descriptive data can allow you to describe the basic characteristics of the data such as the mean value and the difference between a score and another score. In addition to frequency (n) and percentage (%), other descriptive statistics can also be used to describe and summarize your data such as mode, median, mean, standard deviation and z score.

- To obtain the descriptive dialog box (see Figure 7.5.1 and 7.5.2), choose the following menu:
  - Statistics
    - Summarize
    - Descriptives...
      - Choose variable that you want .... click the cursor

Options ... (tick mode, mean, median, standard deviation, range, minimum, maximum)
Measuring central tendency:

- **Mode**
  - A value that often emerge
  - Appropriate for all variables, but mostly for nominal/categorical (no orderly arrangement) variable such as sex. For example, mode for sex is male for 15 males and 12 females respondents.

- **Median**
  - The middle number for any distribution of scores.
  - For example, in the set of score 1,3, 5, 7 and 9, the median is 5. For the set 1,2,3 and 4, the median is between 2 and 3, or 2.5. This means that half of the score is less than 4 [the rest is (50%) more than 4].
  - Appropriate for measuring ordinal, interval and ratio.

- **Mean**
  - Is the total score divided by the frequency in the data set.
  - Mean is appropriate for interval and ratio variable.
  - The mean value for categorical or nominal variable (e.g., sex or identity number) is meaningless. What would the meaning be of adding a male and female, dividing it by two? Of course, it brings no meaning at all.

Measuring dispersion value

- **Range**
  - The difference in score between the high (maximum) and low (minimum) score.
  - Range is a gross measure for a data set distribution. However, it can briefly reflect the variation amongst the scores in the data set. For example, the age range for the respondents in your study is between 13 and 25 years.

- **Standard deviation**
  - Is a measurement that is most often use to reflect the distribution of the data in the data set.
Standard deviation is the mean difference in every individual score from the mean of the data set. The bigger the standard deviation, the bigger the dispersion of the data in your data set.

- **Statistic Table gives the following information:**
  - N Valid – case/respondent counted in the analysis.
  - Missing – case/respondent that is not counted during the analysis; maybe the respondent answer or the question is not relevant for the respondent.
  - Statistics – mean, mode, standard deviation, minimum and maximum.

- **Frequency Table gives the following information:**
  - Frequencies according the category or group (e.g.: male and female).
  - Percent refers to the % counted based on the total number of respondents involved in the study without considering the respondent answer or did not answer the question.
  - For accurate percentage you need to refer to the valid percent column. The valid percent does not take into account respondent who does not answer any question.
  - Cumulative refers to the accumulated percentages.
8.6: Inferential Statistics

Inferential statistics is used to imply the sample characteristics to the population from where it is taken. This statistic is typically used to analyze two (bivariate) or more (multivariate) simultaneously. In this section, the inferential statistic tests that are often used to test the difference in mean value between two groups (Ujian-t) and the relationship between two variables (correlations) will be discussed.

T-test

- This test is used to compare the mean values on two variables (continuous data) for one group, or one variable (categorical data) for two groups.
- There are two types of t-test:
  1. Independent samples t-test
  2. Paired samples t-test

Independent samples t-test

- Independent samples t-test is used to compare the differences in terms of mean between two groups on a single variable.
- For Independent samples t-test, every case must have scores for both variables, i.e.:
  1. Group variable – dividing case into two different groups (mutually exclusive). For example: Sex (male and female).
  2. Test variable – defined variables in quantitative term (score) For example: Self-concept, academic achievement.
Based on Independent samples t-test, you can measure whether the mean for a variable for a group is significantly different from the mean for the second group.

An example of a hypothesis testing:

H₀: There no significant different in the academic achievement between the male and female students.

Independent samples t-test is done as follows:

- Analyze
  - Compare Means
    - ...Independent-samples T-test

- ...include independent variables

- Click at grouping variables
  - define group (e.g., Group 1: type 0 (male) and Group 2: type 1 (female))

- Click at Continue...include dependent variable

- Click Test variables

- Click Ok

**Paired sample t-test**

Paired sample t-test is used to compare the mean value between two different variables. It is normally applied in the following form of research: 1). Repeated measure, and 2). Paired subject.

**Repeated Measure**

- Respondent is evaluated in two situations or different circumstances for one measure. For example: The heart beat rate of students before the and after take the test.

- Each respondent has two different variables for the same measure in the SPSS data file. For example, variable 1 represent the first score for the measure, while variable 2 represent the second score.

- The question to be answered is, “Is the difference in mean scores for both situations significant?”
Paired Subject

- Each respondent has a partner and both are assessed as a pair using the SPSS program. For example, you want to assess if a child is taller than his father, you can measure both child and father for that purpose.

- Each pair represents a case and has scores for two variables:
  - Score for respondent 1a in situation A
  - Score for respondent 1b in situation A

- The same question is formulated for repeated measure study, “Is the difference between the two mean scores significant?”

- To analyze using paired t-test would involve the following procedures:
  - Analyze
    - Compare Means
      - Paired-Samples T-Test (the dialog box Paired Samples T-Test will appear on the screen).

- All variables in the file will be displayed like in the box on the left.

- Click at variable A,
  ...variable A appears as variable 1 in the Current Selections.

- Click at variable B
  ...variable B appears as variable 2 in Current Selections.

- Click the cursor to move the paired variable A-B to the box, Paired Variables.

- Click OK.
Corelational Test

- Correlational test is used to test the relationship between two variables.
- There are various correlation models such as Pearson Correlation, Spearman's rho and Kendall's tau-b.
- Pearson correlation model is used when the two variables are in continuous or interval measure and have a normal distribution. For ordinal scale, you need to use the Spearman's rho.
- An example of a hypothesis to be tested:
  $H_0$: There is no relationship between the age of the mother and her level of marital satisfaction.

- The correlational test is done as follows:
  - Analyze
    - Correlate
      - Bivariate
  - Determine which correlational model you want to use.
  - Determine the type of test you want; one-tailed or two-tailed.
  - Click Options if you want to display descriptive for both variables.
  - Click Continue.
o Interpretation of the correlational test is as below:

<table>
<thead>
<tr>
<th></th>
<th>Family Function</th>
<th>Marital Conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Family Function</strong></td>
<td>1</td>
<td>.595</td>
</tr>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td><strong>Marital Conflict</strong></td>
<td>.595</td>
<td>1</td>
</tr>
<tr>
<td><strong>Pearson Correlation</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

**The correlation is significant at the 0.01 level (2-tailed).**

8.7 CONCLUSION

- Data gathered in a research need to be analyzed so that they can be interpreted according to the objective of the study.
- The level of measurement of the data will influence the type of the statistical test that can be used in the data analysis process.
- Descriptive statistics will allow for the description of the basic characteristics of the data.
- The use of inferential statistics will allow you to estimate to what extent the study sample represent the population of interest.
UNIT 9
RESEARCH REPORT

After a long and tedious research, you would surely want to write the results of your research in a manner that can be read and understood by target group. Your study is considered incomplete until you have completed a report that can be assessed by a third party. A research report is typically written for a specific audience or following a certain requirement. There are reports written for academic journal, or to be sent out to the sponsoring agencies, or for conference presentation. For academic research report, your report will be evaluated to meet the requirements for graduation. For the the purpose of this course, your report need to follow the format determined by your university.

Unit Objective

At the end of this unit, student will be able:

1. Describe the basic components of research report.
2. Discuss important concepts in related to the basic components.
3. Evaluate research report based on the components learned.
Unit Contents:

9.1 Writing Format
9.2 Writing Technique
9.3 Summary

References:


9.1 Writing Format

A research report is written according to its various sections. Generally, a research report contains the following parts. The description of each part follows.

- Title page
- Abstract
- Abstrak
- Texts including introduction, Literature Review, Method, Results and Discussion
- References
- Appendix
- List of Tables
- List of Figures
Title Page
The title page is the first thing a reader will look at when receiving your report. This title page must present the information that is clear, simple and accurately of the research. As you have learned in the previous units, your research title must be clear, workable, and need not be translated for the reader to understand. A good title would provide the importance of the research and its content. The title page for Final Year Research Project at the Faculty of Human Ecology, Universiti Putra Malaysia comprises the following:

- Name of Department and Faculty where you are studying
- Title of Report
- Name of Writer
- Year the report is published

Abstract
Abstract is a brief content of the research report that you wrote. Abstract should provide enough information for your reader to understand about the purpose and the results of your study. Abstract is typically written concisely, accurately and focus only on the facts related to the study. Elements you would normally find in an abstract are as follows:

- Statement of the problem
- Description of the sample such as size and background information, and main variable studied.
- Research results
- Conclusion
Text
The first page of a report begins with the title. A title is usually written using a first letter-cap. After the title, you need to start your writing with an introduction of the report. You need not write the word “introduction” since, this section is already begins in the very first part of the report and aims at providing an overview of the whole report. In other words, this section acts like a framework for the whole research report.

A good introduction will provide the reader with a brief introduction of the problem of the study, its purposes and importance. The statement of the problem need to be written clearly to convince the reader that the problem is worth studying. This is a section where you do not have to discussion your literature review at length but, suffice it to say that you can include pertinent reviews that are closely related to your study. Basically, this introduction section is a place for you to help your reader understand and appreciate the importance of your study. Thus, your statement of your problem is extremely important in this section. After stating the problem, you may include some research questions that you like to address in your study, followed by the main and specific objectives. If necessary, you can list down the hypotheses that you like to test in your study.

Literature review
As discussed in earlier unit, the purpose of the literature review section is to inform your reader that your have made indepth and current reviews related to the topic of your study. This section will also indicate that how your study would contribute to the existing body of knowledge. Generally, you should be able to conduct an analytical and critical review of the contribution of past studies in the area that your are focusing, what theories were available and how they could be used to guide your research, what comparison could you make, what concepts and variables have been utilized. Given that there are abundance of materials that you could review, you need to intelligently choose which materials are relevant for you to include in this section. After completing your analysis on the available
literature, you will find yourself able to trace a gap in the literature or an area that you find need to be validated. This then could serve as the justification for why you need to conduct your study.

One important aspect that you need to remember is regarding the originality of your study, that is your totally need allow to plagiarize someone else research or materials. Studying the literature does not mean you to report only on the research findings of past researchers; you need to critically evaluate those findings. You actually need to compare, reject, accept or argue on past findings relevance to your context. If in any case you disagree or reject any past findings, you need to explain or make equivalence comparison, for example, you could based your arguments on theories or more convincing findings that indicated quality control with regard for example, sampling strategy or research design.

**Methodology**

The methodology section describe to the reader how the study is done. The whole study procedure need to be described to reader so that replication especially if the study is of high quality, is possible. There are some variations in writing the methodology. Generally, this section includes a description of the respondents, instruments used and the analysis conducted. You would also discussed about your sampling technique, variables and their measurements, instrumentation and statistical procedures used. Information that could be provided related to these aspects are as follows:

- **Respondent:** whom did you study, how many were involved, how were they identified?
- **Instrument:** Tools and method for your data collection. Were you using a questionnaire that includes standardized instruments (if the instrument is already established, you do not need to describe it in detail), how did you administer the questionnaire – interview, self-administered, etc.
• Data Analysis: Did you used a certain statistical programme, what statistical test did you conduct, were inferential statistics needed, and etc.

Results
The results of the data analysis are presented in details the results section. This is the time you may want to look back at your conceptual framework and research objectives. The summary (mean, standard deviation, frequency, correlation coefficient) of your data can be presented in a table or graphic form such as histogram, pie chart or scatter plot. Statistic can be reported in two decimal places only. Discussion on descriptive findings can be interpreted directly. Arrange your tables based on your study objective so that your discussions on the findings are more systematic. Include only important findings as needed in the stated objective. If you are testing hypothesis, state your whether your null hypothesis is rejected or failed to be rejected.

Discussion, Conclusion and Recommendation
The discussion section of a research report is sometimes combined with the results section. Nonetheless, some researches prefer them to be separated; in which case the discussion section is included in the last chapter of the thesis. In this section, you need to discuss your findings in the context of your study objectives. By referring to your conceptual framework, you would find the discussions flow in a more systematic manner. You need to examine your descriptives findings, results of your hypotheses testing, and findings at the bivariate and multivariate levels before you can discuss your findings. Why a null hypothesis successfully rejected or failed to be rejected shall also be discussed in the contexts of the study. A concrete and logical argument need to be presented to defend your findings. At the end of this section you need to compare your findings with those of previous research; describing in details any weaknesses or limitations noted and providing recommendations for what future researchers can do. This would reflect the contribution of your study to the related field of knowledge.
References
All the materials that you refer to in your study need to be listed according to an acceptable format. References such as books, journal articles, articles from the web, reports on secondary data, etc., must be listed in details. The purpose of recording the references is to allow the reader to refer to the same materials if they want to. The reader can also make an assessment on the extent of your literature review and your knowledge on the the depth and the breadth of the your research topic. If the reference list is too short and out-dated, this can reflect that you did not fully examine past research before you conduct the your study.

Appendix
All materials that are important for your study but, not so important to be included in the research report can be attached as an appendix to your report. The idea of the appendix is for readers to make additional references on a certain aspect that are interested in. All the materials included in the appendix must be listed in the appendix page. Examples of materials that can be included in the appendix are maps, authorization or permission letters, and details graphic presentation of your data.

9.2 Writing technique

In this section you will be introduced to a guide to writing a research report. A guide to the proper format for writing a final year research report is available for students of Faculty of Human Ecology. Final year students enrolling for FEM 4999 will get a copy of this guide book upon meeting with the course supervisor.

Research report is an academic writing that follows a certain format. Below are examples of the sequence of the contents that you may find in a research report. Details of each are discussed.
1. Title page
2. Acknowledgement
3. Table of Content
4. List of tables, figures and appendixes on a page by itself
5. Abstract (in English & Malay if required)
6. Introduction
7. Literature Review
8. Methodolog
9. Results and Discussion
10. Summary and Recommendation
11. Bibliography or List of References
12. Appendix (if, any)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description &amp; writing technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Title page&lt;br&gt;Reflect your study variables in brief; avoid unnecessary words such as, “A study on...or a case study on...an exploratory study.”</td>
</tr>
<tr>
<td>2</td>
<td>Acknowledgement&lt;br&gt;Introduce and give appreciation to those who have contributed to the success of the study.</td>
</tr>
<tr>
<td>3</td>
<td>Table of content&lt;br&gt;The frame to your texts indicating the locations of the main and subtopics of your report.</td>
</tr>
<tr>
<td>4</td>
<td>List of tables and figures&lt;br&gt;List of all tables and figures with given numbers and title. If a table is less than half a page, include it with the text; bigger tables (more than half a page, need to be on a page by itself). Avoid including too many tables. Some variables or items can be summarize in one table</td>
</tr>
</tbody>
</table>
(e.g., background information of respondents).
Not all variables need to be presented in a table; sometimes a brief description is appropriate.
Tables must appear immediately in the page where it is mentioned (on the same page if table is small; on a new page if table is big).
Only horizontal line is need in drawing the table.

5 Abstract (& abstrak, if necessary) Include the objective, brief methodology, main findings, conclusion & implication in less than 300 words.

6 References in the texts All academic papers referred must be listed. Give priority to current research (5 years back), with exception papers that are philosophical, theoretical, historical or classic. Fictional or non-academic papers are not encourage. Include local references as much as possible as comparison to others.
Ensure that all authors cited in the text are listed. You want to check the acceptable format for citation from your faculty or refer to the Project Guide Book prepared by your faculty for your course.

7 Methodology All procedures are described clearly in details, including research design, locations, sampling, procedures, limitation and analyses.

8 Research results, discussion, summary & recommendation As in the noted above in the format for writing.

9 References/Bibliography List of references are listed in alphabetical order according to the first author.
Style of writing a reference is different for different resources (journal, books, reports, web pages, etc.)
Check the style for writing required. For example, American Psychological Association (APA); Chicago?
Only original references that your truly referred can be included in the reference list. Do not get
catch either in intentional and unintentional plagiarism.
Plagiarism means taking someone else’s work without giving credit to the original writer.

10 Typing the research report

- Type your report on a A4 (21 cm x 29 cm) white bond paper, 80 gram in weight).
- Use 2 line (double spacing) except for tables, references/bibliography and quotations
- Use font 12 Times New Roman or Arial
- Live about 2.3 cm at the top, right and bottom of page, and 4 cm on the left. A space of 6.5 cm is needed for the title page
- Title is type using capital letters and centered.
- The first line for a new paragraph is indented at 5 points spacing.
- Tables, graph, and figures are on a page by itself (except those that are small in size).
- Check with your school or faculty requirement with regard to page set-up, for example can you fully justified a page or leave it unjustified.
9.3 CONCLUSION

- One of the ways to determine if a research is complete or otherwise is through the completion of a research report.
- Research report is an academic writing that must abide by certain format to meet the requirements of the intended audience.
- It is important to create a check list for the format and writing technique for your report to ensure that you meet the stipulated requirements.