

ACADEMIC PROGRAMME: BSCS COMPUTER SCIENCE

COURSE CODE AND TITLE: BSCS 305: COMPUTING RESEARCH METHODS

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INTRODUCTION SECTION OF RESEARCH

Expected Learning Outcomes:

By the end of this lesson, you should be able to:

- i. Understand the various components of introduction section
- ii. Know basic terms of introduction section

Introduction

- ❖ A research process often starts by formulating a research problem
- ❖ The research problem can be investigated through research procedures
- ❖ This section will focus on identifying a research problem, and the characteristics that make a good research problem

Identifying a research problem

- ❖ There is unlimited research problems that can be identified
- ❖ This is because knowledge is infinite and we process a small portion of it
- ❖ The first step in selecting a research problem is to identify the broad area that one is interested in
- ❖ Examples in the field of technology include information security, technology use in organizations, technology usability issues, etc
- ❖ After the broad area of research, one would then select a specific problem they would like to research
- ❖ The researcher should identify the key factors that will help in identifying the researchable problem
- ❖ A good research problem should:
 1. Lead to findings that have widespread implications in a particular area
 2. Challenge some commonly held truism
 3. Review the inadequacies of existing laws, policies
 4. Covers reasonable scope i.e not too narrow or too general

❖ The factors that determine the scope of a study include:

1. Time availability to carry out the research
2. Money available
3. Availability of tools and equipment to carry out the research
4. Availability of subjects or units of study

Methods of identifying a research problem

- ❖ Use existing theories – research on existing theories to form a basis of what you are researching
- ❖ Use existing literature – read books, and articles in your area of study
- ❖ Discuss with experts – have discussion in seminars or class with experts in the area of interest
- ❖ Previous research studies – review the previous research that has been done would provide researchable projects that could add to the knowledge that has been built by others
- ❖ Replication – a past study could be replicated with the same methods. Done to find out if a study holds the same results over time
- ❖ The media – issues that are discussed in the media could also inform on areas to focus on study
- ❖ Personal experiences - you might also have reflected on issues and have had intuition

Stating the problem

- ❖ A research study will usually start with a brief introduction
- ❖ Introduce the general area of study
- ❖ The researcher will then narrow down to the specific area of interest
- ❖ Follow the funnel approach (global to local)

Characteristics of a good problem statement

1. Written clearly to capture researcher's interest
2. Research problem can be objectively researched
3. Indicates the scope of the research problem
4. The importance of the study in adding new knowledge is stated clearly
5. The problem statement must give the purpose of the research

Stating the purpose

- ❖ As stated, the researcher will start with the general concept of the problem then focuses to the specific
- ❖ The purpose of the study is where the researcher conveys the focus of the study
- ❖ The purpose of the study is where the researcher crystallizes the researcher's inquiry into a particular area of knowledge in a given field
- ❖ If the research purpose is accurately expressed, the research process will be carried out with ease
- ❖ If the research purpose is poorly formulated, the researcher will not find the desired answers
- ❖ A research purpose should not be expressed in a general form like the following phrases:
 - Using incentives in primary schools
 - Shortages of low-cost housing in Kenya
 - Nutrition in children
 - Cyber-threats in Kenya commercial banks
 - Computer network problems in banks
 - The lack of creativity in college students
- ❖ The phrases would need to be narrowed down to specific purpose statements in order to facilitate the research process

Stating the purpose - characteristics

- ❖ The purpose must be indicated clearly, unambiguously and in a declarative manner
- ❖ The purpose should indicate the concepts or variables in the study
- ❖ Where possible, the relationship among the variables should be stated
- ❖ The purpose should state the target population
- ❖ The variables and target population given in the purpose should be consistent with the variables and targets population operationalized in the methods section of the study

Examples of Good Purpose Statements

- ❖ The purpose of this study is to investigate the resource management skills of women in small-scale businesses in Kenya
- ❖ The purpose of this study is to compare the effects of three types of cattle feed on the productivity of milk in cows
- ❖ The purpose of this study is to determine the effect of alcohol on reaction time in heavy truck drivers in Kenya

- ❖ The purpose of this study is to examine the influence of high school curriculum on the career choices of women in public and private universities in Kenya
- ❖ The purpose of this study is to find out the relationship between cattle grazing practices and land degradation in marginal areas in Kenya
- ❖ The purpose of this study is to find out the critical success factors for adopting cloud technology in Kenyan national referral hospitals
- ❖ The purpose of this study is to establish the relationship between the interest of programming in computer science students in Kenya

Stating the Purpose – Choosing the Wording

- ❖ When choosing the purpose of the study, the right words should be used
- ❖ The researcher should avoid the use of value-laden, biased or subjective words or sentences in expressing the purpose
- ❖ The focus should be to the verbs that are used to state the purpose
- ❖ In the table, the verbs in column A are biased and subjective.
- ❖ The verbs in column B are neutral and commonly used in stating the purpose

Biased	Neutral
To show	To determine
To prove	To compare
To confirm	To investigate
To verify	To differentiate
To check	To explore
To demonstrate	To find out
To indicate	To examine
To validate	To inquire

To explain	To establish
To illustrate	To test

Stating the Objectives

- ❖ Research objectives are those specific issues within the scope of the stated purpose that the researcher wants to focus upon and examine in the study
- ❖ Objectives help the researcher to keep to the scope of the study by defining the area of knowledge that the researcher is focusing on
- ❖ The use of neutral verbs or phrases is also used applied in stating the objectives
- ❖ **Purpose:**
 - The purpose of this study is to explore the influence of resource management skills on the performance of small scale businesses owned by women in rural areas of Kenya
- ❖ **Objectives:**
 - i. To identify the socio-economic status of small-scale businesswomen in rural areas of Kenya
 - ii. To investigate the saving practices of women in rural areas of Kenya
 - iii. To investigate the financial management practices of women in rural areas of Kenya
 - iv. To determine the level of knowledge of management processes among women in rural areas in Kenya
 - v. To investigate the sources of information on the management processes in rural areas in Kenya
- ❖ Some authors prefer that objectives be in question form
- ❖ Objective i) above could be stated as:
 - What is the socioeconomic status of small-scale businesswomen in rural areas of Kenya?
- ❖ Objectives help specify the particular issues to be examined
- ❖ They also help guide the researcher in formulating testable hypotheses

Formulating Hypotheses

- ❖ A hypothesis is a researcher's prediction regarding the outcome of the study
- ❖ A hypothesis states possible differences, relationships or causes between two variables or concepts
- ❖ Hypotheses are derived from or based on existing theories, previous research, personal observations or experiences
- ❖ A study can have one hypothesis or several if there are many variables
- ❖ Each hypothesis will usually express a predicted relationship between two or more variables or concepts
- ❖ Formulating hypotheses should be done after doing the literature review but before the data collection
- ❖ In areas where there is no support of theory and previous research, formulating hypotheses should be avoided
- ❖ It is also hard to formulate hypotheses in some types of research, like exploratory
- ❖ Before formulating hypotheses, it is important to have a lot of thought on them, because the research revolves around the stated hypotheses
- ❖ It is the hypotheses which are put to empirical tests in the study
- ❖ The test of a hypothesis will entail collecting and analysing data that might either support or fail to support the stated hypothesis
- ❖ Testing a hypothesis does not prove or disapprove the hypothesis
- ❖ The data that has been collected will help to determine whether hypothesized relationship is there
- ❖ If the result fail to support the hypothesis, it does not mean that the study has failed

Purposes of Hypotheses

1. Hypotheses provide direction. They bridge the gap between the problem and the evidence needed for its solution
2. Hypotheses ensure collection of the evidence necessary to answer the question posed in the statement of the problem
3. Hypotheses enable the investigator to assess the information he or she has collected from the standpoint of both relevance and organization
4. Hypotheses sensitize the investigator to certain aspects of the situation that are relevant regarding the problem at hand.
5. Hypotheses permit the researcher to understand the problem with greater clarity and use the data collected to find solutions to problems

6. Hypotheses guide the collection of data and provide the structure for their meaningful interpretation in relation to the problem under investigation
7. Hypotheses form the framework for the ultimate conclusions as solutions. Researchers usually base their conclusions on the results of the tests of their hypotheses

Characteristics of Good Hypotheses

1. They must state clearly and briefly the expected relationship between variables
2. They must be based on a sound rationale derived from theory, or previous research, or professional experience
3. They must be consistent with common sense or generally accepted truths
4. They must be testable. Data can be collected to support or fail to support hypotheses. This also implies that the variables stated in the hypotheses can be operationalized
5. They must be testable within a reasonable time.
6. They must be related to empirical phenomena. Words like “ought”, “should”, “bad” reflect moral judgement and should be avoided
7. Variables stated in the hypotheses must be consistent with the purpose statement, objectives and the operationalised variables in the method section
8. A good hypothesis must be as simple and as consistent as the complexity of the concepts involved allows
9. Must be stated in such a way that its implications can be deduced in the form of empirical operations with respect to which relationships can be validated or refuted

Examples of Good Hypotheses

1. High alcohol content in the blood influences reaction time among drivers in Kenya
2. Technical support is affects the adoption of cloud computing in national referral hospitals in Kenya
3. High programming anxiety influence the students’ performance in computer exams at Gretsa University
4. There is a positive relationship between level of education and income among civil servants in Kenya
5. Promotion as part of an incentive programme, increases productivity of workers in both public and private sectors

Note about the examples

1. There is a relationship between two or more variables is evident
2. From the examples, there is a rayionale that can be derived from experience, theory, or research

3. They are also consistent with common sense
4. The variables can be operationalized and therefore the hypotheses can be tested

Biased Examples of Hypotheses

1. Jogging one mile a day will be shown to be more effective method of weight control compared to dieting
2. The study will show that students from urban primary schools perform better in national examinations compared to students from rural primary schools

The hypotheses above are biased and subjective

Types of Hypotheses

- ❖ There are three types of hypotheses:
 1. Null hypotheses
 2. Alternative non-directional hypotheses
 3. Alternative directional hypotheses

Null Hypotheses

- ❖ Also called statistical hypothesis
- ❖ It always states that no real relationship or difference exists
- ❖ Any relationship between two variables or difference between groups is merely due to chance or error
- ❖ Example:
 - There is no difference in the performance of national examinations between standard eight students from rural primary schools and standard eight students from urban primary schools in Kenya

Alternative Non-Directional Hypotheses

- ❖ Also referred to as research hypothesis
- ❖ It states that there is a relationship or differences but the researcher does not know the nature of such a difference or relationship
- ❖ Example:
 - High alcohol content in the blood affects reaction time among truck drivers in Kenya
 - There is a difference in the performance of national examinations between children from rural primary schools and children from urban primary schools

- In the first hypothesis, we are told there is a relationship between the two variables but not told whether alcohol increase or decrease reaction time
- In the second hypothesis, we are not told which group performs better than the other

Alternative Directional Hypotheses

- ❖ This kind of hypothesis specifies the nature of relationship or difference between variables
- ❖ This means that a relationship can be stated as being greater than, less than, increased decreased, higher than, lower than, etc
- ❖ Should not be used if the researcher is not sure of the form of relationship
- ❖ Example:
 - High alcohol content in the blood decreases reactions time of truck drivers in Kenya
 - Irrigation and use of cow dung manure decreases the yield of maize per acre in arid districts in Kenya

Assumptions and Limitations

- ❖ Sometimes researchers include in the introduction section assumptions and limitations that might affect their studies
- ❖ An assumption is a fact a researcher takes to be true without verifying

Further E-Resource Readings

Lune, H., & Berg, B. L. (2016). *Qualitative research methods for the social sciences*. Pearson Higher Ed.

7.0 REFERENCE JOURNALS

Lazar, J., Feng, J. H., & Hochheiser, H. (2017). *Research methods in human-computer interaction*. Morgan Kaufmann.