



# **Faculty of Information and Communication Technology**

## **ICT Department**

### **Guidelines for Writing Bachelor's Final Year Projects/Dissertations**

July 2023

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## 1. Introduction

The policies, format and style requirements in this manual reflect The ICT Department of The ICT University's standards for scholarship and quality of work. **It is the student's responsibility to follow and meet the requirements when writing a final year dissertation/project.** The guidelines are reviewed and updated periodically to reflect the dynamic nature of scholarship. Students should not follow the format of a previously written dissertation, nor should they rely on a former version of this manual. **If clarifications are needed, students should consult with the ICT Department.** **Dissertations that do not fully comply with the guidelines will not be accepted.**

### 1.1. Purpose of the Guidelines

The purpose of dissertation is for a student to demonstrate competence while producing original research, investigating a scholarly topic, or producing a creative work. The dissertation should include full documentation, development, and execution of an approved research, scholarly, or creative topic, and complete a final document in a manner that can be understood by both an individual knowledgeable in the topic and an individual whose advanced training is in another discipline. A dissertation is the culmination of an undergraduate student's career, and it represents original scholarly research and writing. **It is a contribution to knowledge and will be available to other scholars through the ICT University Library and even international journals.** Its content and style reflect on the author, the faculty members who have guided the research, and The ICT University. **Hence, these guidelines have been developed to ensure high, professional, and ethical standards for research writing at The ICT University.**

## 1.2. Dissertation Supervision and Evaluation

**Every student carrying out a final year dissertation is allocated a supervisor.** The role of the supervisor is to guide the student through the research and writing process by providing suggestions and feedback as to the contents, direction, timeline, style, citations, and other aspects of the research. Each dissertation will be presented before a panel composed of the supervisor and two other lecturers of the Department. **Even though the supervisor's recommendations may have significant impact on the dissertation's final form, it is the student who is ultimately responsible for the content and style of the dissertation.**

## 1.3. Academic Integrity and Avoiding Plagiarism

As a student you are expected to cooperate in the learning process throughout your programme of study by completing assignments of various kinds that are the product of your own study or research. **Plagiarism by any students is a serious offence: it can lead to your deregistration from the University.** There are three main types of plagiarism:

- Direct copying of text from a book, article, fellow student's essay, handout, thesis, web page or other source without proper acknowledgement.
- Claiming individual ideas derived from a book, article etc. as one's own, and incorporating them into one's work without acknowledging the source of these ideas.
- Overly depending on the work of one or more others without proper acknowledgement of the source, by constructing an essay, project etc. by extracting large sections of text from another source, and merely linking these together with a few of one's own sentences.

Thus, the University's definition of plagiarism is the use of someone else's language, ideas, or other material without making the source(s) evident in situations where there is a legitimate expectation of original work. Plagiarism does not occur when efforts to

promptly identify sources by making source use apparent to the audience of the submitted material are obvious. Plagiarism may not necessarily include mistakes in citation style. In summary, plagiarism is the act of representing another's work or ideas as one's own without appropriate acknowledgement or referencing. **Do not do it.** Where suspected plagiarism is discovered at the pre-submission stage, the ICT Department and shall deal with the matter internally in the first instance. In such a case, a meeting with the student is convened, the maximum penalty shall normally be a requirement to re-draft the relevant section(s) of the dissertation to the satisfaction of the supervisor.

## 2. Guidelines for Writing

The following information presents guidelines for preparing and writing final year dissertations.

### 2.1. Referencing Style

**The American Psychological Association (APA) Style** should be consulted for all questions pertaining to citations and referencing (paraphrasing, direct quotation, and entries of the list of references).

### 2.2. Formatting

Formatting counts. Below is the required formatting for the dissertation:

**Font:** Times New Roman

**Size:** 12

**Line Spacing:** 1.5

**Text Alignment:** Justify

### 2.3. Words' Count

The minimum number of words of dissertation is **20,000 words**.

### 2.4. Structure of the Dissertation

**Preceding the main body of the report are several pages containing the preliminary material.** The following lists the elements (in order) that comprise the preliminary material.

Please note that page numbers for preliminary material are written **in small Roman numerals (e.g., i, ii, iii, etc.).** For the main body of the paper, all pages are numbered with **Arabic numerals (e.g. 1, 2, 3, etc.).**

**The complete structure of the dissertation is the following:**

- Title Page
- Declaration
- Certification
- Dedication
- Acknowledgments
- Faculty Approval
- Abstract
- Table of Contents
- List of Tables
- List of Figures
- List of Acronyms and Abbreviations
- Chapter 1
- Chapter 2
- Chapter 3

## Chapter 4

## Chapter 5

## 2.5. Title Page

**We have a Faculty/Department standard title page form you are required to follow.**

Include the title, author, supervisor, place, and date. The Title Page is the first page of the manuscript. It is considered page “i”, but the number does not appear on the page. **Please see the sample of the title page in the annexes.**

### 2.5.1. Effective Topic

Selecting a topic or question worthy of investigation for dissertation is one of the most significant aspects of undergraduate education. Students should choose a topic with thoughtful consideration and in consultation with a supervisor. This topic should then be validated by the Department. Effective topic is:

- **Accurate, unambiguous, specific and (when possible) complete**
- **As short as possible**
- **Enticing and interesting**

**Please note: Studies that investigate on the effect of an independent variable on a dependent one are not accepted by the Department/Faculty. Applied topics (that solve problems in the community) are highly encouraged.**

## 2.6. Abstract

As Elsevier publication wisely stated: the abstract is your chance to describe your research in a limited number of words: use those words wisely. Together, the title and abstract should fully represent your dissertation/article. A well written abstract will help readers understand what your dissertation is about and whether it's interesting or useful for them. It will also help improve visibility through abstracting and indexing. The abstract

should summarize the problem or objective of your research, and its method, results, and conclusions.

**Thus, briefly state the (1) a short statement of the problem or area(s) of investigation, (2) a brief discussion of the methods and procedures used in gathering data or information/methodology, (3) A summary of findings/key results, and (4) Recommendations/conclusions. Generally, abstracts are between 100 and 400 words.**

Importantly, don't promise more than your article delivers. **Many authors write the abstract last, so it reflects the content accurately.** But it can also be helpful to write it first, to help you focus your thoughts and give you a good starting point for the dissertation.

## 2.7. Acknowledgments

This page is for the author to express professional and/or personal indebtedness. Permission(s) to use previously copyrighted materials, receipt of grant funds, recognition of "readers", etc. is acknowledged on this page. Students must be consistent with the use of the third ("the author") or first person throughout. This page is optional, but if included, it is paginated (lower case Roman numerals) and listed in the Table of Contents

## 2.8. Table of Contents

The table of contents is a topic outline of the manuscript. It functions as an index to the work and must fully and accurately reflect the organization of the manuscript. It is highly recommended that students using the "Automatic Table of Contents" feature in Microsoft Word wait until all final edits to all parts of the manuscript are complete. All chapter divisions and subsections must be included in the Table of Contents (TOC) and labelled exactly as they appear in the text.

## 2.9. List of Figures and List of Tables

A **FIGURE** is a graphic illustration (chart, graph, diagram, photo, map or plate). Figures may be professionally prepared or drawn by the author. In either case, they must be of letter-quality print. Include the figure numbers, figure titles, and page numbers. A **TABLE** is a columnar arrangement of information organized to save space and convey relationships briefly. Include the table numbers, table titles, and page numbers. The List of Tables and the List of Figures (if any) appear as individual pages. A List of Tables/Figures is necessary even if there is only one table or figure.

## 2.10. Chapter 1: Introduction

Chapter 1, which introduces the study and states the focus of the study, begins with background information regarding the problem under investigation. The Introduction should provide readers **with a brief summary of literature and research related to the problem being investigated, and should lead up to the statement of the problem**. In general, the Introduction begins with a broader perspective of the problem and becomes narrower as the Introduction proceeds. This section may be divided into two separate sections, the Introduction and a separate section describing the background of the problem. The Introduction narrows the focus of the study and provides a brief rationale for why the particular study is worth pursuing. Generally, the introductory section of Chapter 1 consists of about three to six pages, but may vary considerably depending on the nature of the study. The Introduction (and Background of the Problem) section(s) are normally expanded in Chapter 2 (Review of Related Literature).

### 2.10.1. Background to the Problem

- It provides the rationale/ justification of the study
- Gives evidence and conditions of existing situation to make the reader feel the urgency of the problem and the need to solve it.

However;

- Try to capture the thrust of your research within first sentence
- Avoid circular reasoning (turning around, repeating the same thing again and again)

### 2.10.2. Problem Statement

- The statement of the problem is the focal point of your research.
- **It is just one sentence (with several paragraphs of elaboration) that explains something that needs close attention.**
- The main function of formulating a research problem is to decide what you want to find out about.
- It is extremely important to evaluate the **research problem in the light of your financial resources at your disposal, the time available and your supervisor's knowledge and expertise in your field of study.**
- Also ask yourself whether you have sufficient knowledge of computers and software if you plan to use them

#### **Why is it important to state and define the problem well?**

Because a clear statement of the problem:

- Is the foundation for the further development of the dissertation;
- Makes it easier to find information and reports of similar studies from which your own study design can benefit;

- Enables the researcher to systematically point out why the proposed research on the problem should be undertaken and what you hope to achieve with the study.

**Points that need to be considered for justifying the selected research problem:**

A problem selected to be studied has to be justified in terms of its:

- **Being a current and existing problem which needs solution.**
- **Being a widely spread problem affecting a target population.**
- Being a problem which concerns the planners, policy makers and the communities at large.

**Information included in the problem statement:**

1. A more detailed description of the nature of the problem
  - **basic description of the research problem**
  - **the discrepancy between what is and what should be (the gap)**
  - **its size, distribution, and severity (who is affected, where, since when, etc.)**
2. **A brief description of any solutions that have been tried in the past**, how well they have worked, and why further research is needed.
3. A description of the type of information expected to result from the research project and **how this information will be used to help solve the problem.**

#### 2.10.3. Objectives

Objectives are the **goals you set out to attain in your study.**

Since these objectives inform the reader of what you want to achieve through the study, it is extremely important to word them clearly and specifically.

Objectives should be listed under two headings;

- **General objective (a single)**
- **Specific Objectives (maximum of 4)**

## General Objective

- **Refers to the general intention of the research.**
- Should clearly spell out what the project is supposed to accomplish.
- **The general objective should be closely related to the statement of the problem.** *For example, if the problem identified is low utilization of computers in rural areas, the general objective of the study could be 'To examine the reasons for the low utilization of computers in rural areas'.*
- If we break down this general objective into smaller and logically connected parts, then we get specific objectives.

## Specific Objectives

- These spell out how the general objective of our research study is going to be achieved.
- Unlike the general objectives, the specific objectives are more specific and are related to the research problem situation.
- Specific objectives should be numerically listed.
- Advisably not more than four in number.

### Example:

- If our general objective is "***To examine the reasons for the low utilization of computers resources in rural areas***"
- Then our specific objectives for this study would be;
  - ***To establish the level/magnitude of low utilization of computers amongst people leaving in rural areas.***
  - ***To determine the reasons for the low utilization of computer resources in rural areas.***
  - ***To find out the relationship between computers and socio-cultural backgrounds amongst people.***

## Formulation of research objectives

The formulation of objectives will help us to:

- Focus on the study (narrowing it down to essentials)
- **Avoid collection of data that are not strictly necessary for understanding and solving the identified problem**
- Organize the study in clearly defined parts

### How should specific objectives be stated?

We have to make sure that our objectives:

- Cover the different aspects of the problem **and arranged in a logical sequence**
- Are **clearly expressed in measurable terms**
- Are **realistic considering local conditions**
- Meet the **purpose** of the study
- Use **action verbs** that are specific enough to be measured

#### Examples of action verbs are:

- to determine
- to compare
- to verify
- to calculate
- to describe
- to find out
- to establish

#### Avoid the use of vague non-action verbs such as;

- ✖ to appreciate
- ✖ to understand
- ✖ to study

## Characteristics of Specific Objectives



Research specific objectives must be SMART, i.e.:

- **Specific** – What do you want to do or achieve?
- **Measurable** – How will you measure or determine whether you have achieved the objectives?
- **Achievable** – Given the resources you have, are the set objectives attainable or realistic?
- **Relevant** – Will the set objectives lead to the desired end result or goal?
- **Time bound** – When will these objectives be accomplished within a given time frame?

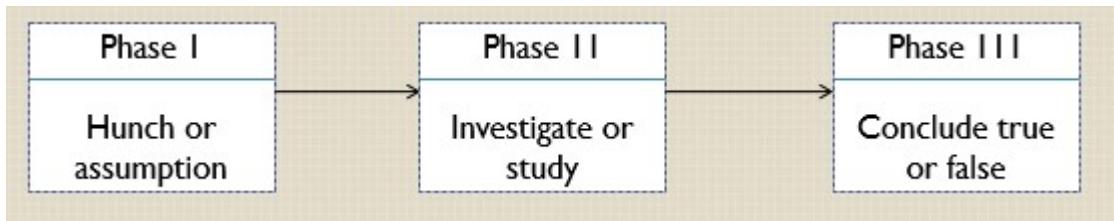
### 2.10.4. Research Hypotheses or Research Questions?

- **Both can't be used.** You have to choose either hypotheses or questions
- Questions are real questions with question marks?
- Hypotheses are assumptions
- **Hypotheses are preferably used when a relationship involving two or more variables in a given research needs to be tested**
- **In applied research, research questions are preferred** (though a good applied research involves statistical/variable analysis)
- **It is up to you and your supervisor to choose!**

## What is a Hypothesis?

- A hypothesis represents a **belief that a researcher possesses before conducting a satisfactory number of experiments that could potentially disprove that belief.**
- For example, you open your refrigerator at home and are greeted with a horrible sour smell. You decide that the milk must have gone bad. ***This is your hypothesis.***
- It is based on the phenomena you are observing right now (sour smell) as well as knowledge from past experience (bad milk has a sour smell).
- You test your hypothesis by opening the container of milk and smelling it. You find that the milk doesn't smell sour after all, so you must come up with another hypothesis (maybe it is the leftover from last week!).

## Process of Testing Hypotheses



The formulation of a hypothesis provides a study with focus. It tells you what specific aspects of a research problem to investigate and tells u what data to collect and what not to collect.

## Types of Hypotheses

There are generally two competing types of hypotheses, i.e. the ***alternative hypothesis and the null hypothesis.***

- **Alternative hypothesis**
  - It is what the researcher actually believes or assumes.
  - E.g. *Class attendance affects a student's performance.*
- **A null hypothesis**
  - It is often the **reverse** of what the researcher assumes.
  - E.g. *Class attendance **does not** affect a student's performance.*

### 2.10.5. Scope of Research

The scope sets the **boundary** of your research study.

**The "scope" section is where you list what you are doing and you also list something explicitly that you are not doing** because it is outside the bounds of the project.

**For example, you may be doing a research about high school students. You the researcher might know what you mean by "high school", but some people reading your work may have different interpretations.** Don't assume too much about your readers.

Therefore, the scope in this study would be:

**Example scope:** In this study we shall gather statistics about high school students enrolled in public and private high schools. We will not study students in alternative educational settings such as juvenile detention facilities.

### 2.10.6. Significance of the Study

- ✖ Refers to relevance of the study in terms of academic contributions and practical use.
- ✖ It justifies the reason for your study and makes the purpose worth pursuing.
- ✖ The significance of the study answers the questions:
  - **Why is your study important?**
  - **To whom is it important?**
  - **What benefit(s) will occur if your study is done?**

### 2.10.7. Limitations of the Study

**Limitations are factors, usually beyond the researcher's control, that may affect the results of the study or how the results are interpreted.** Stating limitations of the study may be very useful for readers because they provide a method to acknowledge possible errors or difficulties in interpreting results of the study. Limitations that are not readily apparent at the start of the research project may develop or become apparent as the

study progresses. In any case, limitations should not be considered alibis or excuses; they are simply factors or conditions that help the reader get a truer sense of what the study results mean and how widely they can be generalized. While all studies have some inherent limitations, you should address only those that may have a significant effect on your particular study.

**Examples of frequently encountered limitations might include the following:**

1. Due to the small/unique sample available for the study, results may not be generalizable beyond the specific population from which the sample was drawn.
2. Due to the failure of sample respondents to answer with candor, results might not accurately reflect the opinions of all members of the included population.
3. Due to the length of the study, a significant number of respondents available in the preliminary testing may be unavailable or unwilling to participate in the final stage of testing.

Although stating limitations of the study assists the reader in understanding some of the inherent problems encountered by the researcher, it is also important for the researcher to design and conduct the study in a manner that precludes having such numerous or severe limitations that any results of the study are essentially useless. Research designs that control or account for the unwanted influence of extraneous variables help assure that the study results are both valid and reliable – thus keeping limitations of the study to a reasonable number and scope. (Note: While this section is optional, almost all dissertations include a limitations section. Not including this section implies that your study has accounted for all (or nearly all) variables, is generalizable to all populations, and could be replicated accurately under all conditions.)

#### 2.10.8. Organization of the Study

**The final section in Chapter 1 summarizes the contents of each of the chapters that will comprise the study.** This permits readers to know what information will be found in each

chapter and facilitates finding specific information without searching through the dissertation page by page to do so. This section also provides a logical transition into the next chapter of the dissertation. **The following presents an example of this section:** Chapter 1 has presented the introduction, statement of the problem, research questions, significance of the study, definition of terms, and limitations of the study. Chapter 2 contains the review of related literature and research related to the problem being investigated (be specific – summarize the actual contents of the review). The methodology and 8 procedures used to gather data for the study are presented in Chapter 3. The results of analyses and findings to emerge from the study are (will be) contained in Chapter 4. Chapter 5 contains (will contain) a summary of the study and findings, conclusions drawn from the findings, a discussion, and recommendations for further study.

## 2.11. Chapter 2: Literature Review

The purpose of Chapter 2 is to provide the reader with a **comprehensive review of the literature related to the problem under investigation**. The review of related literature **should greatly expand upon the introduction and background information presented in Chapter 1**. This chapter may contain theories and models relevant to the problem, a historical overview of the problem, current trends related to the problem, and significant research data published about the problem

### 2.11.1. What is Literature Review?

- A summary and explanation of key studies relevant to a proposed project.
- **It is an account of what has been published on a topic by accredited scholars and researchers.**
- While reviewing a literature, **all what is known about the study topic should be summarized with the relevant references**. This review should answer;
  - **How much is known?**

- **What is not known?**
- **What should be done based on what is lacking?**

In other words, the literature review should bring out the **research gap**.

#### 2.11.2. Use of Literature Review

- ***Brings clarity and focus to your research problem.*** It increases your knowledge on the problem you want to study and this may assist you in refining your "statement of the problem". (**it is the reason why it is advocated by many scholars to start with this chapter instead of chapter 1**)
- ***Improves your methodology.*** Going through the literature acquaints you with the methodologies that have been used by others to find answers to research problems similar to the one you are investigating.
  - It tells you if others have used procedures and methods similar to the ones you are proposing, if these methods have worked well for them and what problems they have faced with them.
  - By becoming aware of any problems and pitfalls, you will be better positioned to select a methodology that is capable of providing valid answers to your research questions.
- ***Broaden your knowledge base in your research area.*** The most important function of the literature review is to ensure you read widely around the subject area in which you intend to conduct your research study.
  - It is important that you know what other researchers have found in regards to the same or similar question, what theories have been put forward and what gaps exist in the relevant body of knowledge.
- ***It prevents you from duplicating work that has been done before.***

### 2.11.3. Sources of Literature to Review

- **Internet:** the **fastest-growing source of information is on the Internet.** It is impossible to characterize the information available but here are some **hints about using electronic sources:**
  - bear in mind that anyone can post information on the Internet so the quality may not be reliable.
  - the information you find may be intended for a general audience and so not be suitable for inclusion in your literature review (information for a general audience is usually less detailed)
- **Journal articles:** These are good especially for up-to-date information. They are frequently used in literature reviews because they offer a relatively concise, up-to-date format for research.
- **Books:** Books tend to be less up-to-date as it takes longer for a book to be published than for a journal article. But, they do offer a good starting point from which to find more detailed sources.
- **Government/corporate reports:** many government departments and corporations carry out research. Their published findings can provide a useful source of information, depending on your field of study.
- **Newspapers:** Often newspapers are more helpful as providers of information about recent trends, discoveries or changes, e.g. announcing changes in government policy, but you should then search for more detailed information in other sources.
- **Dissertations, project reports:** these can be useful sources of information. However there are disadvantages:
  - they can be difficult to obtain since they are not published, but are generally only available from the library shelf.

- the student who carried out the research may not be an experienced researcher and therefore you might have to treat their findings with more caution than published research.
- **Conference proceedings:** these can be useful in providing the latest research, or research that has not been published.
- **Magazines:** magazines intended for a general audience are unlikely to be useful in providing the sort of information you need. Specialized magazines may be more useful (for example business magazines for management students).
- **Monographs:** (formal piece of writing or handbook on a subject).

#### 2.11.4. Questions you need to ask yourself

- What has been done in your field of research?
- What principles of selection are you going to use?
- How are you going to order your discussion? sequential, thematic, or a combination?
- What section headings will you use?
- How do the various studies relate to each other? What precise contribution do they make to the field?
- What are their limitations?
- How does your own research fit into what has already been done?

#### 2.11.5. Paraphrasing

- Is the most commonly used format when writing **in-text citations** in Literature Review (**and even in the entire dissertation**)
- It means putting someone else's words into your own words but still saying the same thing.

- When you paraphrase from one of your sources, you must recognize where it came from.
- When paraphrasing using the APA style, the researcher is not required to include page numbers in the in-text citation.
- **You only need cite the author's last name and date of publication.**

E.g.

- Pondi (2018) believes that the population of Northern Cameroon has increased by 12% since 2008

OR

- The population of Northern Cameroon has increased by 12% since 2008. (Pondi, 2018).

- However, in cases where words are difficult to paraphrase, we can use **direct quoting...**

#### 2.11.6. Direct Quotation

- A direct quotation is one in which **you copy an author's words directly from the text and use that exact wording in your essay.**
- If you are quoting directly from a source, APA style sets out 2 formats:
  - one for quotes **less than 40 words and**
  - another for quotes **for 40 words or more.**
- If your quote is less than 40 words type it in text with double quotation marks. Several methods are acceptable.
- **Example Method 1:**
  - Isoh (2018) stated that "the effect of light deprivation on laboratory mice was significant" (p.21).
- **Example Method 2:**
  - "The effect of light deprivation on laboratory mice was significant" (Isoh, 2018, p.21).

- **Example Method 3:**

- He stated, that "the effect of light deprivation on laboratory mice was significant" (Isoh, 2018, p.21), however, no other experiments have been done this year...
- If your quote is **40 words or greater** take a **new line and indent the quote** to separate it from the main text (in this case you do not require quotation marks).
- **Example:**

*In fact, Ziraba (2017, p. 33) suggests that schemata truly are the building blocks of cognition. They are the fundamental elements upon which all information processing depends. Schemata are employed in the process of interpreting data.....*

- When referencing the quote, include the page number from which it was taken and always ensure that the grammar of the quote is consistent with the grammar of your sentence.

### **When use Direct Quotation?**

In cases where you have to highlight:

- Author's definitions of important terms.
- Assumptions underlying the author's choice of words.
- Particularly illustrative examples of an author's specific view, difficult to paraphrase.
- Particularly well-expressed opinions, revealing insights which a paraphrase could not capture.

### **Number of Authors of In-text Citations (Paraphrasing & Direct Quotation)**

- **Two authors.** Use both names each time you quote from the source.
  - Amaechi & Agajo (2019) believe that.....

- **Three to five authors.** Cite all the authors in text the first time a reference occurs; in subsequent citations, include only the surname of the first author followed by et al.
  - **First reference:**  
Amaechi, Ngend, Isoh, Agajo & Ziraba (2019) argue that .....
  - **Subsequent references (the following citations of the same work):**  
Amaechi et al. (2019) argue that...
- **Six or more authors.** Cite in text only the surname of the first author followed by et al. and the year for the first and subsequent citations.
  - Amaechi et al. (2020) argue that....
- **Author is listed as "Anonymous".** Use it as if it were the author's name.
  - Anonymous (2016) argues that....

## 2.12. Chapter 3: Methodology

- This chapter should make clear to the reader **the way that you intend to approach the research problem and the techniques and logic that you will use to address it.**
- It also includes the procedures, the sample and the instruments you will use in your research.
- The methodology answers these three main questions:
  - **How is the data/ requirements going to be collected or generated?**
  - **How will data/requirements be analyzed or designed?**
  - **What processes, methods, tools, and techniques will be used and how they will be used?**

- In other words, the methodology shows the reader how you are going to obtain your results.

### 2.12.1. Data/Requirements Gathering

Tools and techniques for data or requirements gathering are described here. They may include:

- Interviews
- Review of existing documents (documentation)
- Questionnaires (Physical or Google forms)
- Remote Sensing (through GPS, robots or drones for instance)
- Joint Application Development (JAD)
- Focus Groups
- Participatory Design
- Observation
- Shadowing

### 2.12.2. Population and Sample

**This section describes the population used in the study and the process utilized in selecting a sample.** Unless the population is extremely small, a sample usually will be drawn from the population. **The sample should be small enough to provide a manageable volume of data, but the sample must accurately represent the population if any valid inferences are to be drawn from the sample results.** In general, the sample will accurately represent the population from which it is drawn if (a) sample selection carefully follows an appropriate sampling design, (b) the sample is randomly selected from the population, (c) a large enough sample is selected in relation to the total population, and (d) the sample size is adequate for the data-collecting instrument being used.

### 2.12.3. Quantitative Analysis

- Even though pure quantitative research is not encouraged in the Faculty/Department, your applied research could make use of it.
- You could embed quantitative analysis in your applied research to answer the following questions for instance:
  - What does the population (or sample) think about my idea? your idea could be a Web/Mobile Application to address a problem in the community for instance
  - What does the population (or sample) think about my solution? What is their experience (opinion, feeling) after using my solution?
- Best applied research include a quantitative analysis. So, we advocate your research design to be smart enough to accommodate both applied and quantitative approaches.

#### Tools & Techniques used in Quantitative Analysis

If you decide to make use of quantitative design in your applied research (**it is what we recommend**). You could make use of the following tools and techniques:

- Sampling (probabilistic or non-probabilistic sampling)
- Descriptive and inferential statistics
- Statistical software packages (like Spreadsheets, SPSS, Stata, etc.)

### 2.12.4. Processes, Methods, Techniques, and Tools

Whether you are developing a model, an algorithm, or a system, you will use Processes, Methods, Techniques, and Tools. In this Chapter 3 you should indicate the ones you will use. They may include for instance:

#### Processes:

- System Development Lifecycles
- Analysis and Design Cycles

- Implementation and Testing Cycles
- Work Breakdown Structures and Plans
- Etc.

**Methods and Techniques:**

- Unified Modeling Language (UML)
- Modeling and Diagramming Techniques
- Agile Development
- Prototyping
- Algorithmic Design
- Structured Analysis and Design Technique (SADT)
- Information Engineering
- Modeling and Simulation
- Etc.

**Tools:**

- Development Tools and Languages
- Testing Tools
- Data Resource Management Tools
- System Software
- Etc.

## 2.13. Chapter 4: Analysis, Design, Implementation, and Findings

This chapter 4 is **the execution of what has been said to me done in Chapter 3 (Methodology)**. It provides:

- **The statistical analysis of data collected** (if quantitative design has been used). It could be statistical analysis of the **idea (is it good or bad)** or the **solution (UX, user experience)**

- **The analysis of the requirements gathered.** Specifications of the model, the algorithm, or the system is properly documented here.
- **The design of the specifications.** Diagrams, models, and other artifacts are designed at this stage.
- **The implementation and the testing of designs.** It is done using the tools and techniques listed in the methodology.
- **The findings and results.** It is the reporting of the findings and results (Please note that Chapter 4 is limited to reporting findings and results, **and is not the proper place for conclusions or discussion of the findings**. Chapter 5 is where findings are discussed).

## 2.14. Chapter 5: Summary, Conclusions, Discussion, and Recommendations

- **Summary**

**The Summary section of Chapter 5 provides a brief recap of the entire study.** Generally, this section summarizes the introduction, problem statement and hypotheses/research questions, literature review, methodology, and findings. Someone reading this section would have a good overview of why the study was done, the specific purpose of the study and hypotheses/research questions, what the literature relates about the problem under investigation (very briefly), the methods used to gather data for the study, and findings emerging from analysis of the data.

- **Conclusions**

**This section presents conclusions drawn from the findings and results of the data analysis.** Frequently, **conclusions provide answers to hypotheses or research questions posed in Chapter 1.** While conclusions may be written in narrative form or listed one at a time, listing them one at a time is generally easier for readers to follow and helps maintain clarity of focus for each conclusion. An important observation regarding conclusions is in order: **Conclusions are not the same as findings and should not simply be restatements**

**of findings from Chapter 4.** A conclusion should be broader and more encompassing than a specific finding, and **several findings may be incorporated into one conclusion.** While several findings may be used to support one conclusion, it is also possible that one finding might give rise to several conclusions (although this is somewhat less common). **Generally, while specific findings are stated in the past tense** (e.g., students expressed greatest satisfaction with university instructors), **conclusions are stated in the present tense** (e.g., students are most satisfied with university instructors). **The following illustrates the relationship between findings and conclusions.**

A study of public school superintendents across the United States in 1991 yielded the following findings:

1. Only 5% were non-White
2. Only 8% were female

From these findings the following conclusion was drawn: **Women and minorities continue to remain underrepresented in the ranks of public school superintendents.**

- **Discussion**

The discussion section provides a forum within which **the researcher explores and attempts to explain findings and conclusions that emerged from the study.** Within this section, the researcher attempts to interpret findings and conclusions, and relate these to both the purpose of the study and to published results from other studies examined in the literature review. This section may be used to forward theories and/or models, or raise questions regarding previously developed theories. It is important to note that the discussion section in Chapter 5 provides the researcher with one of the very few opportunities throughout the dissertation to explore ideas and possibilities. Unlike most other sections of the dissertation whose content and form are dictated by fairly rigid standards, the discussion section may be open-ended and take the form that researcher desires. Some researchers choose to discuss each conclusion or finding separately, while others prefer to address several or all of them at once in a general discussion.

- **Recommendations**

The final section of Chapter 5 contains recommendations that emerge from the study. Generally, recommendations are of two distinct types; **recommendations for action or practice (based on the study's findings and conclusions, and sometimes headed Recommendations from the Study or Recommendations for Practice)**, and **Recommendations for Further Study**. Frequently a separate section is included for each set of recommendations – each with an appropriate section heading. Recommendations for practice are generally prescriptive in nature and address what could or should be done by practitioners or members of the intended audience in terms of professional practice and policy. These recommendations are based upon results of the study.

**For example: Since male and female teachers rated elements of the professional development program much differently, the administration should provide gender-appropriate training to the teachers that highlights gender differences.**

Recommendations for further study contain suggestions regarding follow-up studies or replication studies. These recommendations usually acknowledge limitations that the study included and which further studies could help explain or clarify. These might include different methodologies, expanded populations or samples, or changes in the instrument itself.

**For example: Since the current study was completed using a cross-sectional survey design, a similar study should be planned within the same school that uses a longitudinal design to determine if changes over time become perceptible.**

## 2.15. References

- References (i.e. all the sources used to produce your work) come at the end of your paper, on a separate page with the word References centered at the top.
- **The list is alphabetical by the author's last name.** If no author is given, start with the subject heading.

- Each type of reference used, has a different format.
- Referencing simply means that you indicate which material is not your own and show where you got it from.
- Even if you have not used someone's exact words, but have rephrased their ideas you need to give your sources.
- The idea is that someone reading your work should be able to recognize the difference between your work and the author's.
- **You need to provide them with enough information about your sources so that one can easily find the source themselves.**

#### 2.15.1. Referencing a Book

Necessary Information and where to find it:

- **Author(s) of book** can generally be found on both the cover (and dust jacket) and title page.
- **Year of publication** can sometimes be found at the bottom of the title page; otherwise look on the page directly behind the title page, where it says "Copyright ©."
- **Title of book** can be found on both the cover (or dust jacket) and title page (naturally)
- **Place of publication** is usually listed on the title page
- **Publishing entity** is almost always listed at the bottom of the title page. If no listing is made here, try the page directly behind the title page.

#### AUTHOR(S) OF BOOK

For books, put each author's last name, then a comma, then the first initial of the first name, then any additional initials. e. g

- **One author** - Pondi, J. E.
- **Two authors** - Ngend, L. E., & Amaechi, A.

- **Three authors** - Sack, S. H., Chen, C. L., & Crismon, S.

## YEAR OF PUBLICATION

For books, include only the year of copyright, in parenthesis, then end with a period. If no date of publication is listed, put "n.d." in the parenthesis.

- **Standard form** - (1994).
- **No date given** - (n.d.).

## TITLE OF BOOK

Give the full title of the book, Capitalize only the first letter of the first word of the title.

e.g.

- **Standard form** - *The evolution of Internet in the last three decades*

## PLACE OF PUBLICATION

Certain common cities of publication are included with no additional information. These include: Baltimore, Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, Amsterdam, Jerusalem, London, Milan, Moscow, Paris, Rome, Stockholm, Tokyo, and Vienna. If the book was published in one of these places, simply list the city, followed by a colon (:). e.g.

- **Common locations** - New York:

## PUBLISHING ENTITY

Give as much of the publisher's name as necessary to render it comprehensible. Follow the publisher's name with a period.

- **Commercial press**- Collins.
- **University press**- Cambridge University Press.
- **Corporate press**- General Electric Corporation.

## GENERAL EXAMPLE

- Webb, C. D. (2018). *A novel protocol for point to point data transmission in IoT*. Boston, Cambridge University.

- **Order:** Author(s), year, title of the book, place of publication, publishing entity.

## 2.15.2. Referencing a Journal

Necessary Information and where to find it:

- **Author(s) of article** can be found either in the table of contents or on the first page of the article.
- **Year of publication** is almost always included on the front cover of the journal, or on the journal's title page. Often the publication year can also be found on the first page of each article, at the top of each page, or on the journal's spine.
- **Title of article** is printed in the table of contents and on the first page of the article.
- **Title of journal** is indicated on the journal's front cover or title page. Sometimes it will also be printed at the top of each page and on the journal's spine.
- **Volume number** is usually noted on the front cover or title page of the journal.
- **Issue number** is used only if the journal paginates each issue individually; the issue number can usually be found either on the front cover or title page. Sometimes the issue number is also found on the first page of the article.
- **Pages of chapter** are sometimes specified as a range in the table of contents; otherwise, make a note of the first and last page numbers of the actual article.

### VOLUME & ISSUE NUMBER

- **Volume alone** - *Journal title, 25,*
- **Volume and issue** - *Journal title, 18 (6),*

### PAGE NUMBER

- **After volume** - *18, 94-156.*
- **After issue**- *9 (6), 221-238.*

## GENERAL EXAMPLE

- Ngend, L. (2015). A hybrid classification model in machine learning. African Computer Science Journal, 26 (2), 247-289.
- **Order: author(s) name, year, title of article, title of journal, volume number, issue number, page numbers.**

\*\*\*\*\***N.B:** follow the same format for journal referencing to reference other periodicals like magazines, newspapers.

### 2.15.3. Referencing Internet Documents

Necessary Information and where to find it:

- **Author(s) of document** if an author is given it is usually at the very beginning or very end of a particular document; when in doubt, look for an email address-this will often lead you to the name of the person who authored the document
- **Date of publication** if given, the document's date will be included somewhere in its text. There is a special way to note if the document has no specific date. date of publication on the web (or the date of most recently updated version)
- **Title of document** the placement of documents' titles varies. Generally, web authors place a title at the top of the actual web page. If no title is there, use the title of the window as it opens in your web browser
- **Location of document** also varies according to the source of your document. See below for details on this citation element

**Example:**

- Bacon, H. P. (2021). Frequently asked questions about reinforcement learning in AI. URL: <http://www.hannet.org/pigfaqs.html>. Accessed on February 16, 2022
- **Author(s), Date, Title, location (URL), Date of retrieval**



## 2.16. Annexes

### 2.16.1. Cover Page

THE ICT UNIVERSITY



Faculty of Information and Communication Technology

A dissertation presented and submitted in partial fulfilment of the requirement  
for the degree of a Bachelor of Science in Information System and Networking

Title

**RFID assisted Mobile Devices Identification in WSN**

By

Toto Bobo

Registration Number: ICTU1025265

Supervised by: Dr. John Africa

March 2022

### 2.16.2. Declaration

I declare that the work entitled "**RFID assisted Mobile Devices Identification in WSN**" is my own original work, conceived and presented in the partial fulfilment of the requirement for the degree of a Bachelor of Science in Information System and Networking at ICT University. This work has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references

Signed \_\_\_\_\_

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Registration Number: \_\_\_\_\_

### 2.16.3. Certification

This work entitled "**RFID assisted Mobile Devices Identification in WSN**" has been submitted for examination with my approval as the Research Supervisor.

Signed \_\_\_\_\_

Date: \_\_\_\_\_

Name: \_\_\_\_\_



#### 2.14.4. Faculty Approval

This dissertation has been duly reviewed by the Department and the Faculty and is ready for examination with our approval

**Approved by**

Signature Date

---

Engr. XXXXXXXXXXXXXXXXXX

Supervisor

Signature Date

---

Dr. Abdallah Ziraba

Head of Department

Signature Date

---

Dr. Luc Einstein Ngend

Dean