

WRITING RESEARCH REPORTS

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ABSTRACT

Writing research reports is a necessity among students of graduate schools, academics; industry professionals and researchers. The need often arises for them to communicate their research work or studies to other interested parties. An over view of the various forms of research reports was taken; the features common to them examined; and the specific structure, content and style of presentation of research proposals, projects, dissertations / theses, journal articles and technical reports considered in details. Conclusions were reached that research reports are best prepared to the specific guidelines of institutions or organizations requiring them and that the responsibility for developing the much desired writing skills rests on the interested individual scholar, through commitment to diligent learning and practice.

1.0 INTRODUCTION

Writing research reports is an integral part and parcel of scholarship the world over and concerns students, academics, industry professionals and researchers. The need often arises for scholars to communicate their research work or studies to other interested parties in the form of; conference/seminar/workshop papers; as articles in journals or magazines; reports to funding agencies and thesis or dissertation for degrees in tertiary education institutions.

The norms in research report writing are; standard format of presentation and formal language or style of communication. The obvious reasons for these are promotion of clarity, conciseness, completeness and accuracy of the reports. Unfortunately, there are no universally accepted formats of presentation of research reports, but only general guidelines, with several variations specific to individual organizations or institutions. Research reports should therefore be presented in accordance with the specific format of the institution of interest to the reporter. The skills required are universally sought after and the responsibility for developing them that of the individual researcher.

This paper aims to present the general guidelines for writing research reports, with specific consideration for: research proposals, theses / dissertations, journal articles; and technical reports.

2.0 WRITING RESEARCH PROPOSALS

A research proposal has been defined as a document written by a scientists or academic which describes the ideas for an investigation on a certain topic (Business Dictionary .com). It is like the operational architectural plan which precedes the construction of buildings (Alamu and Olukosi, 2010).

A research proposal is intended to convince others that one has a worthwhile research project and that he has the competence and the work plan to accomplish it. A research proposal should usually contain all the key elements involved in the research process together with sufficient information for the readers to evaluate the proposed study.. The quality of a research proposal has been observed to depend not only on the quality of the proposed project, but also on the quality of the proposal writing (Wong, 2016). A good research project may therefore be turned down due to a poorly written proposal. Research proposals should therefore be written in coherent, clear and compelling manner.

2.1 Types/Uses of Research Proposals

Research proposals may be classified on the basis of their uses as those for:

- i. Admission into PhD programmes of universities
- ii. Application for research grants from funding agencies.

The PhD research proposal may be used by a potential supervisor or lecturer in charge of admission to asses the suitability of candidates for admission into the programme and to assign appropriate supervision teams, funding agencies also award

research grants based on appropriate research proposals. Generally research proposals are assessed for;

- a Quality
- b Originality of ideas
- c Skills in critical thinking
- d Feasibility of the research project
- e Realistic timelines
- f Realistic cost estimates

2.2 How to Write Good Research Proposals

The importance of good research proposal cannot be over emphasized. Wong (2016) posited that “one’s research is only as good as one’s proposal”. An ill-conceived proposal dooms the project even if it escapes the scrutiny of the evaluation committee. A good research proposal on the other hand promises success for the project as well as assures the assessment committee of the potentials of the researcher.

Whereas the specific content and format of a research proposal depend on the requirement of the school or funding agency of interest, current literature (FindAPhD Team 2016, University of Edinburgh 2016 and Wong 2016) suggest the following content as a general guide:

- i. Title
- ii. Introduction
- iii. Literature review
- iv. Methods
- v. Results/Discussion
- vi. Time schedule
- vii. Estimates

viii. References

2.2.1 Title

A good title should be concise and sufficiently informative to relate ones proposal to relevant potential supervisors, funding agencies or other such interested parties. It should prick the reader’s interest as well as predispose him or her favorably towards the proposal. It is advisable to do away with phrases such as “An investigation of”.

2.2.2 Introduction

The introduction gives an overview of the intended research. It provides the necessary background or context for the research problem, identifies influences or debates to engage with, but avoiding straying into a long exposition of specific sources. The introduction should establish solid and convincing framework for the research.

It is usual to begin the introduction with a general statement of the problem area and then narrow down to a specific research problem. This is then followed with the rationale or justification for the study. The introduction generally includes the following:

- i. Clear statement of the research problem (purpose of the study)
- ii. The research questions- showing their necessity and importance
- iii. Rationale and significance of the research- indicating why it is worth doing.
- iv. Statement of the theory or hypothesis of the study. An exploratory or phenomenological research may not require any hypothesis.
- v. The limitations or boundaries for the study
- vi. Definition of key concepts (optional).

2.3.3 Literature Review

The literature review is sometimes incorporated into the introduction section, but it is better to have it in a separate section as this allows a more thorough work. Wong

(2016) highlighted the functions and pit falls to be avoided in literature review. The functions include:

- i. Ensures that one is not “reinventing the wheel”
- ii. Acknowledging those who have laid the groundwork for the research
- iii. Demonstrates ones knowledge of the research problem.
- iv. Allows for critical evaluation of relevant literature information
- v. Provides theoretical framework upon which the conceptual framework for the study may be developed.
- vi. Indicates the potential of the proposed study for contributing significantly to existing knowledge (by resolving an important theoretical issue or filling a major gap in the literature).

The pitfalls to be avoided are:

- i. Lack of organization and structure
- ii. Lack of focus and coherence
- iii. Being repetitive and verbose
- iv. Failure to cite influential papers
- v. Failure to keep up with recent developments
- vi. Failure to critically evaluate cited papers.

It is advisable to make use of subheadings in the organization of the literature review as it brings order and coherence to the review.

2.2.4 Methods

This section lays out in clear terms, the structure and specific methods to be used in the work. One guiding principle for writing research methods is to provide sufficient information to enable the reader determine the soundness of the methodology or even enable another qualified researcher to affect the study. A well written method section

should demonstrate knowledge of alternative methods with justification for the appropriateness of the adopted method.

The method section typically consists of the following:

- i. Research design – is it a survey or a laboratory experiment?
- ii. Population of the study, sample size and sampling technique
- iii. Research instruments or material and methods in the case of laboratory experiments. Major issues here include: reasons for selection, validity and reliability.
- iv. Procedure: How would you carry out the study? What activities are involved? How long would they take?
- v. Data Analysis techniques: Specific techniques to be adopted should be highlighted (e.g. for statistical analysis, state whether descriptive, inferential, correlation, regression etc).

2.2.5 Results/Discussion

At the proposal stage, there are obviously no results available. However, clear idea of the data to be collected and the analysis to be carried out should be available. These should provide the bases for convincing one's reader of the potential impact of the research. This should be communicated with a sense of enthusiasm and confidence without exaggeration of the merits. In fact mention should be made of the limitations and weaknesses of the proposed research and how they should be tackled or explained.

2.2.6 Time Schedule

This involves preparing the schedule of activities involved in the proposed research and assigning realistic time periods for effecting them. This is best presented in the traditional project management bar chart format.

2.2.7 Cost Estimates

This involves assessment of resources (material, labour, equipment) in terms of money involved. It is particularly important in applications for research grants. Estimates must be kept realistic as they would provide the basis for value for money assessment.

2.2.8 References

List all literature cited in your paper, in the format stipulated by the institution to which you are sending the proposal. Where there is no stipulated format for this, use the APA format, listing the literature in alphabetical order by first author. Endeavor to reference texts and resources that are critical to your study.

3.0 WRITING A RESEARCH PROJECT, THESIS OR DISERTATION

Writing and oral communication skills have been identified as probably the most sought after qualities by graduate and professional schools as well as employers (Carprette 1995). It is the responsibility of every scholar to develop such skill to a high level.

Most scientists and scholars in general write accounts of their studies using a standard format, which makes explicit certain aspects of the study and allows people to read the work selectively: for example a reader may be interested in just the methods, a specific result, the interpretation or perhaps just the abstract. The structure and style of a research report are therefore very important and as already mentioned with respect to the proposal, should conform to the specific requirements of institution or organization of interest. Most published papers today are prepared in the American Psychological Association (APA) format, which has been adopted for this paper.

The purpose of a research report is to communicate to others the important points of a piece of research:

- i. What was done
- ii. Why it was done
- iii. How it was done
- iv. What was found
- v. What it means (Essex University, 2016).

For convenience, the general content of a thesis or dissertation has been categorized by Darwish (2016) as follows:

A). Front Matter

- i. Title page
- ii. Certification page
- iii. Acknowledgements page
- iv. Abstract
- v. Table of contents
- vi. List of tables
- vii. List of figures

B). Body of the Report

- i. Introduction
- ii. Literature Review
- iii. Methodology
- iv. Results and Discussion
- v. Conclusion and Recommendations

C). End Matter

- i. References
- ii. Appendices

All that were mentioned in the proposal section with respect to the subsections of the above contents are applicable to dissertations or thesis. However, the abstract is considered worthy of some specific attention here because it was not emphasized in the proposal section. Also worthy of mention here are some general notes for research reports.

3.1 Abstract

An abstract is a concise single paragraph summary of completed work or work in progress, of about 200 to 300 words. It should contain a brief account of what was done and why, the method employed, results obtained and conclusion reached. An abstract should stand on its own, and not refer to any other part of the paper such as figure or table. It should focus on summarizing results, with background information limited to a sentence or two; if absolutely necessary. What is reported in the abstract must be consistent with what is reported in the thesis. Correct spelling, clear sentences and phrases and proper reporting of quantities (correct units and significant figure) are very essential.

3.2. General Notes on Style for Research Reports

The Department of Psychology, Essex University UK provided the following general notes on style for research reports:

a). Use of Personal Pronouns

Be sparing with the use of personal pronouns (we, I, our, me, etc). Frequent use of personal pronouns can make your writing sound anecdotal (i.e., based on limited evidence), or appear dependent upon your subjective interpretation (e.g., as if others would not draw the same conclusion from the evidence that you have presented). When writing a method or results section, it is rarely essential to use “I” or “we”. For instance,

you would NOT need to write: “I conducted a *t-test*”, as it is obvious that you as the author of the report conducted the test. Similarly, you should NOT write: “I conclude that the result is significant”, as other people would draw the same conclusion given the same data and the same test result.

Any time that you use a personal pronoun you should check that it is clear whom “I” or “we” refers to, and that this provides the best way to express what you want to communicate. Conventions concerning the use of personal pronouns do vary from one area of research to another. You can expect to receive guidance conventions different from those described above (e.g., from your project supervisor).

b). Use of Tenses

Tenses can be very difficult to use correctly. These guidelines can only be very general rules of thumb. Basically, anything that is history should be written in the past tense. When you write up your work, even your method and results will be history, and should be described in the past tense. The conclusions of previous workers are history; however yours are still current and should be described in the present tense. The theories and models that were derived from the results and conclusions still make predictions today (even if they are the wrong ones) and their predictions thus should be described using the present tense. Thus, for a previous piece of work that you are describing:

“Okeke *et al.*, (1970) found that ... they concluded that ... and developed the XYZ model. This predicts that...”.

If you were discussing the results of *your* experiment;

“It was found that ... and thus we conclude that ... the ABC model predicts that ...”

c). Other Points to Note

Avoid contracting words (don't, cant, couldn't, etc).

Always proof read your work for typos. For example, the spell checker will not alert you to ‘trials’ being incorrectly spelled as ‘trials’.

The word “data” is plural. For example, write: “*the data were collected*”, not “*the data was collected*”.

Affect (verb) to have an influence on something: “*something has affected my experiment*”; something has changed my experiment.

Effect (verb) to cause something to happen: “*something has effected my experiment*”; something has done my experiment for me.

Effect (noun) a consequence or an outcome: “*this is a negative effect*”; this is a bad outcome.

Affect (noun) an emotional state: “*this is a negative affect*”; this is a bad mood

Most common usages are affect (verb) and effect (noun): e.g., “The problems described above affected the results by diminishing the size of the experimental effect”.

3.3 Classes of Journals

Journals may be categorized by types (Canden – Carroll Library, 2006) or by quality (Australian Business Deans Communication ABCD 2013). By types there are:

- i. Academic/scholarly journals
- ii. Trade journals
- iii. Current affairs/opinion magazines
- iv. Popular magazines
- v. Newspapers

Table 1 captures the characteristics of the various types of journals. The ABCD (2013) categorized journals by quality as follows:

- i. A* - This is the highest quality category, and represents approximately the top 5-7% of the journals assigned to the given primary field of research panel.

- ii. A – This is the second highest quality category and represents approximately the next 15-25% of the journals assigned to the given primary field of Research Panel.
- iii. B – This is the third highest quality category, and represents approximately the next 35-45% of the journals assigned to the given primary field of Research Group.
- iv. C – This is the fourth highest quality category, and represents the remaining recognized quality journals assigned to the given primary field of Research Panel.

Journal lists are meant to be a starting point only for assessing publication quality and should not constrain researchers to a particular domain. There is no substitute for assessing individual articles on a case-by-case basis.

The Global Institute for Scientific Information (GISI) also developed the Journal Impact Factor (JIF) for ranking scholarly journals. Journal Impact Factor is a measure of the average number of citations to articles published in journals, books, patent document, thesis, project reports, news papers, conference/seminar proceedings, documents published in internet, notes and any other approved documents. It is a measure of the relative importance of a journal within its field, with journals of higher JIF deemed to be more important than those with lower ones (GISI 2012).

Table 1: Characteristics of the various types of journals

Features	Academic/Scholarly Journals	Trade Journals	Current Affairs/Opinion Magazines	Popular Magazines	Newspapers
Purpose	To inform, report, and make available original research and new findings	To report on industry trends, new products or techniques to people in a specific trade, business or profession.	To offer in-depth reporting and feature articles without scholarly conventions.	To entertain and inform without providing in-depth analysis.	To disseminate news on a daily or weekly basis.
Subject	Often devoted to a single discipline or sub discipline.	Cover practical information related to a field or industry.	Cover a wide range of topics of interest to the readership. Be aware of the predominant philosophical/political stance of the editorial board.	Often focused on a particular subject or hobby but may also cover a variety of topics.	Encompass current events in politics, sports, leisure, religion and business.
Peer Review Process	Articles often reviewed by an author's peers before publication.	No peer review process.	No peer review process.	No peer review process, may be reviewed by an editor or editorial board.	No peer review process.
Access	Mainly held in libraries or on subscription-based databases – few are freely available on the www.	Mainly held in libraries or on subscription-based databases. Commonly available as part of professional/trade association membership.	Many titles available from major newsagents, public libraries and some university libraries.	Available in supermarkets and newsagents.	Available in news agents.
Examples	<i>American Economic Review</i> <i>Australian Journal of Psychology</i>	<i>Advertising Age</i> <i>Nursing Times</i> <i>Drug Topics</i>	<i>Bulletin (Sydney)</i> <i>Current Affairs Bulletin</i> <i>Scientific American</i> <i>Time (Sydney)</i>	<i>Readers Digest</i> <i>National Geographic</i> <i>New idea</i> <i>Sports illustrated</i>	<i>Australian Financial Review</i> <i>Morning Bulletin</i> <i>Counter Mail.</i>

Source: Camden-Carroll, (2016)

3.4 Writing a Journal Article

Writing research papers can be a frustrating experience. There are however many online resources and excellent books designed to provide writing advice to scholars. Much of what has already been discussed in this paper with respect to thesis and dissertation writing also applies to journal paper writing. The format, content and language of communication are quite the same, the major difference being the constraint of much lesser number of pages required for a journal paper. Journal articles, therefore need to be a lot more concise while remaining informative and clear.

A typical journal paper is divided into sections: Title, Abstract, Introduction, Materials and Methods, Results, Discussion, Conclusion and References.

Murray (2013) gave ten tips on writing journal papers as follows:

- a). Have a strategy
 - i. Define why you are writing. This helps sustain the required motivation
 - ii. Determine which journal you are writing for. This shapes the content, focus, structure and style.
- b). Study and Analyse articles in journals in your field
- c). Go on and just write
- d). Get feedback from start to finish
- e). Make specific writing goals and sub-goals. This means defining the content, verb and word length for the sections.
- f). Write with others
- g). Do a warm up before you write
- h). Analyse reviewers' feedback on your submission
- i). Be persistent, thick-skinned and resilient
- j). Take care of yourself – maintain healthy work habits and sustain your motivation.

3.5 Writing a Technical Report

Prance (2010) defined technical report as a formal report designed to convey technical information in a clear and easily accessible format. Technical reports are usually divided into sections which allow different readers to access different levels of information. The structure, content and language of communication are very crucial in any technical report. Table 2 presents a typical structure and details expected in each section of a technical report. Table 3 is a summary of the presentation guidelines.

Table 2: Structure of a Technical Report

Section	Details
Title page	Must include the title of the report
Summary	A summary of the whole report, similar to the abstract in journals or thesis and should include important features of the work, results and conclusions.
Contents	Numbers and lists all section and subsection headings with page numbers.
Introduction	States the objectives of the report and comments on the way the topic of the report is to be treated. Leads straight into the report itself
The Body of the Report	Divided into numbered and headed sections. These sections separate the different main ideas in a logical order.
Conclusions	A short, logical summing up of the theme(s) developed in the main text.
References	Details of published sources of material referred to or quoted in the text (including any lecture notes and URL addresses of websites used.
Bibliography	Other published sources of material including websites, not referred in the text but useful for background and further reading.
Acknowledgements	List of people who helped you research or prepare the report, including the proofreaders.
Appendices (if appropriate)	Any further material which is essential for full understanding of your report (e.g. large scale diagrams, computer code, new data, specifications) but not required by a casual reader.

Source: Adapted from Prance (2010)

Table 3: Presentation Guidelines for Technical Reports

Features	Details
Script	The report must be provided single sided on white A4 paper. Hand written or dot-matrix printed reports are unacceptable.
Margins	All four margins must be at least 2.54 cm
Page numbers	Do not number the title summary or content pages. Number all other pages consecutively starting at 1
Binding	A single staple on the top left corner or 3 staples spaced down left hand margin. For larger reports, binders may be used.

Source: Prance, (2010)

3.5.1 General Tips for Organizing the Report

There are some issues that need attention when writing a technical report, they include the following:

- a) The reader(s) of the report
- b) Writing the first draft
- c) Revising the draft
- d) Diagrams, graphs, table and mathematics
- e) The Report Layout
- f) Heading and Sub-heading
- g) Originality
- h) Finalizing the report and proofreading
- i) The summary

a). **The Reader(s) of the Report**

This will affect the content, technical level and details required, especially in the introduction.

b). **Writing the First Draft**

It is advisable to start with the main text, not the introduction. Make an outline of the headings and sub-headings and follow them through. Just let the ideas flow at this stage without much worry about spellings and styles. Make rough sketches of diagrams or graphs. Keep a numbered list of references as they are included in the text. Write the conclusion next followed by the introduction. Do not write the summary at this stage.

c). **Revising the Draft**

This is the stage at which the report begins to take shape as a professional, technical document. In revising the draft, it should be remembered that the essence of a successful technical report is presentation of concise, accurate information to the intended readership.

d) **Diagrams, Graphs, Tables and Mathematics**

Diagrams should be kept simple and specific to the report. They should be placed immediately after the text reference to them or as close as possible.

Tables should also be presented with table numbers and captions and positioned as close as possible to the text reference to the table. Complicated tables should be taken to the appendix.

Mathematics should only be used where it is the most efficient way to convey the information. Larger Mathematical arguments should be taken to the appendix.

e). **The Report Layout**

The appearance of a report is as important as its content. An attractive well organized report is more reader friendly. It is good to use a standard 12 point font, such as Times

New Roman, for the main text. Different font sizes, bold, italic and underline may be used where appropriate but not for excess.

f). **Headings and Sub-headings**

Headings and sub-headings are employed to break up the text to guide the reader and should be based on the logical sequence identified at the planning stage. The use of numbering, font size and style are helpful to clarify the structure.

g). **Organizing**

It is good practice to have most of the thoughts presented in the authors own words. Every use of existing information from both published and unpublished sources should be properly referenced. Use of existing information (outside those assumed to be common knowledge) without reference is plagiarism and is a very serious offence.

h). **Finishing the Report and Proofreading**

As the report nears completion, with all the necessary sections in place, proper proofreading should be effected, page numbers added, content and title pages as well as the summary written. It is advisable to first personally proofread and check your work very well, and then to get someone else to do the same for you.

i). **The Summary**

The summary should be carefully written to indicate the scope, main results and conclusions of the report. It must be intelligible in itself as many people may only read and refer to it without getting to read the full report.

4.0 CONCLUSION

Research reports are of various types: proposals; dissertations, thesis, journal articles; conference/seminar papers; and technical reports. They however have quite a lot in common: standardized structure; expected content details; formal language and style of

communication, and the need to prepare each to the specific guidelines of intended user institution or organization. The required skills for research report writing are in universal demand but developing them is the responsibility of interested individuals; through commitment to diligent learning and practice.

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