



WRITING A IT CAPSTONE PAPER

JAYMARK A. YAMBAO

WHAT IS A CAPSTONE

A **Capstone Project** is an undertaking appropriate to a professional fields. It Should significantly address an existing problem or need. In particular an Information Technology (IT) Capstone Project focuses on the infrastructure, application, or processes involved on introducing a Computing solutions to a problem (Article 2, CMO 25 series 2015).

Suggested Areas for Capstone Project:

1. **Software Development**
2. **Multimedia Systems**
3. **Network Design and Implementation and Server Farm Configuration and Management**
4. **IT Management**



DOCUMENTATION FORMAT

The College of Computing Studies (CCS) of Don Honorio Ventura State University uses the IMRaD Format.

The “IMRaD” format refers to a paper that is structured by four main sections: **Introduction**, **Methods**, **Results**, and **Discussion**. This format is often used for lab reports as well as for reporting any planned, systematic research in the social sciences, natural sciences, or engineering and computer sciences (George Mason University, nd).

Chapter I: Introduction

Chapter II: Review of Related Literature and Studies

Chapter III: Methodology

Chapter IV: Results and Discussion

Chapter V: Recommendation and Conclusion



CHAPTER I: INTRODUCTION

The **introduction** serves the purpose of leading the reader from a general subject area to a particular field of research. It establishes the context of the research being conducted by summarizing current understanding and background information about the topic, stating the purpose of the work in the form of the hypothesis, question, or research problem, briefly explaining your rationale, methodological approach, highlighting the potential outcomes your study can reveal, and describing the remaining structure of the paper.



CHAPTER I: INTRODUCTION

Sub Topics

- **INTRODUCTION**
- **PROJECT CONTEXT**
- **PURPOSE OF DESCRIPTION**
- **STATEMENT OF OBJECTIVES**
- **SCOPE AND LIMITATIONS**
- **DEFINITION OF TERMS**



SUB TOPIC: INTRODUCTION

WRITING A RESEARCH PAPER INTRODUCTION | STEP-BY-STEP GUIDE



The introduction to a [research paper](#) is where you set up your topic and approach for the reader (Jack Caulfield, 2022).

It has several key goals:

- Present your topic and get the reader interested
- Provide background or summarize existing research
- Position your own approach
- Detail your specific [research problem](#) and [problem statement](#)
- Give an overview of the paper's structure

- **Step 1: Introduce your topic**

-The first job of the introduction is to tell the reader what your [topic](#) is and why it's interesting or important. This is generally accomplished with a strong opening hook.

- **Step 2: Describe the background**

-This part of the introduction differs depending on what approach your paper is taking. This is the place to review previous research and establish how yours fits in.

- **Step 3: Establish your research problem**

-The next step is to clarify how your own research fits in and what problem it addresses.

- **Step 4: Specify your objective(s)**

-Now you'll get into the specifics of what you intend to find out or express in your research paper.

- **Step 5: Map out your paper**

-The final part of the introduction is often dedicated to a brief overview of the rest of the paper.



STEPS THAT WILL HELP YOU PUT TOGETHER
AN EFFECTIVE INTRODUCTION

PROPER CITATION USING APA FORMAT

It is important to properly recognize the work of others to free are self from plagiarism.



ONE AUTHOR:

Mitchell (2017) states... Or
...(Mitchell, 2017).



TWO AUTHORS:

Mitchell and Smith (2017)
state... Or ...(Mitchell & Smith,
2017).



THREE, OR MORE AUTHORS:

Further cites can be shorted to
the first author's name
followed by et al:

Mitchell et al (2017) state... Or
...(Mitchell et al, 2017).



NO AUTHORS:

If the author is unknown, the first few words of the
reference should be used. This is usually the title of the
source.

If this is the title of a book, periodical, brochure or
report, is should be italicised. For example:

(A guide to citation, 2017).

If this is the title of an article, chapter or web
page, it should be in quotation marks. For
example:

("APA Citation", 2017).

SUB TOPIC: PROJECT CONTEXT

WHAT IS PROJECT CONTEXT?



Context is the environment in which the project is taking place. The core aspects of context are the scope, setting, phase, decision-making processes, and stakeholders.

An alternative breakdown of context includes:

Physical Environment - Where the project is physically located and those characteristics.

Social Environment - The stakeholders and the general community (all relevant demographics) in which the project will be carried out.

Economic Environment - What is the effect of the presents, supply, demand, and exchange or resources within the project area.

Cultural characteristics - What are the relevant characteristics of culture within the project area?

- What is the Scope?
-Project scope is the defined work that needs to be accomplished for a project.
- Who is Affected by the Project?
-who may be affected by the project in order to consider their input in the project development decision making process.
- Where is the Project in the Decision-Making Process?
-where you are in the decision-making process for any given project.
- What Are the Desired Outcomes of the Project?
-What are the desired outcomes of the project, as defined by the stakeholders, and how do sustainability goals fit within them?
- How Do You Prioritize Criteria in a Cost-Constrained Environment?
-Implementing the principles of sustainability should lead to a wise and cost-effective use of resources that supports long-term benefits.
- Does the Criterion Meet Project and/or Agency Goals?
-Ensure that selected criteria fit within the agency's sustainability goals, strategies, or approaches (for example, to reduce greenhouse gas emissions).



AN INVENTORY OF THE CONTEXT MAY INCLUDE:

SUB TOPIC: PURPOSE AND DESCRIPTION

A project's purpose and description explains the reason for its existence, the meaning of what is done, the ambition or dream pursued by the project or the direction it takes and maintains.

In our example, the project purpose is the following:

“The purpose of this project is to provide customers with self-service registration for athletic facilities to improve customer access, reduce clerical personnel cost and improve facility utilization.”



STATEMENT OF OBJECTIVES

The objectives are a very important part of a research paper because they outline where the project is headed and what it will accomplish. Developing objectives can be a little tricky, so take some time to consider them. Then work on wording them carefully so your readers understand your goals. With clear objectives, your research paper will be much stronger.

Guide in brainstorming Your Objectives

- **State your main research question to guide your ideas.**
- **Describe the ultimate goal of your study.**
- **Break that goal down into sub-categories to develop your objectives.**
- **Limit your objectives to 3 to 5 at most.**
- **Divide your objectives into 1 general and 3-4 specific ones.**
- **Assess each objective using the SMART (Specific, Measurable, Attainable, Realistic, and Time-bound) acronym.**

Statement of Objectives

Generally, this capstone project aimed to create an O-Shopp: An E-Shopping Application with Product Preview using Augmented Reality for Jasmin's Furniture.

Specifically, the capstone project intended to achieve the following:

1. Design and develop a mobile application which will be capable of:
 - a. assisting the customer of Jasmin's Furniture in making decisions on what furniture fits in the interior of the house using Augmented Reality; and
 - b. enabling the customer to purchase a product and monitor the production status online;
2. Design and develop a web-based system which will be capable of:
 - a. supervising the management of Jasmin's Furniture in monitoring the orders;
 - b. enabling the production staff update the status of the furniture on its production stage; and
 - c. giving an effective way of accessing the contact information for the delivery personnel to use;
3. Evaluate the application and web-based system to determine if it complies with the ISO 25010 standards with the following criteria:
 - a. Functional Suitability;
 - b. Compatibility;
 - c. Performance Efficiency;
 - d. Reliability;
 - e. Usability;
 - f. Security;
 - g. Portability.
 - h. Maintainability;
4. Prepare an implementation plan for the deployment of the capstone project.

SCOPE AND LIMITATIONS

Guidelines in writing the scope and delimitation. The scope and delimitation should include the following:

1. A brief statement of the general purpose of the study.
2. The subject matter and topics studied and discussed.
3. The locale of the study, where the data were gathered or the entity to which the data belong.
4. The population or universe from which the respondents were selected. This must be large enough to make generalizations significant.
5. The period of the study. This is the time, either months or years, during which the data were gathered.

DEFINITION OF TERMS

Your actual thesis statement should define the term in your own words.

EXAMPLE:

E-commerce. This refers to an online platforms both websites and mobile application for selling and purchasing product.

O-shopp. It refers to the name of the application that will be developed using Augmented Reality.

Online Shopping. This refers to the manner of buying goods or services through internet.

Product Preview. This means that the product will be shown in advanced so the customers can decide if they will purchase the product or not.

Augmented Reality. This refers to the technology which creates visualization of computer object or graphics using mobile phones on the real world.

Markerless Augmented Reality. This refers to the type of Augmented Reality which allows user to plot object or model in the real environment without the need of a target object.

Inventory. This refers to the counting of furniture available in Jasmin's Furniture.

Augment. This refers to the viewing of virtual objects in a real environment using a mobile phone

CHAPTER II: REVIEW OF RELATED LITERATURE AND STUDIES

Sub Topics

- **INTRODUCTION**
- **LITERATURE REVIEW**
- **RELATED STUDIES**
 - **LOCAL**
 - **FOREIGN**
- **CONCEPTUAL FRAMEWORK**
- **TECHNICAL BACKGROUND**



LITERATURE REVIEW

A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period.

A literature review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis. A summary is a recap of the important information of the source, but a synthesis is a re-organization, or a reshuffling, of that information. It might give a new interpretation of old material or combine new with old interpretations. Or it might trace the intellectual progression of the field, including major debates. And depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent or relevant.

Strategies for writing the literature review

- **Find a focus** - A literature review, like a term paper, is usually organized around ideas, not the sources themselves as an annotated bibliography would be organized. This means that you will not just simply list your sources and go into detail about each one of them, one at a time.
- **Convey it to your reader** - A literature review may not have a traditional thesis statement (one that makes an argument), but you do need to tell readers what to expect. Try writing a simple statement that lets the reader know what is your main organizing principle.
- **Consider organization** - You've got a focus, and you've stated it clearly and directly. Now what is the most effective way of presenting the information? What are the most important topics, subtopics, etc., that your review needs to include? And in what order should you present them? Develop an organization for your review at both a global and local level

See more: <https://writingcenter.unc.edu/tips-and-tools/literature-reviews/>

RELATED STUDIES

Related Studies focus on the discussion of studies, inquiries, or investigations already conducted to which the present proposed study is related or has some bearing or similarity. They are usually published or unpublished materials such as manuscripts, theses, and dissertations.

These are the common goals of conducting review of related studies:

- To determine what exists in the scholarly literature
- To identify possible gap(s) in the scholarly literature for further research
- To inform the research topic, theory (if applicable), and associated methodology
- **To compare/contrast against findings resulting from the current study**

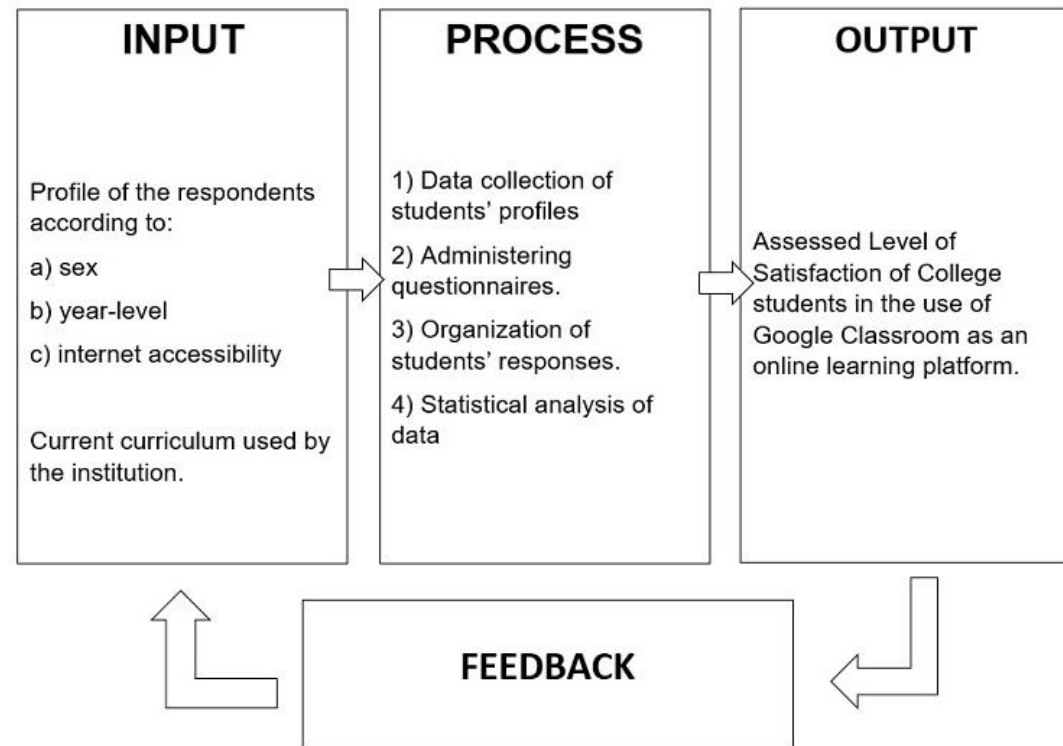
Example

“In the study of Carlos and Jose (2020), analyzed an application, named IKEA Place, which allows customers to buy online using AR technology without the need for a marker to recognize the surface (Markerless Augmented Reality). The application intended to create more confidence and convenience in purchasing a product through the support of this technology. The results had been found to give customers more confidence and convenience in purchasing products online.”

CONCEPTUAL FRAMEWORK

A **conceptual framework** illustrates the expected relationship between your variables. It defines the relevant objectives for your research process and maps out how they come together to draw coherent conclusion

Note: IPO are common for Conceptual Framework but you are not limited to illustrate your own visual interpretation of conceptual framework



TECHNICAL BACKGROUND

It provides information on a technical topic but in such a way that is adapted for a particular audience that has specific needs for that information. It focuses on a technical topics that provides background on the specific set of readers who have specific needs for it.

Example

“Technical Background

The proponents have used web-based program wherein the users can access it through any digital platforms. The SLSU OJT Timesheet Monitoring using QR Code with Journal System is an online monitoring for trainees for easy and convenient access by the students and staffs without using the traditional process. These are some of the technical terms that are being used in our project: VS Code – Text Editor, Server-client side – PHP, HTML, CSS, Apache, Database – Xampp, MySQL, Functionality – Web application, PhpMyAdmin. Some of the terminologies being stated above are also the technology being used in our project

Details of the technologies to be used

This project will be available in any technology such mobile phones, laptops, and computers to run the system. In developing the project, the following technology tools will be used:

VS Code – *In the development of the system, we made use of Microsoft Visual Studio Code for encoding the source code of the system, in order to be the accurate and fast acquisition of data and information.*

PHP – *is a general-purpose scripting language that is especially suited to server-side web development where PHP generally runs on a web server. It can also be used for command-line scripting and client-side GUI applications.*

Xampp 8.0.3 – *Developers will use this as development tool, to allow website designers and programmers to test their work on their own computers without any access to the Internet.*

MySQL – *is an open source relational database management system. MySQL will be used by the developer, because it is one of the system development compatible databases.”*

CHAPTER III: METHODOLOGY

Sub Topics

- **RESEARCH DESIGN**
- **RESEARCH INSTRUMENT**
- **EVALUATION INSTRUMENT AND CRITERIA**
- **SYSTEM DEVELOPMENT
METHODOLOGY/PROCEDURE**
- **ORGANIZATIONAL ASSESTMENT**
- **REQUIREMENT ANALYSIS AND SPECIFICATION**
- **TEST EVALUATION PLAN**
- **IMPLEMENTATION PLAN**



RESEARCH DESIGN

A research design is a strategy for answering your research question using empirical data. Creating a research design means making decisions about:

Your overall research objectives and approach

The type of research design you'll use

Your sampling methods or criteria for selecting subjects

Your data collection methods

The procedures you'll follow to collect data

Your data analysis methods

A well-planned research design helps ensure that your methods match your research aims and that you use the right kind of analysis for your data.

Descriptive research aims to accurately and systematically describe a population, situation or phenomenon. It can answer *what, where, when* and *how* questions, but not *why* questions.

A descriptive research design can use a wide variety of research methods to investigate one or more variables. Unlike in experimental research, the researcher does not control or manipulate any of the variables, but only observes and measures them.

When to use a descriptive research design

Descriptive research is an appropriate choice when the research aim is to identify characteristics, frequencies, trends, and categories.

It is useful when not much is known yet about the topic or problem. Before you can research why something happens, you need to understand how, when and where it happens.

RESEARCH INSTRUMENT

Research instruments encompass measurement tools used in data collection in research.

There are numerous types of research instruments available to a researcher.

The choice of the instrument(s) to use depends on a number of factors, including:

- i. Research objective
- ii. Nature of data
- iii. Statistical significance
- iv. Sample size
- v. Timing

<https://www.professionalwritingbay.com/examples-of-research-instruments.html>

common examples of research instruments utilized in collecting data include:

- i. Questionnaires
- ii. Observations
- iii. Interviews
- iv. Focus group discussions
- v. Experiment

EVALUATION INSTRUMENT AND CRITERIA

There are two sub topics in this section, the evaluation instrument to be used and the statistical approach on how the respondent carefully selected and chosen.

To determine if an appropriate instrument is available, a researcher can search literature and commercially available databases to find something suitable to the study. If it is determined that there are no instruments available that measure the variables in a study, there are four rigorous phases for developing an instrument that accurately measures the variables of interest (Creswell, 2005).

VALUE	RATING
4	Strongly Agree
3	Agree
2	Disagree
1	Strongly Disagree

MEAN RANGE	VERBAL INTERPRETATION
3.26 – 4.00	Outstanding
2.51 – 3.25	Very Satisfactory
1.76 – 2.50	Satisfactory
1.00 – 1.75	Unsatisfactory

GRAND MEAN RANGE	VERBAL INTERPRETATION
3.26 – 4.00	Highly Acceptable
2.51 – 3.25	Very Acceptable
1.76 – 2.50	Acceptable
1.00 – 1.75	Not Acceptable

SYSTEM DEVELOPMENT METHODOLOGY/PROCEDURE

The whole purpose of system development is the enhancement of the productivity of the organization and the group of people working in that organization, as system development got bigger there was a need to systemize the process of system development and come up with a set of steps that are required for any system development.

There are two classification:

- **Predictive and Adaptive**
- **Incremental and Iterative**

Waterfall,
Agile, Lean,
Iterative, Prototyping,
DevOps, Spiral or
V-model, RAD, JAD

ORGANIZATIONAL ASSESTMENT

This section describe the condition of the research local in adapting the proposed system.

It describe the ff:

- **Technical Feasibility**
- **Operational Feasibility**
- **Financial Feasibility**
- **Participants of the Study**

TEST EVALUATION PLAN & IMPLEMENTATION PLAN

This section describes the researchers plan on implementing the proposed system and how the system will be evaluated.

Alpha Test, Beta Test, Training, and Deployment

CHAPTER IV: RESULT AND DISCUSSION

Sub Topics

- **PRE-ASSESSMENT (EVALUATION OF THE EXISTING SYSTEM)**
- **POST-ASSESSMENT (EVALUATION OF THE PROPOSED SYSTEM)**
- **SYSTEM EVALUATION BASED ON ISO STANDARDS**
- **SUMMARY OF FINDINGS**

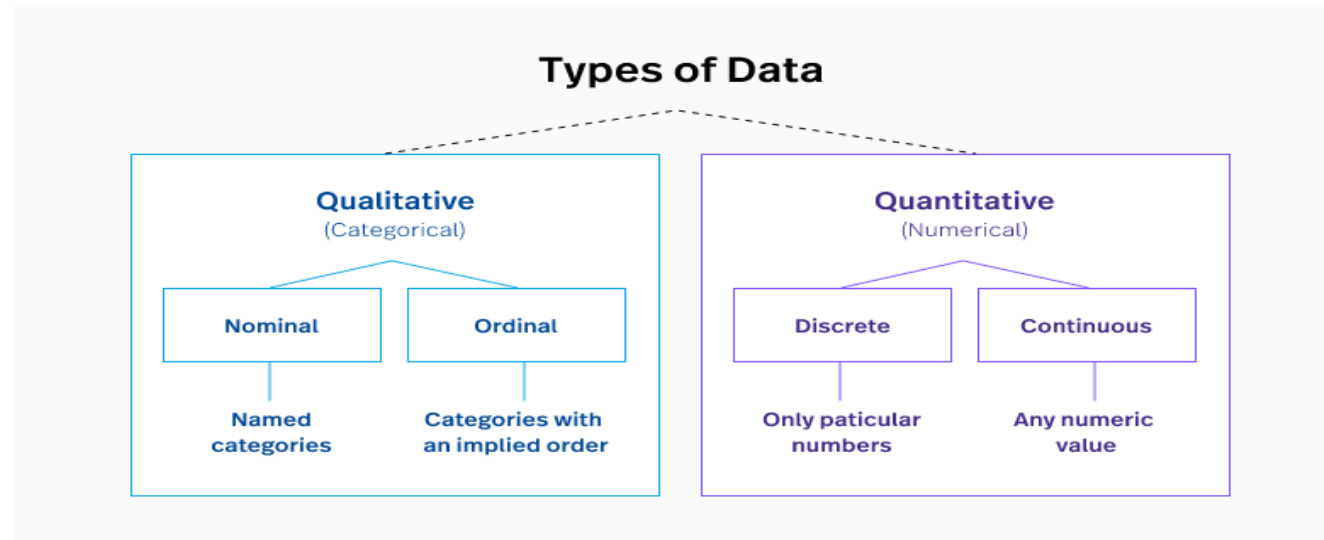


INTERPRETATION OF DATA

Note: Pre-assessment can be assessed thru Qualitative or Quantitative.

The qualitative results section also may be organized by research question, but usually is organized by themes which emerged from the data collected. The researcher provides rich details from her/his observations and interviews, with detailed quotations provided to illustrate the themes identified. Sometimes the results section is combined with the discussion section.

At its simplest level, quantitative data is information that can be quantified. It's data that can be counted or measured, and given a numerical value.



CHAPTER V: CONCLUSION AND RECOMMENDATION

Sub Topics

- **CONCLUSION**
- **RECOMMENDATION**



CONCLUSION

The conclusion is the very last part of your thesis or dissertation. It should be concise and engaging, leaving your reader with a clear understanding of your main findings, as well as the answer to your research question.

In it, you should:

- ✓ Clearly state the answer to your main research question
- ✓ Summarize and reflect on your research process
- ✓ Make recommendations for future work on your topic
- ✓ Show what new knowledge you have contributed to your field
- ✓ Wrap up your thesis or dissertation

CONCLUSION

Steps in making your conclusion

Step 1: Answer your research question

Step 2: Summarize and reflect on your research

Step 3: Make future recommendations

Step 4: Emphasize your contributions to your field

Step 5: Wrap up your thesis or dissertation

<https://www.scribbr.com/dissertation/write-conclusion/>

RECOMMENDATION

Recommendations are arguably the most important part of the analysis phase—this is where you'll suggest specific interventions or strategies to address the issues and constraints identified in the assessment.

Recommendations should directly respond to key findings arrived at through data collection and analysis. A process of prioritization is essential to narrowing down findings, and once this is done, recommendations should be developed that align with the most important findings. Use the abbreviated Gender Analysis and Integration Matrix (GAIM) on 1.4 to prioritize gender findings and determine at which level(s) you may wish to intervene. Will your resulting program/project/strategy address a root cause? Will it seek to accommodate or transform existing gender norms?