

# THESISQUO: Research Management System with Plagiarism Checker and Prescriptive Analytics



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## ABSTRACT

The researchers established a study that can benefit educational institutions by offering an online repository for undergraduate, graduate, master's, and doctorate thesis studies. The system includes a Plagiarism checker that scans and checks the similarity of the thesis study that will be uploaded to the system. The system also includes Prescriptive analytics that can give a real-time update about the current study count, highest upload count, and other relative data that can be presented to help the end-user decide on what study to develop. The researchers and developers ask the guidance and help from faculty, students, and some IT experts from Bulacan State University by evaluating the system. The system's evaluation is based on ISO 25010 and was based on the Likert scale with the scale and descriptive interpretations.

**Key Words:** Repository; Plagiarism Checker, Research Online Repository

## 1. INTRODUCTION

The use of technology is vast for businesses, schools, and even at home. People who use the internet grow exponentially year by year, and about 40% of the world's population has access to the internet [1]. In the 21st Century, where most people use technology on a day-to-day basis, it can now turn anything into reality. Because of the internet and different technology, an Online Class or Remote Learning is now possible through the use of different platforms and applications as well as meetings, webinars, and even presentations. Hence, the technology people use for different transactions cannot be removed because it plays a vital role in every person's life. Technology today is necessary because life without it is pointless in the fast-changing world people are in [2].

Following how prominent the technology is, anyone with internet access can study, search for published books as resources and references and learn online through different websites. Versions of books can be read,

summarized, and cited using the online repository, any user may create their own "bookshelves" by bookmarking sites and resources that they find particularly interesting [3]. People can search for articles, stories, literature, or studies anytime they need through the Electronic-library or E-library.

Developing a research paper or capstone paper requires much reading. The third step in writing a research paper is by doing researchers related to the topic that has been chosen, and the researchers must find a reliable source and skim to find the primary and critical points [4]. After researching the topics, related studies, and critical points, the researchers must re-read the paper before submitting it [5]. Nevertheless, reading-related literature and studies are essential in every research paper because it serves as a background of the research and supports the researcher's statements. The more textbooks, papers, and other references you can include in your literature review, the more credible your research and knowledge will seem [6]. However, this will be a massive problem if the students undertaking the research or capstone subject have difficulties comprehending what they are reading.

It is already official, and the Malacañang stated that the students from the Philippines have poor reading comprehension, and it is a reality [7]. Manaog also stated that in a global survey from the Program for International Assessment (PISA) 2018, Filipino students ranging from ages 15 got 340 points in reading comprehension, a rating lower than the average global score of 487 points the Philippines to ranked last among 79 countries. These ratings show that Filipino students lack reading comprehension at a young age. In addition, this problem may preclude the students from developing a better thesis study or Capstone paper. One of the factors affecting the student's reading comprehension is the effects of modern technology and social media [8]. These factors affect the students at a young age by getting the attention and distracting the students from studying. Social media can help and can also deteriorate the student's education.

Social media also has a positive and negative effect on education; one of the positives is that it helps students from sharing knowledge by making the transfer smoothly, while the adverse effect is that students are becoming dependent on the information that is easily reachable on social media that deteriorate the student's research capabilities [9]. Moreover, because of the fast and reachable sources from social media, the students believe easily what they see on social media such as Facebook, Tiktok, Youtube, and other platforms. These may result in a deceptive and invalid research study. The lack of resources to support the study may also hinder the students from accomplishing their research study.

Students have trouble finding resources online. The most common problems are limited internet bandwidth, inconsistent power supply, a lack of technology to operate on, and inadequate searching proficiency [10]. These are the common problems that the students encounter, resulting in lousy research content. Lack of research time and the complexity of online materials are some of the challenges resulting in incomprehensible literature reviews, lack of effective methods from existing literature that results in the questionable validity of the study, and lastly, the students' research interests are limited by their lack of access to online information resources [11]. Group work is hindered since they cannot share nor disseminate the online materials.

On the other hand, the research papers of undergraduates faded after submitting them to their respective universities. When the research papers are submitted only in a hard copy, the project typically fades and is forgotten by everyone except by its author and mentor; at best, the list of research papers may be available in public; however, the printed copies are primarily hard to find, if not impossible to get [12].

The researchers aspire to an aid that can contribute by gathering and uploading completed studies and capstone projects of users from different schools and organizations in order to develop a system that is accessible for the future researchers that shall undergo and develop their thesis or research. The researchers developed an online repository that holds Capstone studies of the undergraduate students, graduate school, users taking their master's degrees, and other users who are accomplishing thesis or studies. The researchers and developers also collect and include different categories of studies to have more sources and reliable studies that can be used by future researchers. The study aims to develop an Online repository that shall help the users on finding Local resources with efficiency and effectiveness.

The Online repository also includes Prescriptive Analytics to analyze raw data that can be used by the end-user on choosing a future research topic that they are about to develop. Prescriptive analytics evaluates information about potential situations or scenarios, resources available, past data, and present performance before recommending a course of action or strategy [13]. Hence, the researchers consider applying the Prescriptive analytics to help on suggesting probable research topics that can be developed in the future and to prevent saturated research topics from being developed. Moreover, the researchers and

developers also include a Plagiarism Checker that ensures the credibility, uniqueness, and authenticity of the study by scanning the study before uploading it to the repository. A plagiarism checker can aid users in removing poorly paraphrased sentences by checking them through online repositories [14]. Instead of looking and paraphrasing all night, a plagiarism checker helps the user identify the specific line immediately and lets the user change it right away.

### Objectives of the Study

In this part of the study, the researchers showcase the general and specific objectives that are set to be completed and developed by the researchers.

**General Objectives:** The general objective of the study is to design and develop a research management system with a plagiarism checker and prescriptive analytics.

### Specific Objectives:

- To integrate a similarity test for plagiarism into the system to determine the acceptable percentage of copied statements.
- To develop prescriptive analytics that showcases data trends through charts and graphs and the number of topics/categories of research conducted.
- To incorporate a Portable Document Format (PDF) file of the Capstone studies that can be viewed or downloaded by the users.
- To generate Applethe Chatbot framework that shall assist the users with the function of the system.
- To include an Admin page that can change the banner image, monitor study uploads, manage user accounts, and administer the website.
- To construct the following functionalities in the repository menu:
  - Sign up and Sign in Function;
  - Search Content;
  - Upload File;
  - Filter by date; and
  - Sort by Category.
- To assess the developed research management system based on the following criteria requirements of ISO/IEC 25010 Software Quality model particularly:
  - Functional Suitability;
  - Performance Efficiency;
  - Usability;
  - Reliability;
  - Security;
  - Maintainability; and
  - Portability.

## 2. METHODS AND DESIGN

### Software Development Methodology

The researchers used the Quantitative Research Method to evaluate the plagiarism checker in this study because quantitative research entails the collection and

analysis of numerical data. It was used to check for similarities to existing research documents, and the study employ a quantitative approach in which the variables of interest or manipulation have already taken place. To put it another way, the independent variable or variables cannot be changed; instead, the effect they have on a dependent variable is observed.

### **Planning Phase**

During the planning phase, researchers collected and documented the various web-based text-matching systems, then determine how one text-matching system differs from another. In this phase, the researchers gather related studies, literature, and theories to support the Plagiarism Checker and Prescriptive Analytics. It is now as simple to detect plagiarism as it is to plagiarize a document. Anti-plagiarism software, both free and commercially available, can be used to detect plagiarism. Commercial software, on the other hand, is incredibly expensive. As a result, that software is out of reach for the average person. Researchers are interested in prescriptive analytics, which seeks to determine the best course of action for the future. As a result, the researchers incorporate prescriptive analysis on a plagiarism checker [15]. Given the current situation, most students have a difficult time studying online, and some may resort to plagiarism to reduce the difficulty of schoolwork, including research, and to complete requirements with little to no effort [16].

### **Design Phase**

In the first iteration, the researchers form a development team to present the requirements developed in the previous steps. The following teams discuss how to meet these requirements and provide the tools that the researchers need to achieve the best results. It determines, for example, which programming language, framework, and library the team project use. Other iteration developers debate the implementation of new version features and internal structures [17].

During this phase, the developers created a Blueprint that serves as a guide for how the website will look and how it will function in terms of detection. The developers created the site using various web development languages such as Javascript and SQL.

### **Requirement and Analysis Phase**

The first thing to do by the owner or developer is to create documentation that includes the initial requirements of the system before the actual development [18]. The following details that are included in the documents are the features that are supported and features that cannot be supported by the system. Documentation also covers the end result of the project and achieved.

In this phase, the researchers considered all of the system's requirements, user knowledge of how to use the system, functions, system inclusions, and system features. These initial requirements must be documented and serve as a guide for both the developer and the end-user.

### **Development Phase**

The Development phase of the Agile Model is the actual coding and converting of documentation into functional software applications on. This phase is generally the longest part of the SDLC process and is considered the skeleton of the process [19].

In this phase, the researchers created a web application based on the system requirements identified in the study so that the end-user can use it without difficulty. The developer must consider all system requirements when developing the plagiarism checker. The system was built using the various web development languages mentioned in the design phase. All of the designs from the previous phase must be converted and coded into a usable web application.

### **Testing Phase**

Throughout this phase, the end-user evaluates the system's input and output capabilities and features of the game to determine if they met their objectives. Students and faculty members of CICT were asked to take part in the testing. It is receptive to their suggestions and ideas.

In this phase, the researchers monitor the flow analysis and problems during this phase, and the testing team must work on two documents: Test Cases and Test Plans. The Test Cases correspond to the software modules specified in the Technical Design document, whereas the Test Plans correspond to the defects/bugs and problems discovered during testing. Furthermore, while it is impossible to resolve all problems discovered during the testing phase, the results of this phase can be used to reduce the number of errors in the system.

### **Deployment Phase**

The deployment phase completes the software development life cycle (SDLC) by putting the product into production. The product is ready to go live after the project team tests it and it passes each testing phase. This means that the product is ready for use in a real-world environment by all end users.

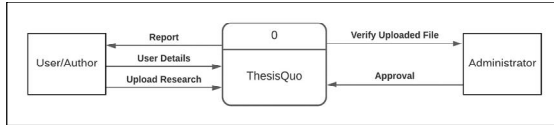
In this phase, the researchers begin by distributing the application to the intended audience, which is Bulacan State University students enrolled in the Bachelor of Science in Information Technology course. The Alpha Version of the application was distributed to end-users during this phase. Bugs found by users are documented, and suggestions were gathered and acknowledged.

### **Review Phase**

After completing all previous phases of development, the project team meets the development team members and evaluates the degree to which the requirements have been fulfilled. The team presents their ideas for correcting the issues that appeared during the previous phases, and the project team considers all the solutions. At the end of each phase, researchers must perform a Phase Review to allow the board to assess whether the project has met its objectives to date and is ready to move on to the next.

In this phase, the researchers determine whether the project is currently on schedule, within budget, and has produced all required deliverables by the due date. Things to consider during the review phase include whether or not the web application meets all of the requirements. After

gathering data and ensuring that it passes all tests and requirements, the survey form was distributed to respondents in order to collect feedback on the web application. The findings are documented in a Phase Review Form, which is then submitted to the Project Board for approval before proceeding to the next phase of the Project.



**Figure 1.** Context Diagram

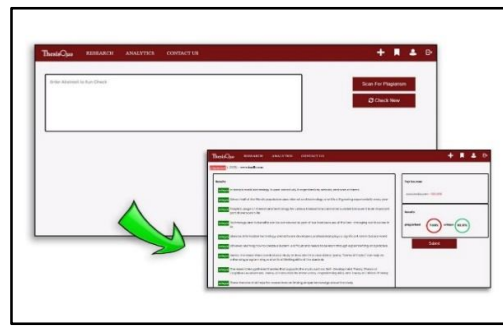
Figure 1 Context Diagram is a visual representation of the system's data flow from one entity to another and between APIs. ThesisQuo's environment can be identified using the level 0 data-flow diagram. The rectangle shape represents the Entity such as the User/Author and the Administrator. The arrows represent the data flow and the main system is represented by the rounded square.

**3. RESULTS AND DISCUSSION**

The data gathered are the result of how the “ThesisQuo: Research Management system with Plagiarism Checker and Prescriptive Analytics” Website performs and what is its overall rating. This chapter also showcases the final output of the system that are needed to be developed as per the general and specific objectives of the study. The first part shows the different web pages that are present on the website and the features that are raised in the objectives in Chapter I. The second part is consisted of some of functionalities of the Web system that are listed in the objectives. Lastly, the third and last part is the tabular representation of the acceptability of the developed Research Management system using the ISO 25010, Software Quality Model that has the following criteria such as: Functional suitability, Performance Efficiency, Usability, Reliability, Security, Maintainability, and Portability.

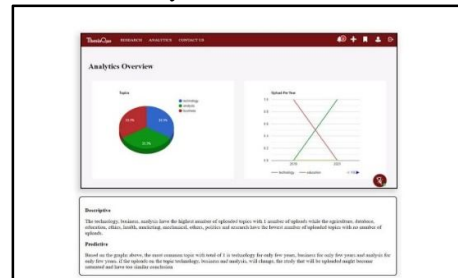
**Part I. Features of ThesisQuo research management system**

Part I showcases the different features of the web application system. This includes the Plagiarism checker page, Analytics page, PDF view of the study, Apple Chatbot, and the Admin page. In this part of the chapter, the features are discussed and the figures are presented as well to showcase the User interface of each feature of the system.

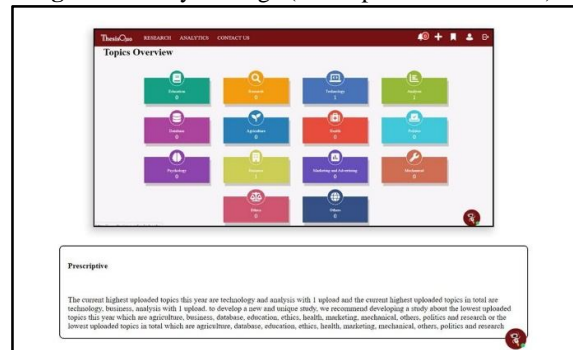


**Figure 2.** Plagiarism Checker

Figure 2 Plagiarism Checker is built almost similar to the prototype created by the researchers; however, the developers make it cleaner and developed a spacious section for the result of the test. On the other hand, the Plagiarism Checker still have the primary functions that was set by the researchers.



**Figure 3.** Analytics Page (Descriptive & Predictive)



**Figure 4.** Analytics Page (Prescriptive)

The Figure 3 and 4 Analytics page that includes the Descriptive, Predictive and Prescriptive Analytics shows the different data from the uploaded files in the system. The Analytics is integrated from Google Analytics and used to show data based on the current studies uploaded and the prescriptive will recommend what study can be developed in the future.



**Figure 5.** Admin Page

The Figure 5 Admin Page shows the different information of the admin that is currently logged on the website, the admin may modify his/her profile details, change display photo, and still be able to navigate and manage different data of the system through the buttons on the sidebar. The admin may change the banner image, monitor study uploads, manage user accounts, answer inquiries of users, create another admin account, and administer the website.

**Part II. Functions of ThesisQuo research management system**

Part II showcases the different functionalities of the web application system. This includes the Login, Registration, search content, sort, and filter function as well as the add article function. In this part of the chapter, the functionalities are discussed and the figures are presented as well to showcase the User interface of each function.



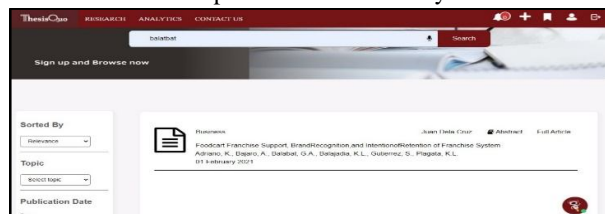
**Figure 6.** Sign in Page

Figure 6 Sign in Page requires the user to input email and password to log inside the website for him/her to use the different features of the website. The user may also reset the password if their password has been forgotten. In addition, if the user does not have account, he or she may click the “Don’t have an account” to access the Sign-up page.



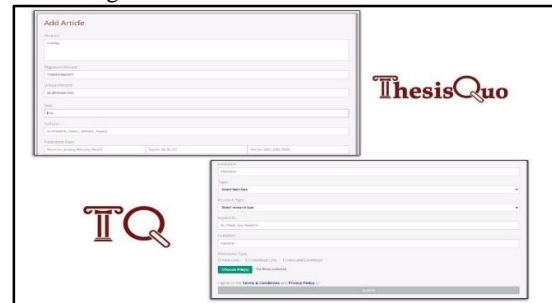
**Figure 7.** Sign up Page

Figure 7 Sign-up Page will ask the user to input the credentials needed to register on the website such as the Name, Birthday, Phone number, Address, Degree level, sex, email, and Password. In this manner, the information gathered shall be displayed in the user’s profile and can be used when the user uploads a research study.



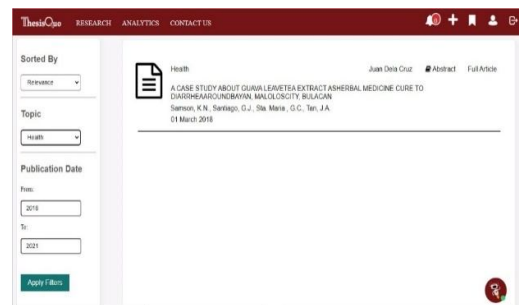
**Figure 8.** Search Content

Figure 8 Search Content showcases the search result of the user. The user may search for the title, category, name of the authors, or the uploader’s name. The search bar also has the audio feature that can be used instead of encoding the keyword, the user may speak and search through audio search.



**Figure 9.** Add Article

The Figure 9 Add Article page or the Upload page showcases the input fields that are needed to be filled by the user in order to upload a certain study. The Add article page will show after getting the result of the plagiarism scan of the abstract. The user shall input the necessary information and shall pick if the audience may only view, view and download or view and download the study uploaded. Before uploading the study, the user must read and agree to the Terms and agreement, and Privacy Policy in order to submit the study.



**Figure 10.** Filter by Date and Sort by Category

Figure 10 Filter and Sort is the function set by the developers for the user to have a better result of research finding. These functions can make the searching efficient especially when the needed study has a specific date and/or topic. By the use of the Filter by date and sort by Category function, the user can save time navigating for the right research that they needed. Once the Filters are set, the user may click apply filter for a direct result.

**Part III. Evaluations of the developed Web System using the Software Quality ISO 25010**

The following table will show the frequency and percentage of the evaluator of the developed Web Application system. The researchers used purposive sampling and chose the evaluators according to their relevance to the study to come up with a better conclusion. The evaluators are as follows:

**Table 1:** Evaluators of the Developed System/Web Application

Evaluators	Frequency (f)	%
Faculty	5	31.25
IT Experts	5	31.25
Students	6	37.5
Total	<b>16</b>	<b>100%</b>

Part III showcases the evaluation per ISO characteristics and sub-characteristics by the evaluators. This part of the chapter shows the rating of the evaluators on how the system responds to the actions made by the user and how the system responds in terms of Functional Suitability, Performance efficiency, Usability, Reliability, Security, Maintainability, and Portability. Below is the Likert scale that presents the corresponding equivalents of the rating given by the evaluators.

**Table 2:** Evaluation Results

Criteria	Weighted Mean	Descriptive Interpretation
Functional Suitability	4.58	Agree
Performance Efficiency	4.44	Agree
Usability	4.55	Agree
Reliability	4.63	Strongly Agree
Security	4.57	Agree
Maintainability	4.53	Agree
Portability	4.46	Agree

The evaluation shows that the ThesisQuo: Research management system passed the criteria of ISO/IEC 25010 with the weighted mean of 4.58 on Functional Suitability or equivalent to Agree, 4.44 on Performance Efficiency which is equivalent to Agree, 4.55 on Usability or equivalent to Agree, 4.63 on Reliability that is equivalent to Strongly Agree, 4.57 on Security that is equivalent as well to Agree, 4.53 on Maintainability or equivalent to Agree, and 4.46 on Portability or equivalent to Agree. The Interpretation shows that the system is able to perform its function with a competitive outcome.

**4. CONCLUSION**

The system can help the end-user such as students, researchers, and future developers who are about to develop a thesis study by providing local research that is readily available in the system’s repository that also has Analytics and went through the system’s similarity testing. In addition, the system can help the future client of the system by providing them a system repository with additional features that they can use to cater to all of the practical research, capstone project, dissertation, feasibility, and other thesis study. Moreover, the system can help the future developers in the IT field by giving an idea to develop and innovate a system that can contribute as well in the educational growth of the society. The

system can also be used by the future IT professionals who are still studying, through the use of this system, the future IT can improve and innovate a system similar to this and have a better feature to help more people in the academe.

**5.RECOMMENDATIONS**

- The future client may consider implementing the proposed developed system "ThesisQuo: Research management system with Plagiarism checker and Prescriptive analytics" for their institution to be used by the students and faculty.
- The College of Information and Communication Technology may consider the present capstone project as part of the research and extension program of the College to ensure that the developed system will be implemented, sustained and maintained.
- The future researchers and developers may consider including general information about a researcher/author, and provide an upload function for additional requirements.
- Future developers may consider developing a mobile application of the system to maximize the potential and mobile adaptability of the system.
- Improve the security and add Authentication features to protect the important information of the user and the system.
- Research related to the present study may be conducted, and encourage to have an additional functions and features or may use different technology in the development of the system based on the needs assessment conducted

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