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## REAL-TIME GUIDANCE AND COUNSELING DECISION SUPPORT SYSTEM

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**ABSTRACT:** *Information Systems is one of the resources that most organizations embrace with certainty that it will make transactions better, easier and faster by providing timely, consistent, accurate and relevant information thereby decision making can be quick and better. In most educational institutions, information systems are widely used and implemented. The aim of the study is to develop a Real-time Guidance and Counseling Decision Support System (RtGaCDSS) that integrates data and reports of guidance and counseling center of the university through a web-based application. It aims to store and manage data and information, generate individual or basic reports and prepare summary and comparative reports in tabular and graphical form. The study gathered the data pertaining to ease, timeliness, consistency and accuracy on the use of the manual system relevant to its problems and issue. These resulted to the development of the Real-time Guidance and Counseling System which was tested and assessed for its compliance to user requirements and software quality. The real-time guidance and counseling decision support system proved to contribute to the ease, timeliness, consistency and accuracy on recording and storing data, retrieving data and/or information and in generating information, either basic or summary reports as there was a significant difference over the use of the manual system. The system is also compliant to software quality using the ISO 9126-1 software quality model.*

**KEYWORDS:** *Guidance and Counseling, Real-time Information System, Decision Support System, Data Warehousing, ISO 9126-1*

### INTRODUCTION

Our society is fast changing. The birth of Information Technology (IT) paved the way for fast and easier way of processing data. Young people nowadays are described as “techies” due to the widespread use of IT. In first-world and developing countries, the “millennial” and



“Generation X” people are so much attached with technology. In the Philippines where population is more than 100 million, almost 40% are Facebook users and the number of cellular phones used is even larger than its population.

In the early 90s, computers were at reach to those experts who were trained to use such technology, but today, even the youngest members in the society long to use the technology available such as computers, tablets and smart phones. In first world countries, nearly all organizations are utilizing computers in their processes, operations and transactions. Online transactions are booming; Internet of Things (IoT) is becoming more popular; cloud computing is utilized; and, e-commerce has been the focus of most business transactions.

In educational institutions, there are many tedious processes and reports to be generated that need a lot of data and operations. If these processes and operations are done manually, what happens to the organizations? Can they make reports needed for decision making; outperform their competitors; and provide information accurately, timely and relevant?

Apparently, in the Guidance Services Department of any educational institution, voluminous students’ data are gathered, stored and manipulated in order to produce necessary reports which the university may utilize for decision making.

The Cagayan State University’s (CSU) philosophy states that “the University serves the INDIVIDUAL by providing the student with a nurturing environment for optimal human flourishing. It serves the COMMUNITY by offering programs responsive to individual and social needs.” (Guidance Manual, 2013)

Every educational institution is composed of different functional units and each unit contributes to the attainment of the university’s philosophy, objectives, vision-mission and goals. “In view of the main objective of the University, the CSU Guidance and Counseling Center has been created primarily to offer various services aimed at developing students’ potentials and helping them in making wise decisions and cope with the demands of life which they are confronted with.” (Guidance Manual, 2013)

The Cagayan State University is composed of eight (8) campuses located in seven (7) municipalities of Cagayan Province. The university has more or less 30000 students in the



year 2016. Despite the number and location of campuses and the large population, the University has a limited number of guidance counselors and staff. Moreover, there is also the limited office space of the different Guidance and Counseling Centers of the University. Along its operation, the Guidance and Counseling Center of the university has manually processed and managed most of students' records for many years now. With the many records each student has in the Guidance Office, Guidance counselors work with voluminous records by manually recording and keeping data in filing cabinets & drawers which makes managing data, information retrieval and preparing reports time consuming and difficult.

The Guidance and Counseling Center of the university offers many services. With the latitude of the services it offers, the guidance counselors are expected therefore to prepare voluminous reports which the management needs. Further, the consolidation of reports from the different campuses is time consuming. With the problems and challenges of the guidance counselors and the university guidance director presented above; the University, the Guidance and Counseling Center in particular, must think of new ways to manage students' records in order to have faster, more accurate, more relevant and timely information.

With this, the researcher sought to proposed the implementation of a Real-time Guidance and Counseling Decision Support System (RtGaCDSS) with the belief that this is a solution to integrate data and reports of the different campuses. Furthermore, easy decision-support information can be generated since there will be data warehouse that will manage historical data and records of students needed by the guidance and counseling center.

### **STATEMENT OF THE PROBLEM**

The proposed Real-time Guidance and Counseling Decision Support System (RtGaCDSS) is a web-based information system that integrates data and reports.

Specifically, it sought to answer the following:

1. What is the assessment of the respondents in terms of timeliness, consistency and accuracy on the manual system of the guidance and counseling center in terms of:
  - 1.1. recording or inputting data;
  - 1.2. storing or keeping data;

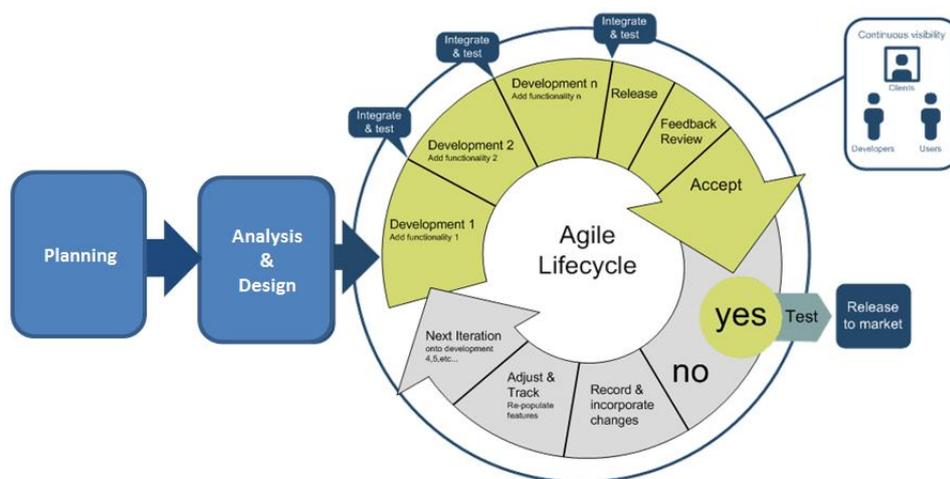


- 1.3. retrieving data and/or information; and
- 1.4. generating information
  - 1.4.1. basic or individual reports
  - 1.4.2. summary or comparative reports
2. What are the problems and issues encountered by the respondents on the manual system of guidance and counseling center?
3. What proposed system can be developed to improve the current operations and records management of the guidance and counseling center?
4. What is the assessment of the respondents in terms of timeliness, consistency and accuracy on the use of the proposed system of the guidance and counseling center in terms of:
  - 4.1. recording data;
  - 4.2. storing or keeping data;
  - 4.3. retrieving data and/or information; and
  - 4.4. generating information
    - 4.4.1. basic or individual reports
    - 4.4.2. summary or comparative reports
5. Is there a significant difference on the assessment of the respondents in terms of ease, timeliness, consistency and accuracy between the manual system and proposed system of the guidance and counseling center?
6. What is the extent of compliance of the real-time guidance and counseling decision support system in the following software quality characteristics:
  - 6.1. Functionality
  - 6.2. Usability
  - 6.3. Reliability and Usefulness
  - 6.4. Operability or Ease of use
  - 6.5. User interface satisfaction

## METHODOLOGY

The study utilized a mixed method. A quantitative approach was used to gather information on the assessment of the respondents on the manual system and the developed system. With the assessment of the respondents on the manual systems, the user requirements were also identified together with the system requirements.

The study also employed research and development because a system was developed. The Systems Development Life Cycle (SDLC) phases were used as basis in the analysis, design, development and implementation of the proposed system. The system went through a thorough planning, analysis of the present system and designed the proposed system. Programming was applied in the designing of the system. Moreover, implementation and testing were performed after the system was developed. An agile process model was used in the systems analysis, design and development of the system.



**Figure 1 – Agile Process Model Used as Basis in the Development of the Proposed System**

The system started with initiation or planning wherein the researcher gathered data on the respondents' assessment of the present system which was used as basis if the proposed development of the system was feasible. Then the analysis and design phases was done wherein the user and systems requirements were defined and analyzed; and designs was created such as Input-Process-Output, Hierarchical Input-Process-Output, Decision Support



System & Data Warehouse Architecture, Web Application Deployment Diagram, Use-Case Diagram, Entity-Relationship Diagram and Website Wireframe. The development was done in an incremental or iteration way by functional module. A thorough unit testing was done before developing the next module. When the proposed system was finished, the researcher implemented the proposed system in order to test its applicability. The proposed system was evaluated by the guidance counselors, staff, and guidance director. Some I.T. experts evaluated system on the aspect of Software quality characteristics.

There were two group of respondents of the study – all the guidance counselors and staff of CSU (15) and selected twelve (12) I.T. experts. The guidance counselors, including the guidance director, will assessed both the manual system and the developed system while the I.T. experts evaluated the system based on the standard software quality characteristics. A survey questionnaire was used gather data on the assessment of both manual and proposed system and the other set of questionnaire was used for the I.T. experts who evaluated the proposed system using the characteristics of a quality software. During the Systems Analysis, Design and Development of the system, an interview was conducted particularly the guidance counselors and the guidance director in order to better understand business rules and processes in the delivery of the services of the guidance and counseling center, user requirements, and reports to be generated by the system. The data gathered were tabulated, treated using appropriate statistical tools, and then analyzed. A weighted mean was used to assess the respondents' assessment in both manual system and proposed system and a frequency and percentage distribution on the problems and challenges encountered by the respondents on the manual system. A Paired Sample T-Test was used to evaluate if there was a significant difference on the respondents' assessment on manual system and the proposed system. Also, the developed decision support system was evaluated by the IT experts using ISO 9126-1 quality model through weighted mean. Likert scale was used as basis in the analysis of data.

## **RESULTS AND DISCUSSION**

### **1. Assessment of Respondents on the manual system**

In this section, the assessment of the respondents on the manual system is presented and discussed. The assessment of the respondents in terms of ease, timeliness,



consistency and accuracy is divided into five (5) functional areas, namely: a) recording (or inputting) of data, b) storing (or keeping) of data, c) retrieving of data, d) generating information (basic or individual reports), and e) generating information (summarized and comparative reports).

**Table 1: A Summary of the Assessment of the Respondents' Responses on the Status of the Manual System**

Functional Area	Guidance Services Results	Wt. Mean	Qualitative Description
1. There is ease, timeliness, consistency and accuracy on recording (or inputting) data	College Aptitude Test (CAT) Results	1.60	Very Little Extent
	Student's Individual Record	1.33	Very Little Extent
	Psychological Test Results of students	1.47	Very Little Extent
	Counseling results of students	2.00	Little Extent
	Interview Results of students on initial, terminal and/or exit interviews	1.73	Very Little Extent
	Certificate of good moral character requested by students	1.87	Little Extent
	Information service and career guidance activities results	1.43	Very Little Extent
<b>Overall Weighted Mean</b>		<b>1.63</b>	<b>Very Little Extent</b>

2. There is ease, consistency and accuracy in storing (or Keeping) Data	College Aptitude Test (CAT) Results	1.33	Very Little Extent
	Student's Individual Record	1.20	Very Little Extent
	Psychological Test Results of students	1.33	Very Little Extent
	Counseling results of students	1.86	Little Extent
	Interview Results of students on initial, terminal and/or exit interviews	1.33	Very Little Extent
	Certificate of good moral character requested by students	1.73	Very Little Extent
	Information service and career guidance activities results	1.36	Very Little Extent
<b>Overall Weighted Mean</b>		<b>1.45</b>	<b>Very Little Extent</b>
3. There is ease and timeliness in retrieving Data and/ or	College Aptitude Test (CAT) Results	1.60	Very Little Extent
	Student's Individual Record	1.47	Very Little Extent
	Psychological Test Results of students	1.47	Very Little Extent



Information	Counseling results of students	1.79	Very Little Extent
	Interview Results of students on initial, terminal and/or exit interviews	1.53	Very Little Extent
	Certificate of good moral character requested by students	1.60	Very Little Extent
	Information service and career guidance activities results	1.21	Very Little Extent
<b>Overall Weighted Mean</b>		<b>1.52</b>	<b>Very Little Extent</b>
4.1 There is ease, timeliness, consistency and accuracy in generating Information (Basic or Individual Report)	College Aptitude Test (CAT) Results	1.53	Very Little Extent
	Student's Individual Record	1.47	Very Little Extent
	Psychological Test Results of students	1.40	Very Little Extent
	Counseling results of students	1.79	Very Little Extent
	Interview Results of students on initial, terminal and/or exit interviews	1.73	Very Little Extent
	Certificate of good moral character requested by students	1.40	Very Little Extent
	Information service and career guidance activities results	1.36	Very Little Extent
<b>Overall Weighted Mean</b>		<b>1.53</b>	<b>Very Little Extent</b>
4.2 There is ease, timeliness, consistency and accuracy in generating Information (summary or comparative reports)	College Aptitude Test (CAT) Results	1.53	Very Little Extent
	Student's Individual Record	1.40	Very Little Extent
	Psychological Test Results of students	1.47	Very Little Extent
	Counseling results of students	1.71	Very Little Extent
	Interview Results of students on initial, terminal and/or exit interviews	1.40	Very Little Extent
	Certificate of good moral character requested by students	1.60	Very Little Extent
	Information service and career guidance activities results	1.21	Very Little Extent
<b>Overall Weighted Mean</b>		<b>1.47</b>	<b>Very Little Extent</b>
<b>GRAND Weighted Mean</b>		<b>1.52</b>	<b>Very Little Extent</b>

### Recording (Inputting) Data

Table 1 reveals the assessment of the respondents as to ease, timeliness, consistency and accuracy on the manual or existing system in terms of recording (inputting) data. As shown



in same table, the respondents considered ease, timeliness, consistency and accuracy on recording (inputting) data of a) Student's Individual Record, b) Information Service and Career Guidance Activities results, c) Psychological Test Results, d) College Aptitude Test (CAT) Results, and e) Interview Results of students on initial, terminal and/or exit interviews as "Very Little Extent" with corresponding weighted means of 1.33, 1.43, 1.47, 1.60 and 1.73 respectively. The recording (inputting) of data of a) Certificate of good moral character requested by students and b) Counseling results of students obtained weighted means of 1.87 and 2.00 respectively with descriptive interpretation of "Little Extent". The overall weighted mean assessment of the respondents in terms of ease, timeliness, consistency and accuracy on recording (or inputting) data in manual system is 1.63, with a qualitative description of "Very Little Extent".

#### **Storing (or Keeping) Data**

As shown in the table, the respondents considered ease, consistency and accuracy in Storing (or keeping) data of Student's Individual Record as "Very Little Extent" with a weighted mean of 1.20, followed by Storing (or keeping) data on a) College Aptitude Test Results, b) Psychological Test Results of Students and c) Interview Results of students on initial, terminal and/or exit interviews with a weighted mean of 1.33, then storing (or keeping) data on a) Information Service and Career Guidance Activities Results and b) Certificate of good moral character requested by students got weighed means of 1.36 and 1.73, respectively, with a qualitative description of "Very Little Extent". Only storing (or keeping) data of "Counseling results of students" got a descriptive value of "Little Extent" with a weighted mean of 1.86. The overall weighted mean assessment of the respondents on ease, consistency and accuracy in storing (or keeping) data using the manual system is 1.45, with qualitative description of "Very Little Extent".

#### **Retrieving data and/or Information**

The assessment of the respondents on ease and timeliness in manually retrieving data and/or information on a) Information service and career guidance activities results, b) Student's Individual Record, c) Psychological Test Results of students, d) Interview Results of students on initial, terminal and/or exit interviews, e) College Aptitude Test (CAT) Results, f) Certificate of good moral character requested by students and g) Counseling results of



students have a weighted means of 1.21, 1.47, 1.47, 1.53, 1.60, 1.60 and 1.79 respectively, all obtained a qualitative description of “Very Little Extent”. With manual system, the participant’s assessment on ease and timeliness on retrieving data and/or information has a qualitative description of “Very Little Extent” with a weighted mean of 1.52.

#### **Generating information (Basic or Individual Report)**

Generating information is one of most important activities every organization must do well. The assessment of the respondents on ease, timeliness, consistency and accuracy in generating information (basic or individual report) in a) Information service and career guidance activity result, b) Psychological Test Results of students, c) Certificate of good moral character requested by students, d) Student’s Individual Record, e) College Aptitude Test (CAT) Results, f) Interview Results of students on initial, terminal and/or exit interview, and g) Counseling results of students have their corresponding weighted means of 1.36, 1.40, 1.40, 1.47, 1.53, 1.73 and 1.79 respectively, all obtained a qualitative description of “Very Little Extent”. Hence, in terms of ease, timeliness, consistency and accuracy in manually generating information (basic or individual report), the overall weighted mean assessment of the respondents is 1.53 with a qualitative description of “Very Little Extent”.

#### **Generating Information (Summary or Comparative Reports)**

Also, the respondents’ assessment on ease, timeliness, consistency and accuracy in generating information (summarized or comparative reports) in “Information service and career guidance activity results (summary of served clientele on information service and career guidance activities)” obtained the highest weighted mean of 1.21, followed by both “Student’s Individual Records (Summary of students per college with Individual Record and comparative report on the target number of clientele over the no. of students with IR)” and “Interview Results of students on initial, terminal and/or exit interviews (summary of interview per area per college with comparative on the number of target clientele over the number of students)” garnered a weighted mean of 1.40. The highest weighted mean is 1.71 on generating information on “Counseling results of students (summary of counseling done according to nature of counseling case; summary of counseling done coming from referrals)” with a qualitative description of “Very Little Extent”. The overall weighted mean assessment of the respondents in terms of ease, timeliness, consistency and accuracy in



manually generating information (summary or comparative reports) is 1.47 with a qualitative description of “Very Little Extent”.

Lastly, the grand weighted mean assessment of the respondents in terms of ease, timeliness, consistency and accuracy on the use of manual system is 1.52 with the corresponding descriptive interpretation of “Very Little Extent”. This implies that the current system needs to be enhanced by developing a computerized system to address the limitations encountered by the respondents on the manual system.

## 2. PROBLEMS AND ISSUES ENCOUNTERED BY THE RESPONDENTS ON MANUAL SYSTEM

To support the assessment of the respondents on the manual system, the researcher also gathered data on the problems and issues encountered by the respondents on the use of the manual system. Below is the table presenting the problems and issues encountered by the respondents of the study on manual system.

**Table 2: A Summary of the Assessment of the Respondents’ Responses on the Problems and Issues Encountered on the Manual System**

Activity/Function	Problems and Issues	F	%	Rank
What are the problems and issues you encountered on the current operations of guidance and counseling center?				
1. Recording (inputting) data	1. Time consuming to record or input	15	100	1
	2. Voluminous data to record/input	14	93.33	2
	3. Data is hard to organize	12	80	3.5
	4. High error rate in recording due to voluminous data	8	53.33	6
	5. Lack of staff in the office	12	80	3.5
	6. Slow turnaround time	10	66.67	5
2. Storing (keeping) data	1. Bulky records to store every year	15	100	1.5
	2. Lack of storage space to compile records	15	100	1.5
	3. Sometimes data are lost	9	60	6
	4. Lack of protection of data/records	11	73.33	3.5
	5. Hardcopies are more at risk to be destroyed due to decomposition, being wet, being eaten by termites.	10	66.67	5
	6. Difficulty to organize and categorize records	11	73.33	3.5



3. Retrieving data and/or information	1. Time consuming to retrieve data	14	93.33	1.5
	2. Difficulty to locate data/information due to being unorganized or not categorized	11	73.33	4
	3. Data cannot be located due to uncertainty of location or storage area	10	66.67	5.5
	4. Hard to duplicate data and to create backup	14	93.33	1.5
	5. Difficult to locate historical data	13	86.67	3
	6. Retrieving and viewing data lacks system/procedure	10	66.67	5.5
4.1 Generating information (basic and individual reports)	1. Difficulty to generate due to voluminous data stored	15	100	1
	2. Since data are recorded manually, information to be generated tend to consume time and effort	12	80	2.5
	3. Reprinting of the same information requires the same process of activity	12	80	2.5
	4. Information to be generated may contain some errors due to duplication of data entry	10	66.67	5
	5. Information to be generated maybe obsolete or incorrect due to data are not updated.	11	73.33	4
4.2. Generating information (summarized and comparative reports)	1. Difficulty to generate summarized reports due to voluminous/bulky data/records	15	100	2
	2. Time consuming to prepare a summarized report manually	14	93.33	4
	3. Information to be generated may contain some errors due to uncertainty of completeness of data	15	100	2
	4. Summarized reports to be generated maybe incomplete due to time consumed in preparation	13	86.67	5
	5. Summarizing records takes time because individual records of students is retrieved, reviewed and verified	15	100	2

### Recording (or inputting) data

In terms of the problems or issues in recording (or inputting) data in the manual system, the respondents identified the following: "Time consuming to record or input" ranked 1 with all the respondents raised such concern; followed by "voluminous data to record/input" with 14 (93.33%), then followed by "Data is difficult to organize" and "Lack of staff in the office"



with 12 (80%) frequency. The two least problems or issues encountered which ranked fifth and sixth are on “Slow turnaround time” and “High error rate in recording due to voluminous data” with a frequency of 10 (66.67%) and 8 (53.33%) respectively.

#### **Storing (or recording) data**

Also, the respondents identified the succeeding problems and issues in storing data manually such as “Bulky records to store every year” and “Lack of storage space to compile records” obtained a frequency of 15 (100%) which ranked 1.5. These are followed by “Lack of protection of data/records”, and “Hard to organize and categorize data/records which are ranked 3.5 with frequency of 11 (or 73.33%). The problems and issues on “Hardcopy are more at risk to be destroyed due to decomposition, being wet, being eaten by termites” and “Sometimes data are lost” were also recognized with frequencies of 10 (66.67%) and 9 (60%), respectively ranked fifth and sixth.

#### **Retrieving data and/or information**

In retrieving data and/or information, the problems and issues encountered by the respondents in manual system are: “Time consuming to retrieve data” and “Difficulty to duplicate data and to create a backup” is ranked 1.5 both have a frequency of 14, or 93.33%; “Difficult to locate historical data” ranked 3 with a frequency of 13 or 86.67%; followed by “Hard to locate data/information due to being unorganized or not categorized” with frequency of 11 or 73.33%; and “Data cannot be located due to uncertainty of location or storage area” and “Retrieving and viewing data lack systems and procedure”, ranked 5.5 both have a frequency of 10 (66.67%). This shows that retrieving voluminous data is one of the main problems in manual operations or transactions.

#### **Generating information (basic or individual report)**

The respondents also identified some problems or issues in generating information, specifically basic or individual reports. The results show that “Difficulty to generate due to voluminous data stored” ranked 1 with frequency of 15 or 100%, followed both by “Information to be generated tend to consume time and effort” and “Reprinting of the same information requires the same process of activity” which ranked 2.5 with frequency of 12 or 80%. “Information to be generated maybe obsolete or incorrect due to data are not updated” and “Information to be generated may contain some errors due to duplication of



data entry” came out also as one of the problems and issues which ranked 4 and 5 with frequency of 11 (73.33%) and 10 (66.67%) respectively.

### **Generating information (summary or comparative reports)**

In generating information (summary or comparative reports) manually, there are three (3) main problems or issues which are equally ranked 2, these are: “Difficulty to generate due to voluminous data stored, “Information to be generated may contain some errors due to uncertainty of completeness of data” and “Summarizing records takes time because individual records are retrieved, reviewed and verified” with a frequency of 15 or 100%. This is followed by an issue on “Time consuming to prepare a summarized report manually” which ranked 4 with a frequency of 14 or 93.33% of the respondents. Lastly, “Summarized reports to be generated maybe incomplete due to time consumed in preparation” ranked last with a frequency of 13 or 86.67% of the respondents.

Moreover, the previous table shows the assessment of the respondents that the manual system needs to be enhanced in terms of recording (or inputting) data, storing (or keeping) data, retrieving data and/or information and generating information, both basic or individual report and summary or comparative reports.

The results of the assessment of the respondents in the manual system as well as the problems and issues encountered, the researcher suggested that an automated system has to be developed to address the needs of the Guidance and Counseling Center in terms of records management and report generation. Thus, the problems and issues on recording (or inputting) data, storing (or keeping) data, retrieving data and/or information, and generating information both basic or individual reports and summary or comparative reports were used as basis in planning, analyzing, designing and developing the Real-time Guidance and Counseling Decision Support System (RtGaCDSS).

### **3. SYSTEMS DESIGN AND DEVELOPMENT**

The Systems Development Life Cycle (SDLC) was utilized as basis in the analysis, design and development of the Real-time Guidance and Counseling Decision Support System (RTGaCDSS). An agile process model was used as guide in the development process. There



was a little modification in such a way that analysis and design were not included in the iteration. Each phase produced a deliverable needed in the next phase.

**PLANNING PHASE.** In this phase an evaluation was conducted whether the proposed system is feasible or not. It actually addresses the question: “Is there a need to develop a system?” Business requirements and processes were gathered in order identify functional and non-functional requirements of the proposed system. Moreover, the system scope, objectives and requirements were formulated to serve as guide in the analysis, design and development of the system.

**System Scope:** The study aimed to develop a Real-time Guidance and Counseling Decision Support System an net to students’ records keeping, information management and report generation needed by the guidance counselors and staff. It will also provide annual and decision-support information needed by university guidance director. The system can be accessed only by individuals who are given accounts. A log-in interface is provided in order for users to access the system. User-access privileges vary; the different user roles is discussed in the succeeding section. The main functional modules of the proposed system was aligned to the services of Guidance and Counseling Center, these are: College Aptitude Test, Individual Inventory, Psychological Test, Counseling, Information Service, Career Guidance Activities and issuance of Good Moral Character.

### **SYSTEM OBJECTIVES**

To develop a Real-time Guidance and Counseling Decision Support System for records management and report generation of individual and summary reports needed by guidance and counseling center.

Particularly, it has the following specific objectives:

1. To record and store student data and information of the different services;
2. To organize data and information in a centralized storage or database;
3. To access data and information at a real-time transaction;
4. To access and provide student’s records faster and easier;
5. To integrate records of the eight (8) campuses of the university;
6. To apply electronic recording techniques for storing, updating, recording data;



7. To allow the guidance director access important information across different campuses; and
8. To generate summarized reports (or annual reports) at a real-time.

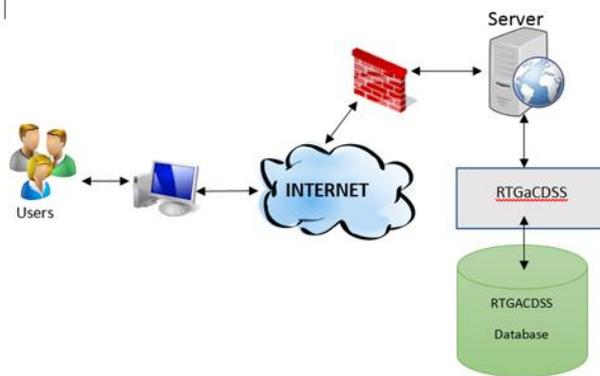
### **SYSTEM REQUIREMENTS**

After a thorough study of the processes and procedures of the Guidance and Counseling Center, the researcher identified the following system requirements.

1. The system must be secured. Only the identified/authorized users may access the system. A user log-in is required.
2. The system must be accessed by users of the eight (8) campuses. This is made possible through the availability Internet connection.
3. The system must be user-friendly. It must be easy to learn by non-technical people as it will be used by Guidance Counselors/Staff and students.
4. The system must be able to manage the records of all students pertaining to their Individual Record File including Psychological Test Results, Interview Results, Information Service and Career Guidance Activities attended. The records must be easily accessed anytime by the concerned guidance counselors.
5. The system must generate basic and summary reports needed by the office. Individual records of students can be viewed and printed as well as the summary (or annual) reports needed by the Guidance and Counseling Center.
6. The system must be able to manage historical data.

**ANALYSIS AND DESIGN PHASES.** In this phase, the defined user and systems requirements will be analyzed and designed. Diagrams, such as Web Application Deployment, Use Case Diagram, Hierarchical Input Process Output, Entity-Relationship Diagram and Table Design for the database structure, Website Wireframe for the interface were created as basis in the development of the proposed system.

**Web Application Deployment.** The Web application deployment diagram presented in figure 7.0 shows that users access the system from the web server through Internet. The web server and database server communicates through the system.

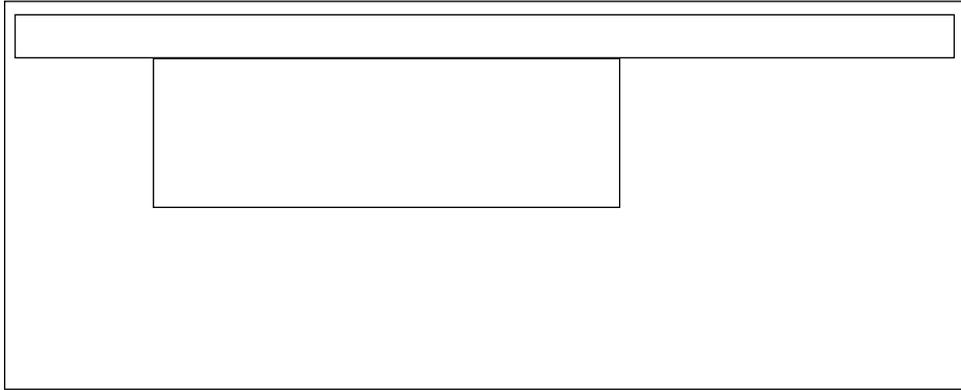


**Figure 2 - Web Application Deployment Diagram**

**The Use Case Diagram.** In the Unified Modeling Language (UML), a use case diagram can summarize the details of the system's users (also known as actors) and their interactions with the system. The purpose of a use case diagram in UML is to demonstrate the different ways that a user may interact with a system. (<https://www.lucidchart.com/pages/uml-use-case-diagram>, 2017). With the use case diagram, the scope of the system becomes clear and the goals of the user-system interactions are shown which gives an overview of what and how users access the system. In a use case diagram, it is very important to identify the actors who have access to the system. The system's use case diagram has three important actors: the guidance director, the guidance counselors and staff and the students.

**The Hierarchical Input Process Output (HIPO).** Hierarchical Input Process Output (HIPO) diagram is a combination of two organized methods to analyze the system and provide the means of documentation. The HIPO diagram represents the hierarchy of modules in the software system. The researcher prepared the HIPO diagram in order to present the functions and sub-functions of the system in a hierarchical way. Also, this diagram is the basis on the development of the website wireframe.

**The Website Wireframe.** In developing web pages, a website wireframe design is very important. This is the blueprint that serves as guide in developing web pages. With this wireframes, it allows the designer and user to communicate well and be able to understand how the website will be developed. It actually presents the features of the proposed website clearly. Below is a sample wireframe design (see figure 3)



**Figure 3 – Sample Website Wireframe of the System**

**The Database Design.** Database is very essential in any information system. The success of an information relies on how secured the database structure. An entity-relationship diagram (ERD) was designed to present how each entities are related to one another. The entities will be the tables of the database to be created.

**DEVELOPMENT PHASE.** Since the development is incremental or iteration, the system was developed by functional module. It means that if a functional module is created, integrated and tested, testing is done before doing the next increment. The web-based system will implement concepts of decision support system and data warehouse. Hoffer, et.al. (2014) discussed different data warehouse architectures, and from those architectures, the researcher used the Logical data mart and real-time data warehouse architecture as basis in developing a DSS prototype that will best suit the proposed system. With data warehouse, the decision-support information or reports can be extracted by the University guidance director and guidance counselors. During the development, the developers used the following software:

**Operating System (OS):** Windows 10 Professional, 64 bit was used as operating system to manage and control the other software used in the development.

**Web design and programming:** PHP codes were used for programming while HTML 5 was used in designing the page. The software used in the development are Notepad++, Xampp and Sublime Text.

Hypertext PreProcessor (PHP) is a server-side scripting language. In this proposed study, PHP was used in programming the (proposed) system. The PHP native was used to embed the script to create design and dynamic pages for the website.



Moreover, PHP codes are executed on the server side in order to return a result to the web browser as plain HTML. It is used to communicate with the DBMS used for storing the data, with this, PHP allows a user to add, update, delete data in the database. It is also used to control user-access thereby allowing only users with access rights to use the web application.

While HTML 5 is used to support the PHP used particularly on the design of the proposed system. HTML stands for Hypertext Markup Language. It used HTML tags in order to render the content of the web page. In order to write HTML codes, Notepad is used as its editor.

**Database Management System (DBMS).** The DBMS used is MySQL, which serves as the back-end system to manipulate and control the database. MySQL is employed as the world's most popular open source database system used on the web. It is a database system that is fast, reliable and easy to use and runs on a server for which the (proposed) system needs such. MySQL combined with PHP, becomes cross-platform, the reason why the (proposed) system used such.

**IMPLEMENTATION PHASE.** Upon the completion of the system, then it is ready for release. While unit testing was used to test every module of the proposed system, a system testing was done in the implementation phase. During the system testing, the proponent of the study sought an audience with some I.T. experts who evaluated the software quality using ISO 9126-1 quality model, an international standard used to test the software quality characteristics.

#### 4. Assessment of the Respondents in the Proposed System

**Table 3: A Summary of the Assessment of the Respondents' Responses on the Proposed System**

Functional Area	Guidance Services Results	Wt. Mean	Qualitative Description
1. There is ease, timeliness, consistency and accuracy on recording (or inputting) data	1. College Aptitude Test (CAT) Results	4.67	Very Great Extent
	2. Student's Individual Record	4.60	Very Great Extent
	3. Psychological Test Results of students	4.53	Very Great Extent
	4. Counseling results of students	4.73	Very Great Extent
	5. Interview Results of students on initial, terminal and/or exit interviews	4.73	Very Great Extent



	6. Certificate of good moral character requested by students	4.80	Very Great Extent
	7. Information service and career guidance activities results	4.53	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.66</b>	<b>Very Great Extent</b>
2. There is ease, consistency and accuracy in storing (or Keeping) Data	1. College Aptitude Test (CAT) Results	4.67	Very Great Extent
	2. Student's Individual Record	4.73	Very Great Extent
	3. Psychological Test Results of students	4.73	Very Great Extent
	4. Counseling results of students	4.60	Very Great Extent
	5. Interview Results of students on initial, terminal and/or exit interviews	4.60	Very Great Extent
	6. Certificate of good moral character requested by students	4.80	Very Great Extent
	7. Information service and career guidance activities results	4.87	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.71</b>	<b>Very Great Extent</b>
3. There is ease and timeliness in retrieving Data and/ or Information	1. College Aptitude Test (CAT) Results	4.80	Very Great Extent
	2. Student's Individual Record	4.80	Very Great Extent
	3. Psychological Test Results of students	4.87	Very Great Extent
	4. Counseling results of students	4.80	Very Great Extent
	5. Interview Results of students on initial, terminal and/or exit interviews	4.80	Very Great Extent
	6. Certificate of good moral character requested by students	4.87	Very Great Extent
	7. Information service and career guidance activities results	4.87	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.83</b>	<b>Very Great Extent</b>
4.1 There is ease, timeliness, consistency and accuracy in generating Information (Basic or	1. College Aptitude Test (CAT) Results	4.80	Very Great Extent
	2. Student's Individual Record	4.80	Very Great Extent
	3. Psychological Test Results of students	4.73	Very Great Extent
	4. Counseling results of students	4.80	Very Great Extent
	5. Interview Results of students on initial, terminal and/or exit interviews	4.80	Very Great Extent
	6. Certificate of good moral character requested by students	4.80	Very Great Extent



Individual Report)	7. Information service and career guidance activities results	4.80	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.79</b>	<b>Very Great Extent</b>
4.2 There is ease, timeliness, consistency and accuracy in generating Information (summary or comparative reports)	1. College Aptitude Test (CAT) Results	4.67	Very Great Extent
	2. Student's Individual Record	4.60	Very Great Extent
	3. Psychological Test Results of students	4.60	Very Great Extent
	4. Counseling results of students	4.67	Very Great Extent
	5. Interview Results of students on initial, terminal and/or exit interviews	4.60	Very Great Extent
	6. Certificate of good moral character requested by students	4.67	Very Great Extent
	7. Information service and career guidance activities results	4.53	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.62</b>	<b>Very Great Extent</b>
<b>GRAND Weighted Mean</b>		<b>4.72</b>	<b>Very Great Extent</b>

### On Recording (or Inputting) Data

The assessment of the respondents on the ease, timeliness, consistency and accuracy on recording (or inputting) data relevant to) Certificate of good moral character requested by students, b) Counseling results of students, c) Interview Results of students on initial, terminal and/or exit interviews, d) College Aptitude Test Results, e) Student's Individual Record, f) Psychological test Results of Students and g) Information service and career guidance activities obtained weighted means of 4.80, 4.73, 4.73, 4.67, 4.60, 4.53 and 4.53 respectively, with a qualitative description of "Very Great Extent". The overall weighted mean on the assessment of the respondents on the ease, timeliness, consistency and accuracy on recording (or inputting) data is 4.66 described as "Very Great Extent".

### On Storing (or Keeping) Data

In terms of ease, consistency and accuracy on storing (or keeping) data on the system, storing Information service and career guidance activities results obtained the highest weighted mean of 4.87 with a qualitative description of "Very Great Extent". The lowest in weighted mean of 4.60 are on storing a) Counseling Results of students and b) Interview Results of students on initial, terminal and/or exit interviews. The overall weighted mean in



terms of ease, consistency and accuracy on storing (or keeping) data using the proposed system is 4.71 gauged as “Very Great Extent”

#### **On Retrieving Data and/or Information**

The table shows that the ease, timeliness, consistency and accuracy on retrieving data and/or information using the real-time decision support system has a very high overall weighted mean of 4.83 with a qualitative description of “Very Great Extent”. Retrieving of data and/or information on the results in three (3) services has a weighted mean of 4.87 while four (4) services has a weighted mean of 4.80. This clearly shows that retrieving data and or information allowed the respondents to experience ease, timeliness, consistency and accuracy.

#### **On Generating Information (Basic or Individual Report)**

In using the real-time decision support system, the assessment of the respondents with regards to ease, timeliness, consistency and accuracy in generating information (basic or individual report), six (6) areas obtained a weighted mean of 4.80, with a qualitative description of “Very Great Extent”, these are: a) College Aptitude Test Results, b) Student’s Individual Record, c) Counseling Results of students, d) Interview Results of students on initial, terminal, and/or exit interviews, e) Certificate of Good Moral Character requested by students and f) Information service and career guidance activities results. On the other hand, generating basic or individual report on Psychological Test results obtained a weighted mean of 4.73 which has also a qualitative description of “Very Great Extent”. With the results, it clearly shows that the assessment of the respondents on the ease, timeliness, consistency and accuracy in generating information (basic or individual report) using the real-time decision support system “Very Great Extent” as it has an overall weighted mean of 4.79.

#### **On Generating Information (Summary or Comparative Reports)**

With regards to the assessment of the respondents on the ease, timeliness, consistency and accuracy on generating information (summary or comparative reports), pertinent to a) College Aptitude Test Results, b) Counseling Results of Students and c) Certificate of Good Moral Character requested by students garnered a weighted mean of 4.67. These were followed by generating information on a) Student’s Individual Record, b) Psychological Test



Results of students and c) Interview Results of students on initial, terminal, and/or exit interviews, with a weighted mean of 4.60. Lastly, retrieving information on Information Service and Career Guidance Activities results comes with a weighted mean of 4.53. There may be different weighted mean, all indicators are gauged as “Very Great Extent”. With this, the overall weighted in terms of ease, timeliness, consistency and accuracy in generating information using the real-time decision support system is 4.62 described as “Very Great Extent”.

The grand weighted mean on the assessment of the performance level of the real-time decision support system in terms of ease, timeliness, consistency and accuracy is 4.72, which indicates that the respondents as a whole characterized the real-time decision support system in terms of ease, timeliness, consistency and accuracy is “Very Great Extent” on recording, storing, retrieving and generating of data or information.

A summary on the assessment of the manual and real-time decision support system is presented in the table below.

**Table 4: Comparative Weighted Mean on the Assessment of the Respondents on the Manual and the Real-time Decision Support System**

Activity	Weighted Mean		Mean Difference
	Manual System	Real-time Decision Support System	
1. There is ease, timeliness, consistency and accuracy on recording (or inputting) data	1.63	4.66	3.03
2. There is ease, consistency and accuracy in storing (or Keeping) Data	1.45	4.71	3.26
3. There is ease and timeliness in retrieving Data and/ or Information	1.52	4.83	3.31
4.1 There is ease, timeliness, consistency and accuracy in generating Information (Basic or Individual Report)	1.53	4.79	3.26
4.2 There is ease, timeliness, consistency and accuracy in generating Information (summary or comparative reports)	1.47	4.62	3.15
<b>Overall Weighted Mean</b>	<b>1.52</b>	<b>4.72</b>	<b>3.20</b>



Table 4 shows the weighted mean assessment of the respondents of both manual and real-time decision support system. The overall weighted mean on the assessment of the respondents on manual system with regards to ease, timeliness, consistency and accuracy is 1.52 while the overall weighted mean of the real-time decision support system is 4.72. The table clearly shows a great mean difference of 3.20 of the real-time decision support system and manual system.

**5. Significant difference on the assessment of the respondents between the manual system and real-time decision support system of the guidance and counselling center**

**Table 5: T-test for Significant Difference between Manual and Real-time Decision Support System Mean Scores of the Respondents of the Guidance and Counselling Center**

VARIABLES	MEAN	MEAN DIFFERENCE	DF	t-VALUE	P-VALUE	REMARKS
Manual System	1.52	3.20	14	90.63	0.00	Significant
Real-time Decision Support System	4.72					

Table 5 shows that the mean score assessment of the respondents on the manual system is 1.52 while system mean score assessment real-time decision support is 4.72. This indicates very great extent of ease, timeliness, consistency and accuracy in performing the different activities or functional areas of the different services of the Guidance and Counselling Center. The computed t-value of 90.63 and the probability value of 0.000 which is less than the 0.05 level of significance indicate that the mean difference is statistically significant. This means that the system mean score assessment of the respondents is significantly higher than that of the manual system mean score assessment. This implies further that the real-time decision support system for the Guidance and Counselling Center has complied with the software requirement for its purpose and thereby can better facilitate activities in records management and report generation efficiently.

This finding validates also the findings from the study of Pantaleon (2017) on “TUP-T Guidance and Counseling Information System” which pointed out that web application for the Guidance office will easily monitor and manage students’ record as data bank. He stated that the system “entails innovative change in technology, modernize the process and system and reduce time and efforts work by the Guidance Counselor.”



Moreover, Untalan(2016) in her study on “Web-based Student Guidance Information System” stated that “the system received an 89.6% acceptance rating, making the system more likely to be implemented by the client, having its strongest point on usability and weakest in maintainability.” The two studies support the findings in the Real-time Guidance and Counseling Center Decision Support System.

## 6. The Real-time Guidance and Counseling Decision Support System (RtGaCDSS) in Compliance with the Quality Standard Characteristics of Software as Defined by ISO 9126-1.

The researcher also sought the evaluation of the selected IT experts. The ISO 9126-1 quality model for software was used as basis in the evaluation. Below is the table presenting the assessment of the IT Experts on the extent of compliance of the real-time decision support system as shown in Table 6.

**Table 10.0: A Summary of the Assessment of the IT Expert-Respondents’ Responses on the Extent of Compliance of the Real-time Guidance and Counseling Center Decision Support System with the Quality Standard Characteristics of Software as Defined by ISO/IEC 9126-1 Quality Model.**

Characteristics	Sub-characteristics	Wt. Mean	Qualitative Description
Functionality	1. Suitability	5.00	Very Great Extent
	2. Accurateness	4.91	Very Great Extent
	3. Interoperability	4.55	Very Great Extent
	4. Compliance	4.73	Very Great Extent
	5. Security	4.64	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.77</b>	<b>Very Great Extent</b>
Reliability	1. Maturity	4.73	Very Great Extent
	2. Fault Tolerance	4.82	Very Great Extent
	3. Recoverability	4.82	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.79</b>	<b>Very Great Extent</b>
Usability	1. Understandability	5.00	Very Great Extent
	2. Learnability	5.00	Very Great Extent
	3. Operability	4.91	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.97</b>	<b>Very Great Extent</b>



Maintainability	1. Analyzability	5.00	Very Great Extent
	2. Changeability	4.73	Very Great Extent
	3. Stability	4.91	Very Great Extent
	4. Testability	4.91	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.89</b>	<b>Very Great Extent</b>
Portability	1. Adaptability	4.91	Very Great Extent
	2. Installability	5.00	Very Great Extent
	3. Conformance	5.00	Very Great Extent
	4. Replaceability	5.00	Very Great Extent
<b>Overall Weighted Mean</b>		<b>4.98</b>	<b>Very Great Extent</b>
<b>GRAND Weighted Mean</b>		<b>4.88</b>	<b>Very Great Extent</b>

Table 6 presents the results of the evaluation of the selected I.T. experts on the software quality compliance of the proposed system using the ISO/IEC 9126-1 quality model. The researcher used five (5) main quality characteristics, namely: a) functionality, b) Reliability, c) Usability, d) Maintainability and e) Portability

**Functionality.** This characteristic focuses on the purpose and function of the system. The table shows that all sub-characteristics of functionality scored a weighted mean higher than 4.60 with a qualitative description of “Very Great Extent”. These are: a) Suitability, b) Accurateness, c) Compliance, and d) Security with a weighted mean of 5.00; 4.91; 4.73; and, 4.64 respectively while interoperability has a weighted mean of 4.55. This means that the I.T. experts assessed the real-time decision support system’s suitability, accurateness compliance and security as “Very Great Extent” while interoperability as “Great Extent”. The functionality overall mean is 4.77, which is interpreted as “Very Great Extent”.

**Reliability.** This characteristic focuses on the capability of the system to continue and preserve its service. Reliability has three (3) sub-characteristics, namely: a) Maturity, b) Fault Tolerance and c) Recoverability; having obtained weighted means of 4.73, 4.82 and 4.82 respectively with a qualitative description of “Very Great Extent”. With maturity, it means that the real-time decision support system has a low rate of failure; while, fault tolerance means that the real-time decision support system can withstand or recover from component and/or environmental failure and recoverability of the system means that the system can recover from a failed system to full operation.



**Usability.** This characteristic comes along with functionality since it focuses on the ease of use of the different functions of the system. Usability is composed of three (3) sub-characteristics, namely: a) understandability, b) learnability and c) operability. Understandability and learnability obtained a weighted mean of 5 while operability has a weighted mean of 4.91. This means that the IT experts assessed the real-time decision support system as: a) function is easy to understand, b) operations and environment is easy to learn and c) user-friendly. The overall weighted mean of usability is 4.97 described as “Very Great Extent” and this implies that the real-time decision support system is easy to use.

**Maintainability.** Maintainability focuses on the ability of the system to detect and fix a fault to ensure the supportability of the system. The four (4) characteristics, namely: a) analyzability; b) stability; c) testability; and, d) changeability, obtained corresponding weighted means of 5.00, 4.91, 4.91 and 4.73, gauged as “Very Great Extent”. The overall weighted mean of maintainability is 4.89, interpreted as “Very Great Extent” in terms of detecting and fixing a fault and the system’s supportability is very high.

**Portability.** This focuses on how the system can adjust to changing environment or with its requirements. Adaptability, instability, conformance and replaceability are the four (4) sub-characteristics of portability. A weighted mean of 5.00 with a qualitative description of “Very Great Extent” is obtained along a) instability; conformance; and, replaceability; while 4.91 weighted mean for adaptability. This clearly shows that the real-time decision support system can a) can adapt to new specifications and operating environment; b) can be installed without too much technicalities; c) used PHP and MySQL which makes it conformance and d) facilitate components for replacement within specified environment. The overall weighted mean of portability is 4.98 which is interpreted as a “Very Great Extent”. This implies that the real-time decision support system can adjust to changing environment and with its requirements.

The previous table presents the overall results of IT experts’ assessment on the Real-time Decision Support System’s compliance with the quality standard characteristics of software as defined by ISO/IEC 9126-1 quality model. It shows that majority of the respondents with a grand weighted mean of 4.48 ascertained that the real-time decision support system is



compliant to a great extent with the software quality characteristics in terms of functionality, reliability, usability, maintainability, efficiency and portability.

This finding of the study conforms to the project study of Untalan (2012) entitled “Web-based Student Guidance Information System” where the system obtained an overall evaluation rating of 4.48, which implies that the real-time decision support system is effective and efficient.

## **SUMMARY OF FINDINGS**

On the basis of the analysis of the data gathered, the following findings were established:

1. That ease, timeliness, consistency and accuracy is hardly achieved in using manual system particularly in recording (or inputting) data, storing (or keeping) data, retrieving data and/or information and generating basic or summary information (or reports).
2. There are a lot of problems and challenges encountered by the respondents on the use of manual system.
3. The development of real-time decision support system must go through the systems development life cycle. System planning must be done well by having an in depth analysis on the assessment on the manual system and the problems and issues encountered. With this, the analysis and design, diagrams such as Web Application development diagram, Use-Case Diagram, Hierarchical Input-Process-Output (HIPO), Website Wireframes, Entity-Relationship Diagram (ERD) and Table design are created to serve as basis in the development. In the development, modular basis was used in the development of the proposed system. PHP programming and MySQL was used. The proposed system was implemented and tested in order to verify its user and system requirements, thereby having a quality software. After a systematic development of the decision support system; inputting and storing data is made easier and faster, retrieving data and/or information is faster and better, generating information such as basic or individual reports and summary reports in tabular and graphical form are generated. The tabular and graphical form for annual reports aids the Guidance and Counseling Center particularly the Guidance Director in decision making.



4. With the real-time decision support system: ease, timeliness, consistency and accuracy in recording (or inputting) data, storing (or keeping) data, retrieving data and/or information, and generating information both basic or summary reports are achieved to a very great extent. Also, problems and issues in the manual system are most likely addressed. end-users in the manual system is reduced through the use of the real-time decision support system.
5. There is a significant difference in terms of ease, timeliness, consistency and accuracy between the manual system and the use of real-time decision support system in records management and report generation in the guidance and counseling center. The results revealed that the guidance counselors and staff who evaluated the real-time guidance and counseling decision support system encountered ease, timeliness, consistency and accuracy in recording data, storing data, retrieving data and/or information and generating reports.
6. The respondents, particularly the IT experts, said that the proposed system is compliant with a very great extent with regards to software quality characteristics in terms of functionality, reliability, usability, maintainability, efficiency and portability; this is using the ISO 9126-1 software quality model.

## **CONCLUSIONS**

From the abovementioned findings, the researcher reached at the following conclusions:

The proposed Real-time Guidance and Counseling Decision Support System (RtGaCDSS) is far better than the manual system in terms of ease, timeliness, consistency and accuracy in recording and storing data, retrieving data/information and generating reports. This therefore means that the proposed system will be of great help to the productivity and efficiency of the guidance counselors. Moreover, the problems and issues encountered in the manual system could be addressed through the development of the proposed system. In terms of quality characteristics of the system, the researcher concludes that the system is compliant to ISO 9126-1 software quality model specifically on its functionality, reliability, usability, maintainability and portability.



The RtGaCDSS therefore will be of great help in the records management and report generation on the different services of the Guidance and Counseling Center.

## **RECOMMENDATIONS**

On the basis of the findings and conclusions derived from the study, the following recommendations were made:

1. The real-time guidance and counseling decision support system can be implemented and utilized. The Guidance counselors and staff are encouraged to use the system. This can be made possible if the Institution will support the implementation of the Real-time Guidance and Counseling Decision Support System. Moreover, this can be made possible if the institution will appropriate a budget for the web hosting and for the domain name system (DNS) of the said system.
2. The Guidance counselors and staff should consider using the system and identify more reports needed for other operations of the university such as accreditation and SUC leveling especially on annual, comparative and summary reports.
3. If the said system is implemented, it is further recommended that thorough evaluation and testing should be done as data are integrated into the system. This will further contribute to identification of more user requirements that will add to the features and functionality of the system thereby providing more information or reports.
4. If system is implemented, a system administrator should be hired and be assigned to manage the said system in order to address problems encountered in the manipulation of the system and continue to upgrade the said system.
5. The end-users particularly the guidance counselors & staff who would use the proposed system must be provided with training in order to be familiar with its environment.
6. Future researchers and systems developers may conduct and development parallel studies to verify the findings in the proposed system particularly in its efficiency and effectiveness.
- 7.



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