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Monitoring the Students Discipline through the Implementation of LAN – Based Information System for College of Information and Communications Technology

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ABSTRACT: The Monitoring of Students Discipline through the Implementation of LAN – Based Information System for College of Information and Communications Technology provides a solution on data processing, data presentation and record-keeping. It produces reliable output by keeping track of records with minimum data redundancy, reduction of paper works, Improve data quality, accessibility and responsiveness and elimination of human errors. With the use of Local Area Network (LAN) connection, the proficiency in administrating the Guidance Center will be enhanced and the needed outputs will be more reliable and easy. Every specific feature integrated in the system allows transactions to be done easier such as uploading of file and storing different records in the database. Access to the system will be limited to principal users to maintain the security of the system. The researcher followed the System Development Life Cycle in order to be organized in developing the system. Interviews and researches were conducted to note different requirements and expectations by the end-users as part of the Planning stage. Data gathered are interpreted and converted into source codes that composed the information system. While developing the information system, it is thoroughly tested in order to identify bugs that can occur after the system has been implemented. The LAN-Based Guidance Information System has the following main features: Personality Test, Attendance Monitoring, Student Offense Record and Generating of Reports. These main functions of the system provide easier handling of records and production of outputs. The developed system will allow the Guidance Center of CICT to be more productive and beneficial not only for the college but also for its students.

KEYWORDS: data processing, data presentation, record – keeping, accessibility, responsiveness.

1 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Information systems are developed for the improvement of the necessities of a company and to provide solutions to their problems in data processing, data presentation, and record-keeping. It supports decision-making activities and statement of the progress of an organization. It produces reliable output by keeping track of records with minimum data redundancy, reduction of paper works, improved data quality, accessibility and responsiveness, and elimination of human errors, which is the main purpose of using information systems. Because of these advantages, the use of information systems will be beneficial to different institutions especially universities and government agencies.

The main role of the College of Information and Communications Technology Guidance Center is to monitor the behavior of students and respond to those who need psychological support. The Guidance Center of CICT uses the traditional way of record – keeping of student offense records, list of violations, and dealing with different transactions done in the office such as issuance of referral slips, interview records and letters sent to the Student Discipline Committee, and student counseling. Due to the manual way of keeping important records in the office, some problems were encountered that are needed to be solved.

After an interview to the CICT local Guidance Counselor, the following situations were noted by the researcher: (1) Difficulty in searching for individual records, (2) Production of lists of violations is not easy, (3) Generating of detailed reports cannot be easily done. These problems were caused mainly by the manual record – keeping and transaction system existing in the office thus leading to the situations mentioned above which are the effects of the main problem.

Loss of data due to paper records misplacement, accidental damage and data integrity constraints are the main problems of the CICT Guidance Center. Difficulty in generating of reports is also encountered because of these problems as well as searching of records. The existing manual transaction causes the aforementioned problems and lead to the development of a Guidance Information System for CICT.

The researcher convey that the use of an information system for managing their records, the proficiency in administrating the Guidance Center will be enhanced and the needed outputs will be more reliable and easy. The Monitoring the Students Discipline Through the Implementation of LAN-Based Guidance Information System for CICT will be useful regarding the reduction of the existing problems in the office. As an additional feature, the system will be networked that will allow the sharing of data from each of the workstations. It will be easier compared to those who uses independent workstations because it is much convenient, the processes will be faster since the operation is real-time. Access in the system will be limited for principal users to maintain the security of the system. A certain type of function can only be used in each of the workstations such as major transactions for the server computer and personality tests to be conducted on the rest of the workstations.

1.2 THEORETICAL AND CONCEPTUAL FRAMEWORK

One of the advantages of putting up a LAN Based system is the cost of the development of the system itself compared to web – based systems for it is more inexpensive to implement rather than web-based systems. In addition, LAN – Based systems have the ability to share resources with their peers. A good fact about LAN – Based systems is that they are less prone to hacking since the system is network – based, therefore limiting in span of its peers alone, better than web – based. [3]

College of Information and Communications Technology (CICT), in their quest to produce graduates who are capable of responding to the needs of the region and the demand of the global standard will need a tool to help them maximize the expertise and different resources technical staffs are so expected to possess.

To compete globally, many organizations invested heavily in computer-based tools and information systems to support organizational decision-making and planning. As technical barriers disappear, a pivotal factor in harnessing this expanding power becomes our ability to create applications that the people are willing to use.

The Technology Acceptance Model (TAM) forms the foundation of this research. As the key dependent variable in the IT research literature, its usage is of increasing theoretical interest. It is also of increasing technical importance as the usage of IT becomes more pervasive. From a pragmatic point of view, understanding the determinants of IT usage should help ensure effective deployment of IT resources in an organization. Such usage is a necessary condition for ensuring productivity payoffs from IT investment. Usage includes the concepts of ease of use and usefulness [6]

Perceived usefulness is defines as “the degree to which a person believes that using a particular system would enhance his or her job performance”. A system high in perceived usefulness is one that a user believes will lead to a positive use-performance relationship.[4]

Perceived ease of use, in contrast, refers to “the degree to which a person believes that using a particular system would be free of effort”. This follows from the definition of “ease”; “freedom difficulty or great effort”. Effort is a finite resource that a person may allocate to the various activities for which he or she is responsible [5]

LAN – based guidance information system is a software that improves and speed up the process of monitoring and information system , efficient and suitable to everyone impacted by these processes. The system has features that can provide a database for storing records and information. It allows the end-user to add, edit, delete, save and update records or information if some changes occur. It can generate reports such as letters for Guidance of the student who exceeds the allowed absences, adding, viewing, searching and uploading of records of violators, system is able to upload a file that will directly save to database, to lessen the effort of inputting manually all the new records of the student.

The Software Development Life Cycle was applied in developing the LAN-based Guidance Information System. SDLC (Systems Development Life-Cycle) is used in information systems, systems engineering, and software engineering as a

process of creating new or altering existing systems. The SDLC can be thought of as a concept that lies beneath a number of software development methodologies currently employed throughout industry. From these, the framework to create, plan, and control an information system flows which is also known as the software development process.

The LAN-Based Guidance Information System for CICT is capable of running in a computer with Windows XP and higher operating system. It was developed using an object-oriented programming language Java which helped in providing a clean design for the code. Programming of the system became easier because of the features of the language such as intellisense that helps a programmer in writing the code by giving suggestions of what function or data type to use. It is also designed to be able to make programs that can run on computer networks. Java provides an extensive library of classes for communicating, using TCP/IP protocols such as HTTP and FTP. Java is used because of this feature needed to run the system on a Local Area Network. Java is also capable of interacting with different databases.

MySQL as a relational database system that is used to store information. MySQL can store many types of data from something as tiny as a single character to as large as complete files or graphics. Although it can be accessed by most programming languages, it is often coupled with PHP because they work together with ease. Information stored in a MySQL database hosted on a web server can be accessed from anywhere in the world with a computer. This makes it a good way to store information that needs the ability to change over time, but also needs to be accessed over the net. Some examples that can utilize MySQL are a web message board or a customer's shipping status.

For this study, Fig. 1 shows the steps in developing the system. A system can be modelled using the basic IPO model. The IPO model describes how a process can transform and input to give a desired output [1]. A system is a combination of parts or components, which work together to control a task or activity. Most systems need to be controlled, and this is usually done by means of a feedback loop which checks the outputs and feeds the results back into the system. A system with a feedback loop is called a closed-loop system. [3]

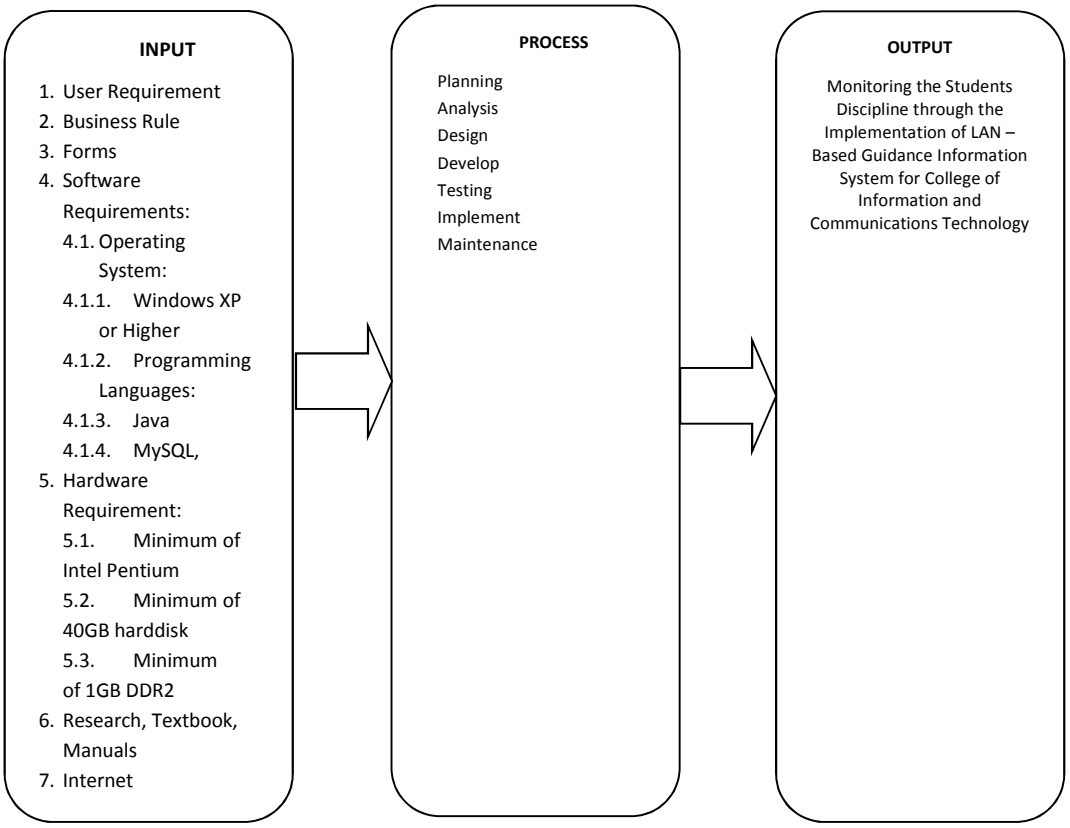

Fig. 1. Conceptual Model of the Study

The first part of the diagram is the input which refers to all raw materials required in the development and production of the output. Basically the most common inputs included the user requirements, hardware and software requirements, and the steps involved in the system process.

The second part is the process which involved different stages of software development. The first stage included feasibility that resulted in the creation of well-defined functions from the defined project goals. Second stage was planning and analysis which discussed the analysis of the input and its conversion into technical aspect resulting to programming and development. The systems design phase followed wherein project features and operations were described in detail to include technical specifications, process diagrams, and even prototype creation along with other required documentations. Development stage included the programming side such as the development of the front-end application and back-end application of the system. During the implementation stage the developed LAN-based Guidance Information System for CICT became operational. This included user training and software installation. For better quality, the system underwent testing which was applied under the processing. Later in this stage, the system was evaluated by a pool of experts. In this phase all of the project components were integrated and tested for errors and interoperability in a special test environment. The maintenance part accommodated all necessary enhancements to the system as well as future software upgrades, bug fixes, or correction of any error encountered.

Upon completion of all the stages in the process, the final output became fully functional, a developed LAN – Based Guidance Information System for CICT.

2 OBJECTIVES OF THE STUDY

2.1 GENERAL OBJECTIVES

To develop a system which is "Monitoring the Students Discipline through the Implementation of LAN – Based Guidance Information System for the College of Information and Communications Technology."

2.2 SPECIFIC OBJECTIVES

This study has the following objectives:

1. To develop a guidance information system that ease the service in terms of keeping track of student offense record files by means of saving the files as well as the students' offense record files into database.
2. To develop a system that is LAN- based for an easier way sharing resources;
3. And to integrate the following features:
    - 3.1. Personality Test;
    - 3.2. Monitor students habitual tardiness;
    - 3.3. List of students that took counseling;
    - 3.4. Issue letter of notice to students that committed violations;
    - 3.5. Requesting for different types of forms such as dropping forms.
    - 3.6. Producing a list of students that violated rules of the college or the university.
    - 3.7. To integrate a Detailed Demographics feature which produces graphical representation of different data stored in the database.
4. To develop a computerized system that will lessen the time consumed in checking records and allows the easy retrieval of different data through a database.

3 STATEMENT OF THE PROBLEM

The general problem of the study is: How may the Guidance Information System for the College of Information and Communications Technology be improved?

Specifically, this study sought answers to the following questions:

1. What are the important features of the Guidance Information System for the College of Information and Communications Technology?
2. What application development model shall be used for the Guidance Information System for the College of Information and Communications Technology?
3. What operational requirements are needed by the system in terms of hardware and software requirements?
4. How functional is the Guidance Information System for the College of Information and Communications Technology in terms of the following software evaluation criteria: functionality, reliability, usability, maintainability; and security?

4 METHODOLOGY

4.1 METHODS AND TECHNIQUES OF THE STUDY

The study made use of the descriptive-developmental research design. Developmental research attempts to answer the question: How can researcher build a 'thing' to address the problem? It is especially applicable when there is no adequate solution, even a test for efficacy in addressing the problem and presupposes that researcher do not know how to go about building a solution that can be tested. Developmental research generally entails three major elements: Establishing and validating criteria the system must meet, following a formalized, accepted process for developing the system, and, subjecting the system to a formalized, accepted process to determine if it satisfies the criteria. [4]

Developmental research is distinguished from product development by: a focus on complex, innovative solutions that have few, if any, accepted design and development principles; a comprehensive grounding in the literature and theory; empirical testing of product's practicality and effectiveness; as well as thorough documentation, analysis, and reflection on processes and outcomes [9]

Since the study is developmental in nature, it attempted to determine the acceptability of developing the system for Monitoring the Students Discipline through the Implementation of LAN – Based Information System for College of Information and Communications Technology. Hence, the researcher used this method to gather data which is necessary for creating the system.

4.2 TARGET CLIENTELE

The target clientele of this project is the College of Information and Communications Technology of the Bulacan State University. The target users include the Local Guidance Counselor CICT. This system is intended to change the way how guidance information system is created from manual process to an automated process.

4.3 DATA GATHERING INSTRUMENTS

The researcher used several instruments in gathering the data needed for the study. The following were the tools used in the data collection.

Survey questionnaire. It is a form to be filled out by the respondents. By administering the questionnaires, the researcher was able to evaluate the significant difference between the developed system and the existing one.

Evaluation form. This is an instrument that was used to assess the operational feasibility of the system. The following criteria were provided in order to evaluate the developed system: 1) functionality, 2) reliability, 3) usability, 4) maintainability, and, 5) portability.

The software evaluation form has five major criteria each of which are subdivided into major elements. In functionality criterion, the elements are: a) suitability which refers to appropriateness of functions based on specifications; b) accuracy or correctness of the functions; c) interoperability which is ability of the software to interact with other components or systems; d) compliance which means adherence of the system to standards; and e) security, that is the ability of the system to secure data and information from accidental alterations or sabotage.

The elements of the reliability criterion are: a) maturity which means absence of failure; b) fault tolerance or the ability to withstand and recover from a component failure; c) recoverability, that is the ability to bring back a failed system to full operation, including data and network connections; and d) correctness which refers to the ability to produce correct computations, output or reports.

The elements of usability criterion are as follows: a) understandability or the ease of understanding of the systems functions; b) learnability which means the demand for minimal learning effort for different users such as novice, expert, and casual users; c) operability or the ability of software to be easily operated by a user in a given environment; and, d) the provision for comfort and convenience.

For the maintainability criterion, the following elements are the subdivisions: a) analyzability which refers to the ability to identify the root cause of a failure within the software; b) changeability, that is the ability of the software to adjust well to different screen dimensions, color depths, and font sizes; and, c) stability which means that the system characterizes the susceptibility of the system to changes.

Lastly, the elements for portability are: (a) adaptability or the ability of the system to adapt new specifications or operating environments; b) installability, that is if the software was easy to install; c) replaceability which means the ease of exchanging a given software component within a specified environment and system coupling; d) software compatibility which refers to the provision for portability of operating system used; and, e) built environment portability, which characterizes that the system has no other software requirement such as runtime system or standard database management engine.

4.4 SYSTEM'S DEVELOPMENT MODEL USED

This part of the research deals with the methods used by the researcher in developing the system, which describes the different methods, techniques and systematic approaches used in the analysis and the design of the representation.

The system development involved the use of the System Development Life Cycle (SDLC) which is a conceptual model used in project management. This cycle describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application.

The software life cycle model (also called process model) is a descriptive and diagrammatic representation of the software life cycle [8]. A life cycle model represents all the activities required to make a software product transit through its life cycle phases. It also captures the order in which these activities are to be undertaken. In other words, a life cycle model maps the different activities are to be undertaken. It maps the different activities performed on a software product from its inception to retirement.

The software life cycle model defines entry and exit criteria for every phase. A phase can start only if its phase criteria have been satisfied. So without software life cycle model the entry and exit criteria for a phase cannot be recognized. Without software development life cycle models it becomes difficult for software project managers to monitor the progress of the project. [2]

The waterfall model is the classical model of software engineering. This model is one of the oldest models and is widely used in government projects and in many major companies. As this model emphasizes planning in early stages, it ensures identification of design flaws before they develop. In addition, its intensive document and planning make it work well for projects in which quality control is a major concern. The pure waterfall lifecycle consists of several non-overlapping stages as shown in the Fig 2. The model begins with initiation phase, followed by concept development, creating the plan, establishing system and software requirements and continues with the detailed design, development, testing, implementation, maintenance and disposition. The waterfall model serves as a baseline for many other life cycle models [8].

In each stage, documents that explain the objectives and describe the requirements for that phase are created. At the end of each stage, a review to determine whether the project can proceed to the next stage is held. The prototyping can also be incorporated into any stage from the architectural design and after. [7]

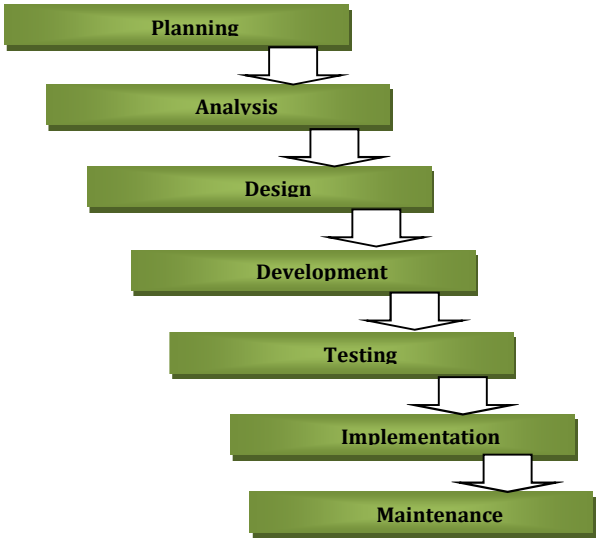

Fig. 2. Waterfall Model

Presented below are the steps in the SDLC and the different activities done in this study for each of the stages.

1. **Initiation.** The initiation phase began when a sponsor identified a need or an opportunity. A concept proposal was also created during this phase [8].
2. **System Concept Development.** This phase defined the scope or boundary of the concepts. It included systems boundary document, cost benefit analysis, risk management plan and feasibility study [8].
3. **Planning.** The planning phase was the most critical step in completing software development. The researcher carefully planned, particularly in the early stages of developing the project. In planning, the problem in the existing system was identified to understand the operation of the present. The objectives were once again considered in planning to develop a system that would enhance the existing system [8].

Requirements Analysis. In the analysis phase, the researcher analyzed the difference between the existing system and the developed one. The problem in the existing system was carefully studied in order to compare the existing one with the developed system. This was made part of the investigation of the inputs and outputs [8].

Design. The information gathered in the preceding phase allowed the researcher to write about the elements of the new and improved system. During the design phase, input and output records were prepared, forms were laid out and file specifications were written. Major aspect on design phase included structuring the kind of interface used for the software [8]

Development. The developed system was actually built based upon the designs conceived in earlier phase. It included acquiring and installing systems environment, creating and testing databases, preparing test case procedures, preparing test files, coding, compiling, refining programs, performing test readiness review and procurement activities [8] These were made possible through the use of the developed programming language, specifically Java and MySQL which served as database management system.

Integration and Test. This phase covered the process of testing the efficiency, accuracy, reliability, speed and security of the system. After the facilities had been installed, programs, software and hardware were tested to ensure design specifications are met [8].

Implementation. The system was implemented with minimum requirements. It was fully utilized by users. All users were trained on how to use and implement the system [8].

Operation and Maintenance. This is phase of the cycle which dealt with the changeover to a new improved system. Final changes and modifications were incorporated in the new system at this stage. Future software upgrades, bug fixes, and regular maintenance were addressed during this stage, which may or may not have a well-defined end state [8].

Disposition. This was the last phase of the cycle where end-of-system activities were described. Emphasis was given to proper preparation of data [8].

Systems Evaluation

The system was evaluated by a pool of experts: an information technology (IT) developer/consultant with three years of experience on system development, an IT supervisor with three years' experience in software development, and, an associate software engineer with two years of experience in the IT Industry.

The ratings given by the respondents on different criteria of acceptability were tabulated and analyzed on the basis of weighted mean, and were qualitatively analyzed using the following:

Table 1. Results and Discussions

Rating	Descriptive Rating
4.50 – 5.0	Excellent
3.50 – 4.49	Very Good
2.50 – 3.49	Good
1.50 – 2.49	Fair
1.0 – 1.49	Poor

The evaluation of the system shows the detailed assessment done by the CICT Local Guidance Counselor and IT experts.

The system was demonstrated and explained by the researcher. After giving the evaluation forms, browsing, testing and questions about the system of the respondents were catered. They evaluated and tested the system based on the evaluation forms.

Table2 shows the number of respondents of the study

Table 2. Respondents of the Study

Respondents	Number
CICT Local Guidance Counselor	4
IT Experts	2
Total	6

Every criterion would be marked by the evaluator on a scale of 1 – 5 (1 – lowest, 5 – highest) as to how they would rate this system given the following criteria.

The scores and their corresponding equivalent were as follows:

Table 3. Scale Rating

Numerical Rating	Equivalent
5	Excellent
4	Very Good
3	Good
2	Fair
1	Poor

Table 3 represents the range of mean and its corresponding interpretation together with a descriptive rating from the evaluation instrument for the system evaluation according to the five criteria previously mentioned.

The gathered data was tabulated and analyzed. To interpret the result, the proponent used this formula to get the average value or the mean for each given criteria.

$$x = \sum \frac{fz}{N}$$

Where:

X = mean

f = total number of respondents for particular rating

z = value of the rating

N = total number of respondents

Table 4. Reference Table to Obtain Mean Value Scores

Range of Mean	Descriptive Rating
4.51 – 5.00	Excellent
3.51 – 4.50	Very Good
2.51 – 3.50	Good
1.51 – 2.50	Fair
1.00 – 1.50	Poor

RESULTS

The results for the system evaluation are shown below:

Table 5. Table for Functionality

Functionality	**Mean**	**Descriptive Rating**
1. The system can be easily operated	4.67	Excellent
2. The system provides comfort and convenience	4.83	Excellent
3. The system is gives enough information or details to the user	4.83	Excellent
Average Mean For Functionality	4.78	Excellent

The average mean for the functionality is 4.78, which means that the mean value score is excellent, indicating the system functionality perceived by the evaluators.

Table 6. Table for Security

Security	**Mean**	**Descriptive Rating**
1. The system requires username and password before logging - in	4.83	Excellent
2. Confidential transactions require special access and higher system privileges.	4.33	Very Good
Average Mean For Functionality	4.58	Excellent

The average mean for security is 4.58, which means the mean value score is excellent. The system has a log-in feature to ensure the security of the system which requires username and password. Through this, authorized person is the only one who can access the system. If the user input wrong password three times, the system will automatically block the user.

Table 7. Table for Reliability

Reliability	Mean	Descriptive Rating
1. The system can produce the desired output of the user.	4.53	Excellent
2. The system provides information in an acceptable response time.	4.63	Excellent
3. The system gives precise inventory of assets.	4.74	Excellent
4. The system can generate accurate and reliable PDF report.	4.58	Excellent
5. The system can store and retrieved the data inputted by the user.	4.55	Excellent
Average Mean For Reliability	4.60	Excellent

The average mean for reliability is 4.60, which means the mean value score is excellent. It produces reliable output by keeping track of records with minimum data redundancy, reduction of paper works, improved data quality, accessibility and responsiveness.

Table 8. Table for Usability

Usability	Mean	Descriptive Rating
1. Understandability. Ease of which the systems functions can be understood	4.75	Excellent
2. Learning effort for different users, i.e. novice, expert, casual etc.	4.63	Excellent
3. Operability. Ability of the software to be easily operated by a given user in a given environment.	4.44	Very Good
Average Mean For Usability	4.60	Excellent

The average mean for reliability is 4.60, which means the mean value score is excellent, indicating the system usefulness perceived by the evaluators.

Table 9. Table for Maintainability

Maintainability	Mean	Descriptive Rating
1. The system can be easily maintained	4.67	Excellent
2. The system performs diagnostic tools and procedures	4.33	Very Good
3. The system has an ample room for improvement	4.50	Very Good
Average Mean For Maintainability	4.50	Very Good

The average mean for maintainability is 4.50, which means the mean value score is very good. The researcher has considered minor revision in the maintainability of the system to attain a better mean value for maintainability.

The researcher used the mean value scores to determine the evaluation ratings of the system.

Table 10. Total Mean Average of System Evaluation

Category	Mean	Descriptive Rating
Functionality	4.78	Excellent
Security	4.58	Excellent
Reliability	4.60	Excellent
Usability	4.60	Excellent
Maintainability	4.50	Very Good
Total Mean Average	4.61	Excellent

The total mean average of LAN – Based Guidance Information System for the College of Information and Communications Technology is 4.61, which means the entire system is excellent in terms of functionality, reliability, usability, maintainability and security.

5 CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

1. The developed system for Monitoring the Student Discipline through the Implementation of LAN – Based Guidance Information system for CICT has the following important features: portability, accessibility, user-friendliness, scalability, security.
2. The Waterfall Model was effectively used in developing the system for Monitoring the Student Discipline through the Implementation of LAN – Based Guidance Information system for CICT.
3. The system for Monitoring the Student Discipline through the Implementation of LAN – Based Guidance Information system for CICT used Java and MySQL as development tools in developing the system.
4. The system for Monitoring the Student Discipline through the Implementation of LAN – Based Guidance Information system for CICT was found excellent in functionality in terms of functionality, reliability, usability, maintainability and portability and therefore be beneficial to the CICT community.

6 RECOMMENDATIONS

Based on the aforementioned conclusions, the following recommendations are hereby presented:

1. That the system for Monitoring the Student Discipline through the Implementation of LAN – Based Guidance Information system for CICT developed be implemented in the College of Information and Communications Technology of the Bulacan State University;
2. That the university management provide high-end computers that may be used by the local guidance counselor; and
3. The researcher suggested that it is more convenient if the operating system of the computer to use is Windows 7 because it can perform tasks faster compared to the previous version of the operating system. It will similarly be an advantage to the user if each computer has the same operating system to avoid conflict on the connection of the network.

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