
Academic Performance Monitoring System of Quirino State University

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ABSTRACT

The advent of information technology poses a considerable impact in the educational systems. The creations of computerized systems have helped improve time-consuming, repetitive and laborious data processing activities like test scoring, grade computation and student records management. Academic performance is commonly measured by examinations or continuous assessment. Generally, there is no general agreement on how it is best tested or which aspects are most important - procedural knowledge such as skills or declarative knowledge such as facts. Being the outcome of education, academic performance is the extent to which a student, a teacher or an institution has achieved educational goals.

This study focused on the design and development of a computerized system of monitoring the academic performance of each student enrolled in Quirino State University from the time the student is admitted until he finishes the course enrolled. In this study, a descriptive method was used to gather relevant facts and information to achieve the objectives in a floated questionnaire. Developmental research was also utilized to systematically design, develop, and evaluate the software needed to monitor the academic performance of the students. Rapid Application Development (RAD) was used to design the project following the ISO/IEC 25023 software quality standards, thus, giving the researcher an opportunity to capture the features of the system from the perspective of the end-users. RAD utilizes structured, prototyping, and Joint Application Development (JAD) techniques to rapidly develop systems.

The extent of compliance of the developed system to the ISO 25023 software quality standards was measured using the five-point Likert scale. IT experts and end users evaluate the developed system to ISO 25023 Software Quality Standards in terms of appropriateness recognizability, learnability, operability, user error protection and user interface aesthetics to a very great extent and therefore, ready for deployment and implementation.

KEYWORDS: *Academic Performance, Monitoring, Rapid Application Development, Joint Application Development, ISO 25023*

INTRODUCTION

In educational institutions, success is measured by academic performance or how well a student meets standards set out by a particular institution. As career competition grows ever fiercer in the working world, the importance of students doing well in school has caught the attention of parents, legislators and government education. Although education is not the only road to success in the working world, much effort is made to identify, evaluate, track and encourage the progress of students in schools. Parents care about their child's academic

performance because they believe good academic results will provide more career choices and job security. Schools, though invested in fostering good academic habits for the same reason, are also often influenced by concerns about the school's reputation and the possibility of monetary aid from government institutions, which can hinge on the overall academic performance of the school. State and federal departments of education are charged with improving schools, and so devise methods of measuring success in order to create plans for improvement [1].

Academic performance is commonly measured by examinations or continuous assessment. Generally, there is no general agreement on how it is best tested or which aspects are most important - procedural knowledge such as skills or declarative knowledge such as facts. Being the outcome of education, academic performance is the extent to which a student, a teacher or an institution has achieved educational goals [2]. Student information system (SIS) is a software application for educational establishments to manage student data. Student information systems provide capabilities for entering student test and other assessment scores through an electronic grade book, building student schedules, tracking student attendance and managing many other student-related data needs in a school, college or university.

The strong implication for education is that skills in effective online searching should occupy more value and more important place within the education curriculum at all levels where the adaptation of SIS is most valued for academe effectiveness. From the perspective of the individual student, SIS incorporates enormously increased potential for representing and manipulating information in range of structured education paradigms and strategic study forms as appropriate for a justifiable application of diverse learning styles. Furthermore, the student information systems do provide greater range of ways through which learners can express their knowledge, including the publication of multimedia presentations to the world through the Internet. Aside from some of the information system know-how, it is needed that certain students must struggle with the inclusion to discover how to complete comprehensive reviews of such research studies, to learn how to evaluate sources within the context of their projects and citing properly the different sources within their theses or dissertations [3].

The SIS process is typically completed early into the students' school career and encapsulates each of the facets of knowledge built up and literacy value, including learning what type of SIS is available, finding and accessing system sequence, evaluating tools for the information and then synthesizing the student information system into certain end product for a better career patterns as it seemed like the ideal project to focus SIS and relate it to ample literacy instruction around. While the students had all performed database searches before, they were less likely to have taken advantage of the search management tools available to them through educational databases and how to set up automatic searches to help streamline the research process [4].

Institutions should designate one clear point of responsibility for maintaining complete, accurate and up-to-date records on every student covering all aspects of the relationship. They should also tightly control access to student records to prevent unauthorized use, alteration, removal or destruction of the records themselves and unauthorized disclosure of the information they contain. Only those members of staff who need them to do their work should have access to student records, and their access should be restricted to records of the direct relationship and not to the content of the whole file. In an attempt to take advantage of the effects of knowledge explosion, the Quirino State University has started using faster and

more efficient means of student and accounting records management system to improve data processing activities.

OBJECTIVES OF THE STUDY

The main objective of this study was to design and develop a computerized system for monitoring the academic performance of students in the university.

Specifically, it aimed to:

1. determine the procedures employed by the deans and the academic advisers of the university in monitoring the academic performance of students;
2. identify the problems encountered by students, academic advisers and deans in relation to the present procedures of academic performance monitoring;
3. find out and provide solution to the problems encountered by students, deans and academic advisers in relation to academic performance monitoring; and
4. determine the extent of compliance of the developed application in terms of its:
 - 4.1. appropriateness recognizability;
 - 4.2. learnability;
 - 4.3. operability;
 - 4.4. user error protection;
 - 4.5. user interface aesthetics;

Conceptual Paradigm of the Study

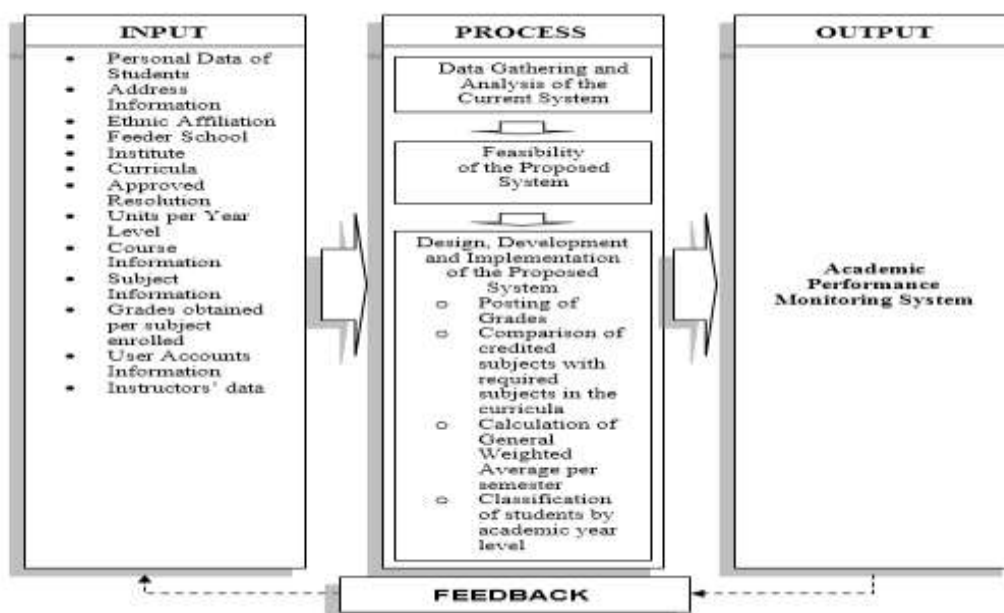


Figure 1. Conceptual Paradigm of the Study

Figure 1 presents the data inputs and the desired outputs of the developed Academic Performance Monitoring System (APMS).

The first box enumerates the needed data inputs about the personal data of students like required subjects in the university curricula, the grades obtained by each student per subject, the units earned and the name of instructors handling each subject. These data are stored in an electronic database and processed according to the instructions provided in the program.

The second box presents the activities by the researcher in coming up with the System. It also contains the processes which are done by the System to come up with the desired outputs. These processes include: a) posting of grades; b) comparison of credited subjects with the required subjects in the curricula; c) calculation of General Weighted Average (GWA) per semester; and d) classification of students by academic year level.

The output of the system includes individual student evaluation sheet, master list of students per academic year, list of subject deficiencies of shifters and transferees, list of academic scholarship qualifiers per semester, certification of grades per student, copy of grades, student's profile and generates statistical reports such as distribution of students by address, age profile, minority group profile, feeder school profile, gender profile, profile by type of students and enrollment data.

The feedback box suggests that the researcher solicited the comments and suggestions of IT experts and end users to revise and improve the system.

METHODOLOGY

Research Design

A descriptive method was used to in this study gather relevant facts and information to achieve the objectives in a floated questionnaire. Developmental research was also utilized to systematically design, develop, and evaluate the software needed to monitor the academic performance of the students, which must meet the criteria of internal consistency and effectiveness.

As the need to define the user's requirements to be able to design the system, Rapid Application Development (RAD) was used to design the project following the ISO/IEC 25023 software quality standards. RAD utilizes structured, prototyping, and Joint Application Development (JAD) techniques to rapidly develop systems. Using the structured techniques, preliminary data and process models of the user requirements will be first built. Figure 2 shows the development methodology of the system.

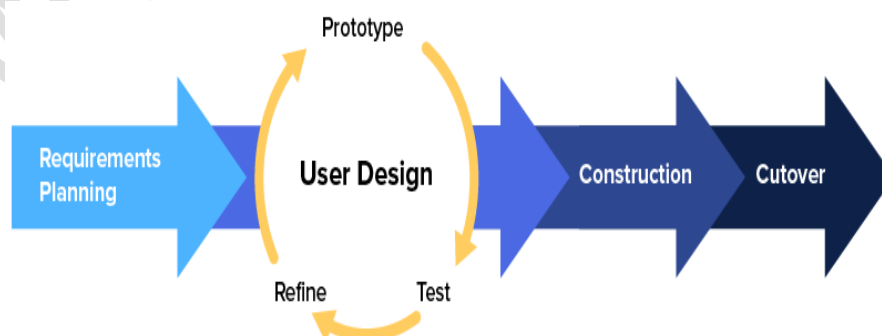


Figure 2. Rapid Application Development (RAD)

Samples and Sampling Procedures

A purposive sampling was used to identify the respondents. They were the deans, academic advisers and students of the University. There were six department deans, 54 academic advisers, and 1860 students with a total population of 1920. From the total population, there were 331 respondents.

Research Environment

This study was conducted at Quirino State University during the School Year 2018-2019.

Development Tools

These are the different tools and techniques used by the researcher in developing the system. These were utilized to better analyze the system needs.

The Data Flow Diagram (DFD) was used to describe the transformation of inputs into outputs and to graphically illustrate the flow of data and logic within the system. The Hierarchy-Plus Input Process Output (HIPO) was developed to plan and document the developed system that utilizes a hierarchy chart to graphically represent the system's control structure. Using this technique, the researcher can evaluate and refine the systems' design and correct flaws prior to implementation. Given the graphic nature of HIPO, the target users can easily follow a systems' structure. The hierarchy chart serves as a useful planning and visualization document for managing the systems development process. The Input-Process-Output (IPO) chart was used to document the inputs, outputs and the processes performed by the developed system. The Entity-Relationship Diagram (ERD) represents the various tables in relation to a very large database. It was also used to conduct data modeling activity. The attributes of each data object can be described using data object description. The data dictionary served to analyze the data flows and data stores of the developed system. It collects, coordinates, and confirms specific data. It provides documentation, eliminates redundancy, validates the data flow diagram, provides a starting point for developing screens and reports and develops the logic for DFD processes. The chart helped the researcher in planning the activities to be undertaken during the design and development of the developed system, allocating the time and schedule for each activity to ensure that the activities will be completed as scheduled. The Program Evaluation Review Technique (PERT) chart was made available to graphically illustrate or represent a developed system's schedule which shows the sequence of tasks to be performed. It aided in the determining the critical path of tasks and helped in completing the project within a given time frame. The cross-functional flowchart was used in analyzing, designing, documenting or managing a process or a program. This chart allowed the researcher to locate the responsibility for performing an action or making a decision correctly and showing the responsibility of each organizational unit for different parts of a single process.

Data Gathering Techniques

Descriptive survey method was used in this study to conduct interviews, used questionnaires, documentary analysis and observation to be able to understand how users interact in the work context to the current information systems.

The interview method helped much in learning the different methods and practices employed in the evaluation of students in the University. The deans of the different colleges were interviewed for the students' records management. The researcher studied the existing forms

on student information and the evaluation form of students. Documents and processes regarding the monitoring of academic performance of students of the university were also analyzed. The researcher observed the current procedures done in the monitoring of the academic performance of the students in the Quirino State University. The procedures of the evaluation of students were closely observed to study the correct process of the current student academic performance monitoring.

Data Analysis Tools

After gathering the data, the following statistical tools were used to analyze the data. To be able to get a total number of population, the number of respondents was determined by using the Slovin's formula [5].

A sample size can be determined using the formula:

$n = N \div (1 + Ne^2)$ where n = number of samples, N = total population and e = error tolerance.

The Likert Scale was used in analyzing the result of the evaluation of the developed system. The five points that were used are shown in Table 1. In determining the compliance of the developed academic performance monitoring system, it made use of the interpretation as shown in Table 2.

Table 1. Likert Scale and its Descriptive Interpretation

Points	Descriptive Interpretation
5	Very Great Extent
4	Great Extent
3	Moderately Extent
2	Low Extent
1	Very Low Extent

Table 2. Range of Weighted Mean and its Descriptive Interpretation

Points	Descriptive Interpretation
4.20-5.00	Very Great Extent
3.40-4.19	Great Extent
2.60-3.39	Moderately Extent
1.80-2.59	Low Extent
1.00-1.79	Very Low Extent

Participants of the Study

There were 1,920 total number of respondents in the university. With the use of Slovin's formula, a number of 6 deans, 54 academic advisers and 271 students were taken from the different colleges as respondents. Since there were only 6 deans and 54 academic advisers, they were all considered as respondents. Ratio and proportion were used to determine the number of student respondents from each college.

Table 3 shows the list of colleges and number of deans, academic advisers and student respondents while Table 4 displays the list of colleges and the total number of respondents.

Table 3. List of Colleges and Number of Deans, Academic Advisers and Student Respondents

College / Department	No. of Deans	No. of Academic Advisers	No. of Students	Total
CA	1	8	231	240
CHIM	1	10	249	260
CHS	1	3	97	101
CITCS	1	12	468	481
COPS	1	11	346	358
CTE	1	10	469	480
Total	6	54	1,860	1,920

Table 4. List of Colleges and Total Number of Respondents

College / Department	No. of Deans	No. of Academic Advisers	No. of Students	Total
CA	1	8	19	28
CHIM	1	10	23	34
CHS	1	3	5	9
CITCS	1	12	87	100
COPS	1	11	50	62
CTE	1	10	86	98
TOTAL	6	54	271	331

Legend:

CA – College of Agriculture Management

CHS – College of Health Sciences Technology and Computing Sciences

COPS – College of Public Safety

CHIM – College of Home and Industry

CITCS – College of Information

CTE – College of Teacher Education

Statistical Tools

The researcher was guided by the objectives to determine the appropriate statistical tools to be used.

Frequency. This was used to quantify the number of the respondents falling into a class in a statistical survey for the variation of specified characteristics.

Percentage. This was used to determine the number of respondents. The formula used was:

$$P = (F * 100)/N$$

where

P = Percentage

F = Frequency

N = Total Number of Classes

Weighted Mean. This was used to determine the over-all description of the responses given by the respondents in each item in the questionnaire. The formula used was

$$XW = (WiFi)/Fi,$$

where

XW = weighted mean

WiFi = sum of weighted frequencies

Fi = number of respondents

RESULTS AND DISCUSSION

1. The Current Procedures in Monitoring the Academic Performance and Evaluation of Students

The registrar of the university, the college deans, academic advisers, the director for instruction and program coordinators were interviewed to know and be familiar with the procedures of the existing system in evaluating the students as well as the monitoring of their academic performance. With this, the researcher was able to know the current procedures of the present system. In the University, the difficulty of monitoring the academic performance of the students is shouldered by the college deans together with the designated advisers. But the dean alone is the one responsible for checking the grade sheets and class records, and collects grade sheets from subject instructors. For purposes of simplifying the task of monitoring academic performance, the dean prepares a summary of grades by course, by year level and by section. Based on the summary of grades, students who incurred failing marks or incomplete grades are identified. Individual evaluation sheets for these students are then prepared for academic counseling and for purposes of assisting these students in identifying subjects to be taken for the succeeding terms.

During enrolment, students are required to fill out the Student Cumulative form which contains the personal information of individual students. This form includes important details of the student like name, home address, birth date, gender, ethnic affiliation, name of father and mother and other supporting data like e-mail address and contact number. These forms are kept by the deans in individual folders inside a filing cabinet for future use. These forms in the cabinet are arranged according to the school year and the semester they applied for. Aside from the copy of the deans, the registrar also requires the same information but is being out in the enrolment form of the students.

Every student has an individual evaluation form. During enrolment, the advisers require the students to get a copy of their evaluation of grades from the registrar and then they manually write the grades into the individual evaluation forms provided by the deans/advisers. Together with this process, advisers conduct a review of grades during the last semester with their students to assist in their progress during the working semester. This will be an opportunity for the advisers and students to discuss topics about the students' progress towards overall expectations and goals, and students' performance during the previous semester.

For the process of changing of grades, official grades in course subjects may be changed by the subject instructor or the department dean up to one year after the original grading deadline. Changes are valid if reasons given are approved by the Academic Council or the Director for Instruction. When duly filed in the Office of the University Registrar, grades

become final and cannot be subjected to change or revision unless there is error in computation or transcription or student's work is unintentionally overlooked.

If a student questions a final grade based on the grading part of a specific piece of work like a part of a test on the basis of one of the allowable factors mentioned above, the instructor may review the entire piece of work in question for the purpose of determining whether the final grade is a proper one. In general, changing the final grade is permitted on the basis of the allowable factors already mentioned whether an error is discovered by the student or the instructor; however, changing a grade is not permitted by reason of revision of judgment on the part of the instructor.

2. The problems encountered in the current processes of monitoring and evaluating student performance of Quirino State University

Based on the observations and interviews done by the researcher, the following are the problems of the University in the academic monitoring and evaluation of student performance.

Redundant, and time-consuming data entry. Posting of grades and preparation of evaluation sheets are done by both the academic adviser and the dean. Aside from the summary of grades, the dean needs to prepare individual Evaluation Form of students to identify subjects to be taken during enrolment.

Bulky and unsecured paper-based academic records. Academic records of students are printed on paper. These are filed alphabetically on a folder and placed in a storage cabinet. During enrolment period, individual files are detached from the folder for updating and analysis. This practice may cause misplaced individual records which demands unnecessary reconstruction of records. With the increasing enrolment in the college, copies of students' academic records also piling up which poses storage problems.

Slow process of credits evaluation. The usual process of preparing and updating evaluation sheets of students is rather slow considering the number of designated personnel performing such task. Consequently, transferees and shifters often have to wait for some time before they can be enrolled; likewise, students who are performing well have to wait after enrolment before they can apply for academic scholarships due to the attention demanded by students with academic deficiencies.

3. Solutions to the problems encountered by students, deans and academic advisers in relation to academic performance monitoring;

Based on the collated results of the observations and interviews done by the researcher, features were selected that would help resolve if not minimize the issues and difficulties encountered in the present academic performance monitoring and evaluation of QSU. As the developed system shall minimize repetitive data entry activities, the system shall allow data input only once and provides automatic processing instructions so that the data could be manipulated to generate required reports and retrieved when needed.

The following are the main features of the system which can aid the QSU in the evaluation and monitoring of grades of the students:

Reduce Data Entry. This feature allows data to be inputted only once to provide programmed processing instructions so that the data could be manipulated to generate required reports and retrieved when needed.

Automated Master List of Students. The system provides an electronic database for the storage of data which lessens the paper workload and storage problems and solves misplacement of records. The system also provides a master list of students each of which contains an updated grades of each student per semester enrolled including the number of units taken per semester. The developed system also creates a backup copy of the data files to ensure that inputted data are not lost. Moreover, provisions to secure the database are included to safeguard the stored data from unauthorized access.

Fast processing of credits evaluation. The developed system contains a complete listing of subjects required in the courses offered by the university. This list is used as basis in determining list of deficiencies for purposes of identifying subjects to be enrolled by a student. Once the grades of students are complete, the system provides evaluation of grades which can be easily viewed by the students. A master list of students with subject deficiencies is generated to immediately identify students who need academic counseling; likewise, a master list of students who qualify for academic scholarship are also generated by the system to provide incentives to students who are performing well in their academic subjects.

4. The compliance of the developed academic performance monitoring system in terms of appropriateness recognizability, learnability, operability, user-error protection and user interface aesthetics.

The compliance of the developed system in terms of appropriateness recognizability, learnability, operability, user-error protection and user interface aesthetics to the ISO 25023 software quality standards was measured using the five-point Likert scale. It was used in analyzing the result of the evaluation of the developed system. The users' mean assessment regarding the appropriate recognizability of the developed system is "very great extent" with the computed mean value of 4.69. The IT experts and the end users confirmed the learnability of the developed system, as shown in the computed mean value of 4.88, which is described as a "very great extent." In the operability aspect, the users viewed the developed system compliant to "very great extent" with a computed mean value of 4.82. The participants evaluated the developed system to be "very great extent" with the computed mean value of 4.80 as to its user error protection. The developed system's user interface aesthetics was evaluated as a "very great extent" with an added mean value of 4.26.

The assessment summary of usability acceptance level of the developed system to ISO 25023 as assessed by the users is presented in Table 5.

Table 5. Summary Table of Usability Acceptance Level of the developed system to ISO 25023 as assessed by the users

Criteria	Weighted Mean	Descriptive Interpretation
Appropriateness Recognizability	4.69	Very Great Extent
Learnability	4.88	Very Great Extent
Operability	4.82	Very Great Extent
User Error Protection	4.80	Very Great Extent
User interface Aesthetics	4.26	Very Great Extent
Overall Weighted Mean	4.69	Very Great Extent

With an overall mean of 4.69 which is described as very great extent, the evaluation of the developed academic performance monitoring system is compliant with the ISO 25023 Software Quality Standards in terms of appropriateness recognizability, learnability, operability, user error protection and user interface aesthetics as assessed by the users. This means that users found the system to be usable, perform its perceived functions, and met their needs. The finding agrees with the study entitled “The Applicability of ISO/IEC 25023 Measures to the Integration of Agents and Automation Systems” that ISO/IEC 25023 based measures of quality software prove helpful towards comparing practices for integrating software agents and low-level automation functions [6].

CONCLUSION

With the problems and issues encountered by the students, academic advisers and deans in relation to the present procedures of academic performance monitoring, the respondents expressed their interest and appreciation in developing a system as they have seen its capability to address these problems and issues significantly. The end users' evaluation supports this that the developed system is compliant with the ISO 25023 Software Quality Standards in terms of appropriateness recognizability, learnability, operability, user error protection, and user interface aesthetics.

Based on the findings in this study, it was concluded that the analysis, design, development, and testing of the Academic Performance Monitoring System, as a decision-support and management tool developed to address the prevalent problems and issues in monitoring the academic performance of the students of Quirino State University. The developed system automates the process of academic performance monitoring and generation of relevant reports as well. Furthermore, the developed system is essential in the feedback mechanism to have easy and convenient data storage. This is vital for efficient and fast retrieval of data as it serves as an instrument in measuring the school's effectiveness and success.

RECOMMENDATIONS

From the foregoing analysis, the proponent of the study endorses that the system provides additional statistical reports such as students' survival rate, scholarship programs classified by course and by year level aside from the academic scholars and the inclusion of family income in the profile of students to easily identify those students who belong to the poverty line. An inclusion of a Class Scheduling and ID System should also be integrated in the developed

system. The whole Academic Performance Monitoring system should be online so as to checking and monitoring of grades becomes possible for the parents/guardians. It should also be further tested and should be implemented in all the campuses of the university.

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