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RFID - BASED STUDENT EVALUATION SYSTEM WITH CURRICULUM MAPPING

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ABSTRACT: Student evaluation is one of the vital processes during enrollment which usually prone to human error because there are several factors that must be considered before coming up with a list of courses for a certain student to enroll such as the total number of units allowed for every year level, their deficiencies and the pre-requisite. In accordance to this, a system was developedto lessen the possible human error and to provide an accurate and efficient list of courses that a particular student should take every semester.

The development of the system was guided through the different phase of System Development Life Cycle (SDLC) specifically the waterfall model.

To test the system the researchers conducted a survey comprised of different indicators to check and evaluate the developed system. And the findings shows that all criteria such as: functional suitability, usability, reliability,performance efficiency and security obtained a verbal description of strongly agree from the survey. As a result, the researchers developed a system that is secured, functional, efficiently stores student academic records, and automatically generates areliablestudent evaluation(list of courses)through the use curriculum map. Furthermore, kiosk has been designed, serving an access to the student records.

KEYWORDS:*RFID, automation, student evaluation, curriculum map*

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1.0 INTRODUCTION

The advancement in new technology has a real impact on our society and a lot of people tend to use and benefit from it. Almost all aspects of life are aided with this unparalleled innovation in Information Technology particularly automation because automation is another way to improve the performance of the existing manual process [1] and through the use of automation the possible human error will also be lessened since there will be less human intervention because automation reduces the need for human work. A transaction done through automation changes the work because it does not automate the process physically but can also be able to automate cognitive task which is suitable for this study since it requires task that needs decision making; therefore, automation is not just replacing muscle but it is also the brain of the procedure [2]. The education sector or the academe as a whole is a primary beneficiary of automation. From the advancement of facilities, acquisition of computer systems, introduction of integrated systems to the full compliance to automated systems or Information Systems (ISs) are just some of the benefits usually addressed to schools, universities and other educational institutions. These systems are distinct from other information systems. They are designed to be used to analyze and facilitate strategic and operational activities in the organization.

Implementing ISs are now a trend on academic institutions, not just because it serves as an upgrade to services and workloads but is also because these systems can assist school managers in determining the aims of the school, formulating strategic plans, distributing resources, and evaluating staff performance as well as organizational success [3]. ISs are also best used if properly suited on the institution in terms of managerial, structural, psychosocial, goals and values, and technical assets as presented on the article of Moshe Telem in “Computers & Education Journal” [4]. As a result, extensive amount of investment that has gone into introducing information and communication technology (ICT) into schools will be considered worthwhile specifically because there is evidence that it has made a commensurate impact on school performance and effectiveness [5]. One of the examples is the study entitled “Automation of Dean's Office Functions in a Higher Education Institution on the Basis of Electronic Document Flow System” by YarullinIlnarFagimovich. According to the said study, the implementation of automation through electronic document flow system upholds the improvement of quality and efficiency of a dean's office work due to the decrease in time needed to do the processes of collecting, processing and obtaining required information [6]. Therefore, these academic institutionsare relying now in automation to alleviate their areas of services with utmost level of complexity and maintenance such as enrollment process.

Simple it may seem, but evaluating the students for their courses that should be taken every semester is vital and takes on several considerations in terms of incomplete grades, pre-requisite and the maximum number of units allowed for every year level.

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All these factors must be evaluated accurately because any mistake in every assessment may lead to imprecise list of courses that a student may accidentally enroll. This could possibly subject to issues like violation of rules that might damage the performance of the school or particular department.[7] With this issue, the researcher developed a RFID-Based Student Evaluation System with Curriculum Mapping, a system that will enhance and automate the transaction of an academic institution in one of the vital processes of enrollment such as the student evaluation. Through that, the possible cause of human error will be lessened.

The system will cover all related processes such as checking the pre-requisite, setting the time required to complete a particular deficiency and also validate the maximum number of units that should be credited for every year level. Through these processes the system will automatically generate a suggested list of courses intended for a particular student and the list can be reviewed and modified by the evaluator using curriculum map as a reference or guide. Because a map can be used to have an accurate course and curriculum analysis that can be effectively understood by the user [8] because it serves as a tool for path planning and navigation [9] since it builds connection and relationship between different things or concepts. Hence, it is mostly used in educational environment [10]. In the OBE Framework one of the outcomes is the Program Outcomes which highlights the importance of curriculum mapping which identifies and determine whether the curriculum and learning outcomes are aligned[11].

The system also provides a device that will automatically retrieve the information of a particular user which will be saved in a database for more reliable and easy way of information retrieval. Furthermore, a kiosk will be provided for the students to monitor their performances and check all their deficiencies that should be completed.

2.0 METHODOLOGY

The researchers will use developmental method toaccomplish anddevelop system that will automate the process of student evaluation during enrollment and employed survey questionnaire using five criteria of ISO 25000 (system and software quality evaluation)[12]. Respondents of this are students, faculty and staff of Wesleyan University-Philippines, College of Engineering and Computer Technology.

2.1 System Development Methodology

The development of the system will be guided by the System Development Life Cycle as (SDLC) which the proposed system needs to produce an accurate algorithm to accomplish its goal.

In the planning stage, interviews will be conducted to school personnel of Wesleyan University-Philippines and students to determine the existing process of student evaluation

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and the problems encountered during the whole process of enrollment. These inputs will be considered in the succeeding stage of development.

In the analysis stage, the data gathered in the planning stage will be operationalized. The features to be incorporated in the system and the tools that will be used to develop the system will be identified.

In the design stage, system design representations will be developed such as the Context Diagram, Data Flow Diagram, Use–Case Diagram, System Flow Chart and Circuit diagram. These will be used for the code structure of the system.

In the coding stage, the actual creation of source code of the system will be done. All functions identified on planning and finalized on analysisstage, and all concepts from the Design stage will be considered.

In the testing stage, the system will be having a dry run presentation to the school personnel of WUP for the verification of validity of the system. Then after this stage, the system will be subjected for assessment.

2.2 System Design

Figure 1 shows how the designated computer is connected with other devices to work as a kiosk and how the kiosk connect with the server through wireless connection since the kiosk is recommended to be installed outside the faculty office of College of Engineering and Computer Technology (CECT), Wesleyan University-Philippines.

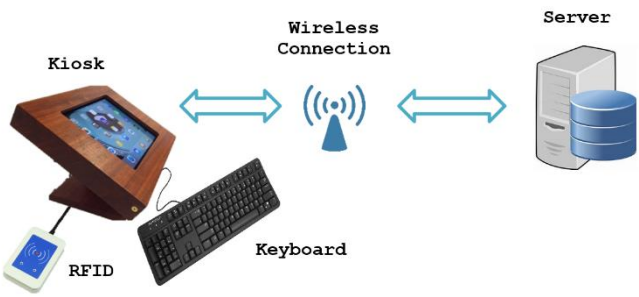

Figure 1: Physical diagram for kiosk

Every time a student logs into the device with RFID reader, a request will be made to the server and the data requested from the server will be sent back to the kiosk.

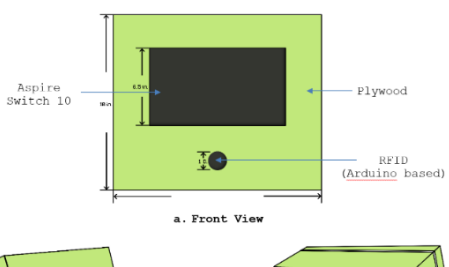

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Figure 2: Kiosk design

Figure 2 shows the design of the Kiosk. It shows how the kiosk was designed and what materials were used.

Figure 3 shows the DFD of the developed system. It represents the specific processes and transactions of the developed system.

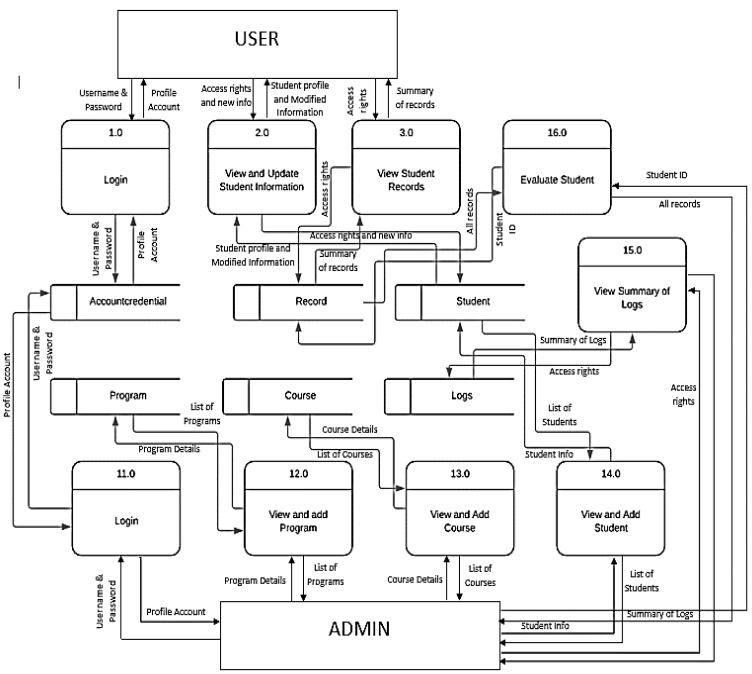

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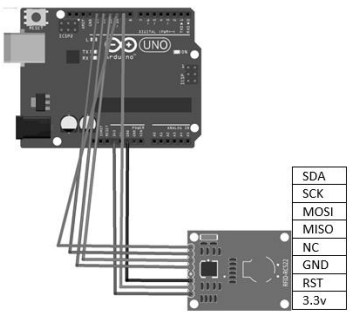
Figure 3: Data flow diagram

The data flow of each specific process (from retrieving and delivering of data) was also illustrated in a bidirectional manner.



RFID Module	Arduino
3.3V	Pin 3.3v
RST	Pin 9
GND	GND
NC	No Connection
MISO	Pin 12
MOSI	Pin 11
SCK	Pin 13
SDA	Pin 10

Figure 4: RFID circuit diagram

Figure 4 shows the parts and connection of the integrated RFID of the system. The primary circuitry which controls the kiosk includes an Arduino Uno, a microcontroller board based on 8-bit ATmega328P microcontroller.

3.0 RESULTS AND DISCUSSION

The objective was to determine whether the proposed system has functioned correctly; has a precision in data management; has usable capability; and has provided efficiency to the user. The data gathered through the result of the survey were analyzed, presented and interpreted for the benefits of the non-technical future researchers or readers of this research.

Table 1: Assessment of the respondents based on security

Security	Non-Expert				Expert		Combined respondents	
	Faculty& Staff		Students					
	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description
1. Accessible by authorized	4.8	SA	4.9	SA	4.3	SA	4.67	Strongly Agree

user only.								
2. Privileges are properly assigned for each user.	4.9	SA	5.0	SA	4.4	SA	4.76	Strongly Agree
3. Modification are done by authorized user only.	4.6	SA	5.0	SA	4.6	SA	4.73	Strongly Agree
Average	4.7	SA	4.9	SA	4.4	SA	4.66	Strongly Agree

Table 1 confirms that the respondents felt confident that the proposed system is secured. The responses are shown as follows: "Privileges are properly assigned for each user" lands on the top rank, which garnered 4.76. It is followed by "Modifications are done by authorized user only" which gleaned 4.73 while "Accessible by authorized user only" ranked the third with 4.67. In summary, the overall responses on the category fall on "Strongly Agree" and garnered a weighted mean average of 4.66.

Table 2: Assessment of the respondents based on functionality suitability

Functionality Suitability	Non-Expert				Expert		Combined respondents	
	Faculty & Staff		Students					
	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description
1. Provides a suggested list of courses to be enrolled by the student.	4.8	SA	5.0	SA	4.5	SA	4.76	Strongly Agree
2. Can add or update courses, programs, user's information and student records.	4.9	SA	5.0	SA	4.7	SA	4.86	Strongly Agree

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3. Displays curriculum map for a particular program and for a specific student.	4.9	SA	5.0	SA	4.7	SA	4.86	Strongly Agree
4. Provides summary of logs of all users.	4.6	SA	5.0	SA	4.6	SA	4.73	Strongly Agree
5. Produces a printable student evaluation form.	4.9	SA	5.0	SA	4.4	SA	4.76	Strongly Agree
Average	4.82	SA	5.00	SA	4.58	SA	4.80	Strongly Agree

Table 2 shows the respondents, confidence that the proposed system is functioning properly.The responses are shown as follows: "Can add or update courses, programs, user's information and student records" and "Displays curriculum map for a particular program and for a specific student" both gleaned 4.86 and fall on the first rank. "Provides a suggested list of courses to be enrolled by the student" which garnered 4.76 together with "Produces a printable student evaluation form" lands on the second rank. Lastly, "Provides summary of logs of all users" gained 4.73. Overall, responses gathered fall on the "Strongly Agree" category, which garnered 4.80 weighted mean average.

Table 3: Assessment of the respondents based on reliability

Reliability	Non-Expert				Expert		Combined respondents	
	Faculty & Staff		Students					
	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description
1. Provides an accurate list of courses allowed for a	4.7	SA	5.0	SA	4.2	SA	4.63	Strongly Agree

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particular student to enroll.								
2. Modifies correctly the specified data.	4.9	SA	5.0	SA	4.6	SA	4.83	Strongly Agree
3. Produces an accurate curriculum map base on student records	4.6	SA	5.0	SA	4.7	SA	4.76	Strongly Agree
4. Displays accurate information	4.7	SA	5.0	SA	4.4	SA	4.70	Strongly Agree
Average	4.72	SA	5.00	SA	4.47	SA	4.73	Strongly Agree

Table 3 shows the respondents, confidence that the proposed system is accurately working. The responses are shown as follows: the first rank is "Modifies correctly the specified data", which gleaned 4.83. Ranked second is "Produces an accurate curriculum map base on student records", which obtained 4.76. On the third rank is "Displays accurate information" with 4.70 while the fourth rank is taken by "Provides an accurate list of courses allowed for a particular student to enroll" which had 4.63. In summary, the responses fall on the "Strongly Agree" category which garnered 4.73 weighted mean average.

Table 4: Assessment of the respondents based on performance efficiency

Performance Efficiency	Non-Expert				Expert		Combined respondents	
	Faculty & Staff		Students					
	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description
1. Reduces human error.	4.6	SA	4.9	SA	4.00	A	4.5	Strongly Agree
2. Improves the manual	4.8	SA	4.9	SA	4.70	SA	4.8	Strongly Agree

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student evaluation.								
3. Helps student to monitor their records and deficiencies.	4.9	SA	5.0	SA	4.90	SA	4.93	Strongly Agree
4. Effective for checking pre-requisite, allowable courses to enroll, and the maximum numbers of units.	4.8	SA	5.0	SA	4.50	SA	4.76	Strongly Agree
5. Helps evaluator in decision making	4.9	SA	4.9	SA	4.10	A	4.63	Strongly Agree
Average	4.80	SA	4.94	SA	4.44	SA	4.72	Strongly Agree

Table 4 shows the respondents, assurance that the proposed system is efficient. The responses are shown as follows: "Helps student to monitor their records and deficiencies", which garnered 4.93 falls on the first rank while "Improves the manual student evaluation" falls on the second rank with 4.8. "Effective for checking pre-requisite, allowable courses to enroll, and the maximum number of units" and "Helps evaluator in decision making" fall on the third and fourth ranks and obtained 4.76 and 4.63, respectively. Lastly, "Reduces human error" ranked fifth with 4.5. Overall, the responses fell on the category of "Strongly Agree" and garnered 4.72 weighted mean average.

Table 5: Assessment of the respondents based on usability

Usability	Non-Expert				Expert		Combined respondents	
	Faculty & Staff		Students					
	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description

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1. Can navigate the whole system easily.	4.6	SA	5.0	SA	4.6	SA	4.73	Strongly Agree
2. User log-in can be done faster using ID.	4.7	SA	5.0	SA	4.4	SA	4.70	Strongly Agree
3. The user findthe device helpful.	4.8	SA	5.0	SA	4.5	SA	4.76	Strongly Agree
4. System can be installed easily.	4.8	SA	4.9	SA	4.3	SA	4.66	Strongly Agree
5. Can be simply manipulated by the user (in terms of adding and updating information).	4.9	SA	5.0	SA	4.7	SA	4.86	Strongly Agree
Average	4.76	SA	4.98	SA	4.50	SA	4.74	Strongly Agree

Table 5 shows the respondents, confidence that the proposed system is user-friendly. The responses are shown as follows: Ranked first is "Can be simply manipulated by the user (in terms of adding and updating information)" and gleaned 4.86. Secondly, with 4.76 is "The user finds the device helpful". "Can navigate the whole system easily" garnered 4.73 and landed on the third rank while "User log-in can be done faster using ID" and "System can be installed easily "gleaned 4.70 and 4.66 which fell on the fourth rank and fifth rank, respectively. Overall, the responses gathered fell on the "Strongly Agree" category, which garnered 4.74 weighted mean average.

Table 6: Summary of Result

Summary of Result	NON- EXPERT		EXPERT	Combined respondents
	Faculty & Staff	Students		

	WM	VD	WM	VD	WM	VD	Weighted Mean	Verbal Description
a. Security	4.7	SA	4.9	SA	4.4	SA	4.66	Strongly Agree
b. Functionality Suitability	4.82	SA	5.00	SA	4.58	SA	4.80	Strongly Agree
c. Reliability	4.72	SA	5.00	SA	4.47	SA	4.73	Strongly Agree
d. Performance Efficiency	4.80	SA	4.94	SA	4.44	SA	4.72	Strongly Agree
e. Usability	4.76	SA	4.98	SA	4.50	SA	4.74	Strongly Agree
Average	4.76	SA	4.96	SA	4.47	SA	4.73	Strongly Agree

Table 6 presents the respondents, confidence that the proposed system is applicable and can be used as a new student evaluation system. The responses are shown as follows: "FunctionalitySuitability" ranked first which garnered a total of 4.80. "Usability", which gleaned 4.74 falls on the second rank. On the third rank is "Reliability", which garnered 4.73 while "Performance Efficiency" and "Security" ranked fourth and fifth with 4.72 and 4.66, respectively. Overall, the responses fell on the category of "Strongly Agree" with 4.73 weighted mean average.

4.0 CONCLUSION

Based on the results of the analysis of data and findings, the following conclusions were drawn:

The computerized student evaluation complies with the rules and policies of Wesleyan University-Philippines, the RFID (Arduino based) can be integrated in a kiosk for student performance monitoring, an automation helps to lessen the time, to be more productive, and to have a reliable student evaluation process and the Kiosk will be helpful for the student to monitor the student academic performance. With the following conclusions, the objectives of the study are all achieved.

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