

Design and implementation of web-based management system instead of manual process efficiently in ATI, Galle

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1. Abstract

Today, there is a growing interest in web-based management system all over the world and also systems have a great importance to the academic institutes. In this sense, web-based management system is greatly concerned in the Advanced Technological Institute (ATI) community functioning under the Sri Lanka Institute of Advanced Technological Education (SLIATE). Focus of this study is to design and implement a web-based management system which automates ATI management system of Galle. Due to the inefficiency of the current manual system, the need arises to automate web-based ATI management system in order to efficiently handle processes currently take place.

This study aims through an extensive study of relevant literature and the implementation of several open source solutions. System requirements are identified by conducting semi structured interviews with staff and reading documentation and system development is based on rapid application development methodology. Further free open source tools are used to develop the system to encourage stakeholders to engage with new technology and Joomla is used as a content management system for the problem domain. Simple random sample of staff members are used to evaluate the new system and identify the user friendly and suitability of the requirement achieved from the new system. Ultimately it is being helped and promoted student's achievement and success, ATI must have accessed to complete, accurate, and timely information about students. Successful feedback of the users proves that the project meets the identified requirements.

Index Terms- Web-Based Management System, Manual system, Rapid Application Development (RAD), Joomla, Heuristic evaluation.

2. Introduction

In today's world, technology plays a great role in an organization and helps to achieve objectives effectively and efficiently by handling their processes with the turbulent environment. So, organizations need to adopt technology and the main purpose of web-based ATI management systems is to help ATI to manage various operations including student data, administrative, and functional operations efficiently.

There are numerous definitions for web-based management system. According to the Piccoli,(2012) [1] web-based management system is a type of information systems that has widely spread and becomes one of the most important resources in providing the key organizational activities such as automation of everyday tasks and decision making process.

Further web-based ATI management system makes the information flow quicker and more accessible and institutional system is more centralized and easier to keep updated. Also ATI system is needed for all parties involved in education – parents, student, academic and non-academic staff in ATIs and parent interest usually is to have a better and quicker way to communicate with academic staff of their children or the ATI administration. They get more involved as they can get up-to-date information about the ATI events, student results and attendance instead of the current annual system. As well as administrators apply their knowledge of hit and miss approach in scheduling classes which

wastes manpower and much time unnecessarily that does not utilize the current technology.

It is different from course or Learning Management Systems (LMS) as ATIs have different needs towards learning process in social manner as well as the educational structure has some nuances compared to general education Institutes [2].

3. Problem Statement

It is very important to have web-based system in academic institutions, which have the will to renew knowledge and experience of their staff to face issues coming under the manual system conducted by institutes. activities are performed via these systems and gained advantageous. One of the big reasons in increasing using rate of web-based system is requirements to these kinds of systems in parallel with developments in the information technology.

Advanced Technological Institute (ATI), Galle is one of the ATIs functioning under the Sri Lanka Institute of Advanced Technological Education in Sri Lanka.

The major problem is currently there is no proper database or ATI management system software and all the documentation work is done manually but computers and internet facilities are available there. In this sense, what are the factors that are found from the application domain which are cause to implement web-based ATI management system are all the documents handled manually by the ATI. So, there are lots of causes challenged by the institute's conducive academic environment. Such as, higher expenditures for stationary each year, they need large space to keep these documents, less secure for important documents, spend time to seek information of students and difficult to make analysis, less communication capabilities causes, weak relationships between parents and lecturers ,parents are not aware of their child's progress, character certificates and educational qualification certificate issuing system is very complex, time consumable and hasn't proper data repository.

Actually, it is decided to provide complete solution for the above problems from this study and also this system can be used for any required education institute and it can be run within the same interface. In the related web-based management system, a institute

can be defined and all academic and administrative processes of these institutes can be managed with the help of developed System.

Thus, designing and implementing a web-based ATI management system can be proposed as a solution for the manual system that satisfy the needs of modern education community.

4. Requirement Analysis

The objectives of this system will be able to efficient and effective accessing the web, access details of academic and other information quickly, access the information of student and results of examination, access the up-to-date information such as time table, attendance, personnel details, accurate reports of Management Information System, efficient ways of communication and reduce paper-based activities.

In addition to that system provides useful tools to decrease the routine tasks which could be automated. As well as by implementing software to manage ATI routing works, lecturers and administrators can save time and have a good overview of resources. It saves a lot of time for the people involved in analyzing of the ATI performance as all statistics are presented automatically. Another ATI specific is the need to involve parents more in the process of their child's education. Some ATI management systems are web-based to provide access from any computer with an internet connection with no additional software installation. The management of the software is more centralized and easier to keep updated.

Additionally, create web-based ATI management system to upgrade management skills, supervision and the design of intervention programmers by policy-makers and educators to improve the efficiency and quality of the education system.

Further implementation of the proposed software is evaluated in terms of cost, it is seen that the cost of software is approximately half of a typical traditional and formal education cost [3]. On the other hand, interactive education feature of web-based management system and up-to-date content presenting function

should also be considered. So, design and implement a web-based ATI management system and provides dedicated access to ATI office staff, lecturers, students and parents.

5. Development Methodology

The methodology used is Rapid Application Development (RAD) among several other methods available. System development lifecycle follows requirements planning, user design, construction and cutover phases. User design is a continuous interactive process that allows users to understand, modify and eventually approve a working model of the system that meets their needs. Beynon-Davies (1999) [4], pointed out that as the project has to be delivered within a short period of time with strict deadlines, it is needed to multiple the activities in parallel.

Rapid application development (RAD) is a software development methodology that uses minimal planning in favor of rapid prototyping. The "planning" of software developed using RAD is interleaved with writing the software itself. The lack of extensive pre-planning generally allows software to be written much faster, and makes it easier to change requirements.

It is flexible and adaptable to changes, it can handle large projects without a doubt and realizes an overall reduction in project risk. Rapid application development is a method that is used in prototyping and iterative development. Considering following functionalities and non-functional requirements, Rapid Application Development method is used to develop the problem domain.

By introducing the new system, the total operation of the institute related to students, academic and nonacademic operations will be automated. All the necessary initialization activities will be done by the staff initially. Students can view all the information related subject matters and their carrier development actives and their performance. Academics can view their profile, lecture room, student information and tracking student progress within one second. Administrator people can generate each and every report and certificates using the proposed system.

The proposed system will be developed as a web-based product that can be accessed everyone in the world. Also, parent can access this website for getting the information of their child and communicate through SMS. It will consist of several components

that are mostly independent of each other. Hence each component will be a system of its own that can be added or removed from the system without affecting the behavior of the overall system.

Content management system is an outstanding solution for small or middle-sized business as well as for intranet or community websites. After comparing functionalities of WordPress, Drupal, Joomla, Umbraco, Pligg, Joomla is used for the problem domain.

Joomla is a free and open source content management system (CMS) for publishing content on the World Wide Web and intranets and a model-view-controller (MVC) Web application framework that can also be used independently [5].

Joomla is so much more than just a powerful content management system. With the list of features" Out of the Box". User Management, Media Manager, Languages Manager, Banner Management, Contact, Polls, Search, Web Link, Content, Menu, Templates, Web services Management and Powerful Extensibility. According to Vinay (2015) [6], Joomla keeps content in its database to provide dynamic formatting. Therefore Joomla is the selected CMS for the problem domain.

In this section, identifies analysis of problem domain and listed the identified functional requirements. The proposed system provides the following details of functional and non-functional requirements.

- Functional requirement
 - a) Student registration process- Students administration staff register student after considering their application and interview. Once the students are selected, student and their parent information are entered to the system and registration numbers will be issued. Then the administrator has privileges to edit, delete, modify and add student to the system.
 - b) Login process-Academic staff, student and parent registration process includes issuing the user id and password. Username and password will be needed to login their user account and view the personnel details and others. User can change their password but cannot

change their user name

- c) Maintenance of student attendance- Lecturers are responsible for collecting attendance. Semester wise attendances are collected from the system. Before complete this module, Administrator should feed ATI lecture ring days per month. Reports of students in attendance are generated by the system semester wise.
- d) Student extracurricular activity records- If students are joining any extracurricular activities all the information could record in this module. Responsible person for these activates will be feed this information to the system and parents and lecturers can be track every detail.
- e) Evaluating of lecturers- Subject wise analysis of the results of students is done by the system. Subject wise result sheets can be generated from the system and report can be generated considering marks ranges. Graphical representation of this result can be view from the system.
- f) Leave-Attendance of Staff enters to the system and progress report will be generating monthly. Lecturers can view their attendance and report of granted leaves. Annual report can be generated from the system.
- g) Issuing of certificates- Students can apply the educational certificates. System administrator can obtain the detail by entering registration number of student and can generate character certificate and educational certificates.
- h) Parent communication- Parents can access system by entering their username and password. They can be viewed progress of the student, they can view homework given by the lecturers and attended extracurricular activities. Parent can view SMS messages send by the lecturers from their mobile phone. These messages can be individual message for parent about their student, common message for whole class or semester wise examination results.
- Nonfunctional requirements
- a) Usability-The web page will be designed in a way of user friendly. The user should be able to navigate, search and work easily. There should be security in the system. The system will follow user interface guidelines on color

schemes, logos, and fonts. Online support option will be well documented and helpful. The database system should be invisible to the user.

- b) Reliability-The system will have the ability to detect specified faults.
- c) Performance-The administrator will be able to add new information to the system easily. The system will be able to be extended to store more products. The system's response time should be reasonable. Platforms supported Windows XP and Linux.
- d) Security-The system architecture is a secure web-based application using standard server-side scripting and database technologies providing back.

5.1 Methods of data collection

Requirement capturing includes interview. All the key peoples in the system are considered and interview conducted with the director, discussion with the lecturers, subject clerks who maintain the information of students and staff. Those interviews are guided to tracking information of their education management system and areas. Documents and journals are referred. Previous projects and sites are analyzed and also the current system is observed.

6. Results and Discussion

Evaluators of software should address the (1) content, including quality, depth, and tests; (2) interface, including ease of use, navigation, text quality, graphics, and sound; (3) interactivity, including feedback, sequence, and questions; (4) customer-related issues, including entry level/technical requirements, motivation, backwash, and management; and (5) support, including online and off-line help. Iterative and prototype development of rapid application development methodology address above criteria in development stages and section addresses the usability evaluation of the system. A heuristic evaluation [7] is a usability inspection method for computer software that helps to identify usability problems in the User Interface (UI) design. It specifically involves evaluators examining the interface and judging its compliance with recognized usability principles (the "heuristics").

Jacob Nielsen (1994) mention that Heuristic Evaluation is the basis for usability evaluation which was carried out with a sample of users by means of a carefully designed questionnaire which can be found in following table.

In this study a web-based ATI management system, which was designed and implemented to be used for documentation work, is described. It is an analysis of the feedback and evaluation of this system hsa to be carried out by showing prototype to the client and getting their feedback. Evaluation can be considered in two ways. One is an evaluation of the prototype of the system and the other is the evaluation of the entire project. The developed prototype system has been tested since at the beginning of 2019. Up to now, no disruption has been observed in both system and the database of ATI. Any educational institution which uses this database design, can be integrated to the developed system easily. So, result measurement, understand whether the program is effective or not, understand the impacts of the project and can determine which activity need to change in order to improve the effectiveness of the

#	Questions	Excellent	Good	Fair	Bad
1	Is the level of language that the program offers clearly indicated?	23	5	2	0
2	Is it easy to start the program?	20	6	3	0
3	Is the user interface easy to understand?	21	8	1	0
4	Is it easy to navigate through the program?	25	3	2	0
5	Are icons that are used to assist navigation (e.g. back to the homepage, exit) clear and intelligible?	23	5	2	0
6	Do your work is easy to do with new system?	22	4	4	1

program.

7	Are you satisfied with the available features?	21	7	1	0
8	Fulfill all are your requirements?	22	8	0	0
9	If the program includes pictures, are they relevant, an aid to understanding?	24	6	0	0
10	Parent lecturer communication through SMS is usable function?	24	4	2	1
11	Sufficient reporting and data analytical facilities available in the system	23	7	0	0
12	Reduce the effort of developing office documentations	21	2	6	0

Table 1: Source: Survey Sample profile, 2019

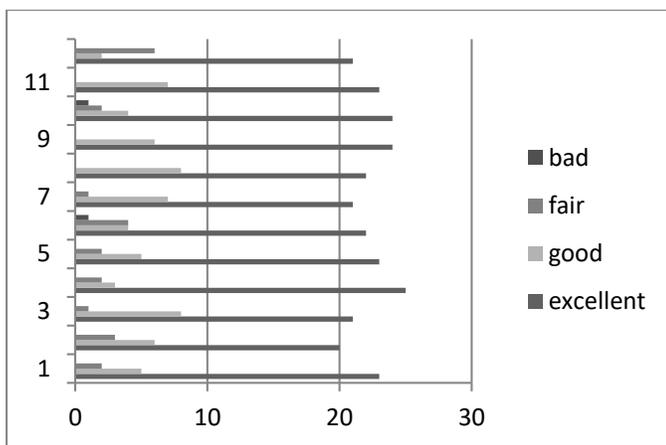
Summary of all the data collected from the 30 clients relevant to the twelve questions and they are shown in Table 1. Descriptive analysis of collected data from 30 respondents in ATI Galle, by using frequency distribution mean, mode, median, standard deviation and variance.

Table 1:Source: Descriptive statistic of finding, 2019

#	Attribut es	N	Mea n	Media n	Mod e	Std. Deviatio n	Varianc e
1	User satisfacti on	30	22.42	28	11	1.505	2.265

As can be seen from table 2 by evaluating mean value, most respondents are high satisfied with the system. As well as respondents have devoted 28.41 mean values and lowest standard deviation value (1.505) on accuracy, relevance of the information they provided. In addition to that figure 1-line chart response the result graphically.

Figure 1:Source: Survey data, 2019 User feedback



7. Conclusion

The aim of this study is to design and implement a web-based software solution to address the current problems and difficulties which have arrived due to the use of manual system. Thus, this study began by analyzing the present manual system and finding out the problematic areas of the system, and then designed a better automated system that covers the problematic areas found in the present system. To get the necessary information interviews had to be conducted with the academic and nonacademic staff. Finally proposed system was developed and implemented based on this information.

This is one of the plus points to select CMS as core system, because there is no client-side program to install or no special configuration is needed for the client-side computers. Also, the menu and the interface design and the structure of the new system helps user to catch the functionalities of the software in less time period.

All the core features and data required to the ATI are built with the system and automated them. Data management of students, report generating and certificate issuing processes are significant modules in this system. Data shift from year to year is automated. When the administrator sets next year, student's classes shift to upper class and individual changes can be done referring the data entering interface.

All the core features and data required to the ATI are built with the system and automated them. Also, data analytical facilities are available in new system and it is forward for this problem in a user-friendly manner. Finally conclude that the information system is efficient and effective to the subjected client.

Any software tool is not perfect tool for any problem. Time to time the requirements will change, the technology will change, the problem domain will change, etc. So according to the changing environment, the software should be changed to meet the new requirements. That is why new versions of the software is released with new features in built into it.

On the other hand, research opens the door to some future development such as review customization, analysis of open source software packages, developed complete system using PHP Language, customer handling and database management which make the application of fully complete web-based management system.

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