The Development of Malaysia ICT Subject School Based Assessment Management System (SBAMS4ICT)

A. A. R. Hadi, M. S. Fadzuli, and M. Z. Fairuz, *Member, IACSIT*

***Abstract*—Curriculum Development Division (CDD) has introduced Information and Communication Technology (ICT) in 2006 as an elective subject for Malaysia Education Certificate. The Malaysia Examinations Syndicate (MSE) designed the assessment instruments based on the syllabus released by the CDD. Anyhow, the management of the assessment records by assessor on ground is still on manual effort. Assessor need fill in same data into different forms. Records need to be bind in a ring file (student's portfolio), and placed in the locked and secured place. Increase assessors' workload, tendency to writing error, time consuming, not updated records, and a few to mention the weakness of this approach. For that regard this project is proposed and the prototype of School Based Assessment Management System for ICT Subject has been developed. The requirements needed have been identified and the prototype development has employed Agile System Development Methodology. By using a Test Script method has tested the functionalities of the prototype. System evaluation has utilized Perceived Usefulness and Perceived Ease-of-Use instruments. The system prototype has enable assessors to manage assessment records easily compared to manual approach. School admins would have capability to monitor the assessment progress. Students will have a copy of their progress notified through email.**

***Index Terms*—Assessment system, school management system.**

I. Introduction

The introduction of ICT as an elective subject in Malaysian secondary schools provides a valuable training ground for students [1]. The Malaysia Examinations Syndicate (MES) designed the assessment instruments based on the syllabus released by the Curriculum Development Division (CDD) [2] Coursework assessment must be completed within the stipulated time and candidates are required to plan and carry out their coursework under the guidance and supervision of their assessors. Assessors must verify candidates' coursework using forms provided by MES Monitoring by external verifiers will be carried out within the duration during which the coursework is being implemented. Internal verifier will verify the implementation of the coursework. The score then will be sent to State Education Department.

The school Examination Secretary will enter the score into MES portal. Schools must keep these forms for at least six months after the announcement of the SPM results. All coursework must be kept according to procedure and specification. Schools must also provide a suitable place to keep the candidates' documents. Normally, the documents will be placed in the locked cabinet and located in the computer laboratory. Schools are responsible to provide all the equipment required for the assessment implementation [2].

Manuscript received August 21, 2012; revised November 18, 2012.

Abdul Hadi Abdul Razak and Mohd Fairuz Zayadi are with the School of Multimedia Technology & Communication, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia (e-mail: ahadiar@uum.edu.my).

Mohd Fadzuli Saad is with the School of Computing, Universiti Utara Malaysia, 06010 Sintok, and Kedah, Malaysia (e-mail: fadzuli@uum.edu.my).

II. Current Scenario

Wherever assessors are those who are teaching an ICT subject. They are responsible in managing the records related to the subject. In managing students' coursework assessment records, assessors must fill the score for every aspect assessed in the following forms: (1) Assessment Checklist Form (ACF), (2) Individual Score Form (ISF), and (3) Batch Score Form (BSF). Then, the external verifier must verify candidates' coursework using the provided forms for products and reports (ISF) [2]. Assessor must submit candidates' coursework portfolio and completed assessment forms, ISF and BSF to the internal verifier. On manual effort, it could lead to increasing assessors' workload, tendency to writing error, time consuming and not updated records.

Norma [3] said, until now, there is no such system provided by MES to help assessors in managing ICT Assessments' records. Zabida [4] added, mostly, assessors use their own approach in managing students' assessment records and progress. Application software, such as Microsoft Office Word or Excel is among the prominent tools used in managing those records. Candidates don't have a copy of their progress on coursework assessment since the documents need to be securely stored by assessor [5] School administrators, as an internal verifier only have a chance to monitor assessment progress based on report provided by assessors during curriculum meeting. When it comes a time for them to verify the ISF and BSF, it's too late for them to comment or give any opinion [6].

III. Significant of Research

SBAMS4ICT is intended to help assessors in performing their task instead of utilizing manual effort in managing coursework's assessment record which is prominently known have lots of weaknesses. Furthermore, school admin will be able to continuously monitor the progress of the assessment implemented by assessors and students. As for students, their assessment update will be able to be notified through their registered email. Since there is no management system been

developed to manage ICT Assessment's records, this project could be made as a reference for any organization intended to develop similar system.

IV. System Scope

Although the system is intended to provide a useful management system for assessor in managing students' assessment record, some other users are also considered as those who will get the benefit from the development of this system. There are three group of users are able to access the system; Administrator, School Admin and Assessor. Administrator is responsible to create School Admin's account for each school offering ICT subject; and managing the users and schools records. The username for School Admin is utilizing a school code since it's uniquely identifying each school's record. School Admin access the system by using the created account and will be able to monitor the ICT assessment progress of their school. Furthermore, the individual detail progress of the student could be printed out.

Assessor needs to register in order to make a use of the system. Upon registration, the system will automatically approve the assessor. Anyhow, assessors are only able to make a full use of the system after their role been assigned by an Administrator. Assessor's role provides a capability to the assessors in managing their students' details and scores. The system prototype is capable to generate Individual Score Form (ISF), Batch Score Form (BSF), Record of Submission (ROS) and Coursework Portfolio (CWP) based on record entered by the assessor. Assessment Checklist Form (ACF) and Report Form (RF) are excluded from system management since these forms are considered as evidences, which need to be filled in by handwriting.

The system prototype enables assessors to send notification email to their students regarding assessment progress update. As for this prototype, the email will be send to a local host repository. Administrator is capable to assign students to other assessor whenever students transfer to another school in Kedah which offering ICT subject as well.

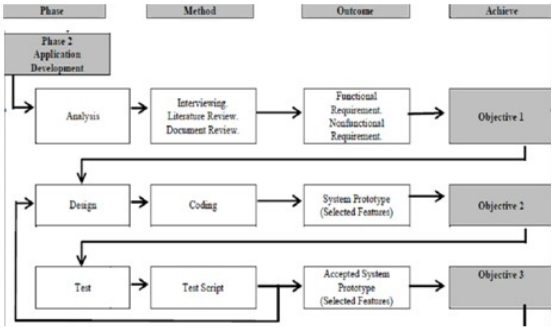

Fig. 1. Extracted research framework for application development phase.

V. Prototype Development and Finding

Development phase was an important part for this project. This part determine wheter the problem statement that has been stated in the ealier phase been answered or instead. In this phase, three (3) sub-phases involved; analysis, design and testing. This project looked deeper into every sub-phases. Every sub-phase has its own methods and outcomes as shown in Fig. 1. This figure shows the outcomes for every sub-phases in application development phase. There are three sub-phases; analysis, design and test.

A. Analysis

The purpose systems analysis sub-phase is to build a logical model of the new system. The first step was requirements modeling, where investigation on business processes and document been implemented in order to gather information on what the new system must do to satisfy users. To understand the system, fact-finding has been performed using three (3) methods; interviewing, literature review and document review. Fact finding results is used to build business models, data and process models, and object models. The outcome for the systems analysis sub-phase is the system requirements document. The system requirements document describes user requirements and outlines alternative development strategies.

Utilizing the input from interviewing session, reviewed literature and document, researcher has determined the requirements and came out with the requirement definition. The requirements definition defined what the system is to do [7]. The requirement definition have been documented using UML notation by presenting list of requirement, use case diagram, use case specification, activity diagram, sequence diagram, and class diagram.

B. Design and Development

The next sub-phase is design. The purpose of the systems design sub-phase is to create a physical model that will satisfy all documented requirements for the system. At this stage, the interface has been designed and necessary outputs, inputs, and processes been identified. In addition, selected internal and external controls, including computer-based and manual features also been designed to guarantee that the system will be reliable, accurate, maintainable, and secure. During the systems design sub-phase, the application architecture also been determined, which researcher used to transform the logical design into program modules and code. Then, the new system prototype is constructed. Programs are written, tested, and documented. Afterward, the selected feature prototype is ready to be tested.

The ASP.Net provide an impressive innovation called master pages, enabling the creation of reusable page templates [8]. Using a master page, the layout for website pages, complete with all the usual details such as headers and menu bars been defined. Once this structure been formalized, the master page could be used throughout a website, ensuring that all pages have the same design. Users can then surf from one section to another without noticing any change. The only changes is on the content place holder, where it will shows the contents for selected menu.

Navigation is a fundamental component of any website. Although it's easy enough to transfer the user from one page to another, creating a unified system of navigation that works across an entire website takes more effort. ASP.NET has a built-in navigation system that makes it easy. The site map model using *SiteMapDataSource* lets the researcher define the navigation structure of the website and bind it directly to

rich controls. ASP.NET includes a set of navigation features that you can use to dramatically simplify the task. Fig. 2 shows the design of navigation structure for the developed system prototype.

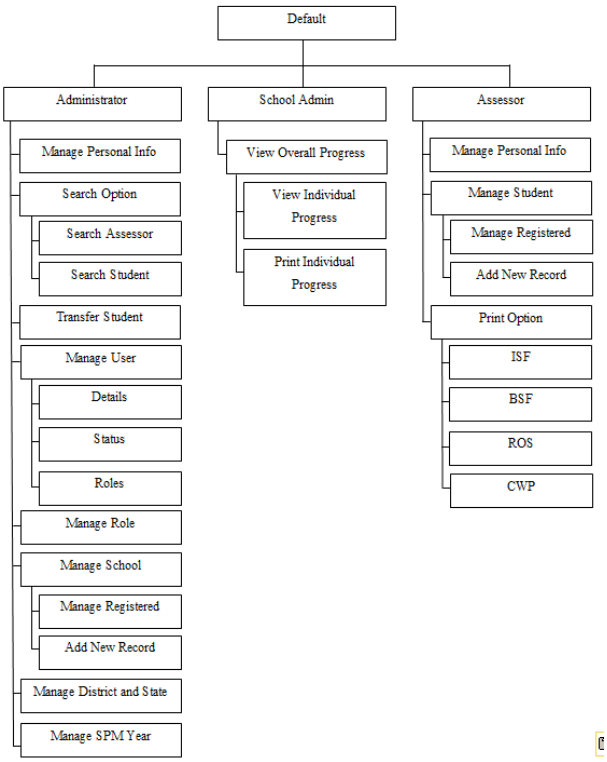

Fig. 2. Navigation structure.

Meaningful menu placed on the left side of the page. The menu is based on roles assigned to the user. Once logged in, user would only navigate the menu provided based on roles assigned. This option been implemeted using security trimming in ASP.NET.

Almost every piece of software ever written works with data. In fact, a typical web application is often just a thin user interface shell on top of sophisticated data-driven code that reads and writes information from a database. Often, website users aren't aware (or don't care) that the displayed information originates from a database. The most common way to manage data is to use a database. Database technology is particularly useful for business software, which typically requires sets of related information [9].

Visual Web Developer has everything you need to get started with SQL Server [10]. As for this project, Microsoft SQL Server 2008 Management Studio has been used to create the *aspnetdb* database which automatically include the table needed for membership and role management. This provider is actually used to handle the users' registration and role assignment capability for the system prototype. Then the created database has been integrated and altered using Microsoft Visual Web Developer 2010 Express. Here, the additional table been added in order to store any intended data and record for the system prototype.

To enable researcher work efficiently with the data in this system prototype, ASP.NET offers set of data-aware controls, called the data-bound controls [11]. The use of this data-bound control is to display and edit data on developed system prototype. Visual Web Developer 2010 Express been used as the Integrated Development Environment for this system. Codes have been written for creating a database connection, displaying data and managing resources.

Whenever users access the system, they will be prompted with the anonymous default page. Here, user has the option either to login or to register for a new account. As for administrator, the account has been created during development phase. Any additional administrator (if needed) could be implemented later on by assigning administrator's role to intended user. As for the school admin, their account need to be created by administrator utilizing school code as the username. New assessor need to register their account first.

Then the administrator will assign an assessor's role to the newly registered assessor. Whenever the role been assigned, the assessor would be able to utilize the assessor option in the system. Once role has been assigned to the registered user, they would be able to log into the system and use the system based on the assigned role. All users use the same login page. Anyhow, the content displayed after the succesful login will be vary based on their role.

C. Testing

Testing is intentionally to determine whether the system operates properly within expectations. Additionally, user involvement in testing sub-phase is also critical to avoid any misunderstanding about what the new system will do and how it will do it. Test Script is used to perform the functionality test on the system. Errors found have been rectified. The outcome from this sub-phase is the accepted selected features prototype of the School Based Assessment Management System for ICT Subject.

Test Script has been handed over to the users and they were asked to test the functionality of the system. Four (4) personnel from two (2) different school took part on this test. From SMK St. Michael, Alor Setar, there were one (1) school admin and one (1) assessor. Anyhow, the assessor from SMK St. Michael actually is the personnel whose been assigned by Kedah State Education Department as the Head Assessor for ICT Subject in Kedah. So, she was implementing the Test Script as an administrator as well. The other two (2) personnel are from SMK Guar Chempedak. One (1) assessor and one (1) school admin. Table I summarised the functional requirement tested.

TABLE I: NUMBERS OF FUNCTIONAL REQUIREMENT TESTED

Respondents	Number of functional requirement tested
1 Administrator	46
2 School Admins	8
2 Assessors	29

D. Evaluation

PUEU test has been implemented when the developed selected features prototype has been tested and finalised. The evaluation phase took place in SMK Guar Chempedak, during a two (2) days briefing on the current year assessment implementation by Kedah State Education Department with the participation of teacher from all school in Kota Setar district. Fifteen (15) assessors, four (4) school admins from a different school and one (1) administrator has been selected

to evaluate the system developed. The questionnaire is distributed after they were asked to use the system prototype on their own under researcher's observation and guidance. Most of the evaluators are the first degree holder graduated from local university. 53% are male 47% are females evaluators. All assessors and administrator are from IT/ICT background, but as for school administrators, mostly from business administration and education academic background. More than 50% of the assessors have been in academic field for more than 10 years. All of assessors have been teaching ICT Subject for more than 3 years.

Evaluation result been used to determine whether the developed system prototype, fullfilling the disignated objectives or not. PUEU consist of twelve questions with seven scale from unlikely to likely. To analyze the PUEU test, the descriptive analysis has been used by utilizing Microsoft Excel 2010 application software. With this descriptive analysis the median and mode for the evaluation have been generated. Evaluation results has been divided into two (2) sections, The first section asked for demographic information and the other section asked about users' perceive toward developed system prototype. As for second section, it's been divided into two (2) parts. The first part is to grasp users' perceive on the usefulness of the system, contains six (6) questions, and the next part to get the information regarding users' perceive on ease-of-use of the system, contains six (6) questions as well.

Table II and Table III show users' respond for the evaluation phase. As for the PUEU test, a 7-point Likert Scale anchored by "Unlikely" (1) and "Likely" (7) was used. Scale 1 to Scale 3 showing users' level of disagreement, Scale 4 showing their neutrality, and Scale 5 to Scale 7 shows the level of their agreement. Based on the result, all users show their agreement on the usefulness and ease-of-use of the developed system prototype.

TABLE Ⅱ: PERCEIVE OF USEFULNESS RESULTS FROM PUEU TEST

	Disagreement			Neutral	Agreement		
	Strong	Mostly	Merely		Merely	Mostly	Strong
	1	2	3	4	5	6	7
Q1					15% (n=3)	50% (n=10)	35% (n=7)
Q2					35% (n=7)	45% (n=9)	20% (n=4)
Q3					45% (n=9)	45% (n=9)	10% (n=2)
Q4					10% (n=2)	65% (n=13)	25% (n=5)
Q5					5% (n=1)	55% (n=11)	40% (n=8)
Q6						35% (n=7)	65% (n=13)

n=20

The only differences are the level of their agreement. 65% users strongly agreed that the system is useful in their task implementation. This result shown in the finding on the Question 6 where the item tested is "*I would find the system useful in my job*". By comparing the level of their agreement on Perceive Usefulness, most response are on "Mostly" agree scale. As for Perceive Ease-of-Use, most of the users are agreed on the question asking for system's ease-of-use characteristic. This is shown by the result for Question 7 and Question 12 where 75% and 55% of them agreed on the questions asked.

TABLE Ⅲ: PERCEIVE EASE-OF-USE RESULTS FROM PUEU TEST

	Disagreement			Neutral	Agreement		
	Strong	Mostly	Merely		Merely	Mostly	Strong
	1	2	3	4	5	6	7
Q7						75% (n=15)	25% (n=5)
Q8					10% (n=2)	65% (n=13)	25% (n=5)
Q9					45% (n=9)	35% (n=7)	20% (n=4)
Q10					25% (n=5)	50% (n=10)	25% (n=5)
Q11					15% (n=3)	45% (n=9)	40% (n=8)
Q12						55% (n=11)	45% (n=9)

n=20

VI. CONCLUSION

This study gave an impact to the several party that involved in the developing a management system. From this project, researcher found that the most effected person is the developer and the Ministry of Education. The expectation from this project is, there will more usefull management system developed in order to assist and help assessors on the ground implementing their task. This is a must since the burden shouldered by teachers nowaday is on increasing pattern. Hopefully the prototype could promote the benefit of using ICT in educational management.

REFERENCES

[1] Curiculum Development Division, "Sukatan pelajaran kurikulum bersepadu sekolah menengah," *Information and Communication Technology*, Kementerian Pelajaran Malaysia, 2006.

[2] Malaysia Examination Syndicate, "Sijil pelajaran malaysia information and communication technology (3765/2)," *Coursework Assessment Manual for ICT*, Kementerian Pelajaran Malaysia, 2007.

[3] *Personal Communication with Norma Ahmad, Sekolah Menengah Guar Chempedak*, February 22, 2012.

[4] *Personal Communication with Nur Zabida Hussin*, February 22, 2012.

[5] *Personal Communication with Husniza Mohamad*, February 24, 2012.

[6] *Personal Communication with Mohamad Norazman Kadir*, 24, 2012.

[7] A. Denis, B. H. Wixom, and D. Tergarden, "Systems analysis and design with UML Version 2.0: An object oriented approach." River Street, Hoboken: John Wiley and Sons, Inc. 2007.

[8] M. Matthew, M. Dan, and F. Adam, *Pro ASP.NET 4 in VB 2010*, 3rd Ed, New York: Apress, 2010.

[9] M. Matthew, *Beginning ASP.NET 4 in VB 2010*, New York: Apress, 2010.

[10] D. Christian, B. Wyatt, and P. Tim, "Build Your Own ASP.NET 4 Website Using C# & VB, 4th Ed," VIC Australia: SitePoint Pty. Ltd., 2011.

[11] S. Imaar, "Beginning ASP.NET 4 in C# and VB," *I*ndianapolis, Indiana: Wiley Publishing, Inc. 2010.

Abdul Hadi Abdul Razak received the Bachelor of Information Technology (BIT) in 2001 from the Northern University of Malaysia. In 2004, he earned Master of Science (MSc) in Computer Science; from Universiti Teknologi Malaysia He was born in Gombak, Selangor. Currently he is a Lecturer at the School of Multimedia Technology and Communication (SMMTC), Northern University of Malaysia, Sintok, Kedah. He has joined the school since March, 2004. Among the positions that he earned in SMMTC and university are Co-curriculum Instructor, Vice Principal of Students Residential Hall, and Coordinator for Multimedia. His research interests focus on Human Computer Interaction, Computer Game, Web Programming and Multimedia technology. Among his achievement in research includes bronze medalist from Seoul International Invention Festival (SIIF), 2011, silver medalist from MTE, 2011, bronze medalist from ITEX, 2010, and silver medalist from MTE, 2010. He also has obtained several professional certificates such as Apple Certified Support Professional (ACSP) 10.6, Adobe Certified Expert (ACE) Adobe Flash CS4, and Adobe Certified Expert (ACE) Adobe Dreamweaver CS3.

Mohd Fazudli Saad received the Bachelor of Information Technology (Management) in 2001 from the Universiti Malaya. In 2012, he earned Master of Science (MSc) in Information Technology; from Universiti Utara Malaysia. Currently he is a Teacher at Malaysia government secondary school. His interest is in building IT related system for school management and keen in doing research in IT related fields.

Mohd Fairuz Zayadi received the Bachelor of Multimedia (BMM) in 2006 from the Northern University of Malaysia. Currently he is a Tutor at the School of Multimedia Technology and Communication (SMMTC), Northern University of Malaysia, Sintok, Kedah. He has joined the school since April, 2008. His research interests focus on Web Programming and Multimedia Technology.