



# Development and Analysis Report Information System Quality Web-Based Student Learning Outcomes at SMK Negeri 1 Banyumas

**Avidah Amalia Zahro**

Engineering and Information Faculty, State University of Yogyakarta, Indonesia

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## ABSTRACT

The purpose of this study was to develop an information system for reporting student learning outcomes at SMK Negeri 1 Banyumas, knowing the level of quality of the information system reporting student learning outcomes based on quality testing in accordance with ISO 25010 standards. The method used in this study was Research and Development (R&D). The development of this information system is carried out in 4 stages according to the waterfall method, namely the analysis stage, the design stage, the coding or implementation stage and the testing stage. The results of this study are 1) a web-based student learning outcome report information system developed with the Codeigniter 3.0 framework. and has the main features to import, manage, print, and display student report cards. 2) the test results show that the information system has met the ISO 25010 standard in aspects (1) functional suitability runs 100% and has a value of X=1; (2) performance efficiency can load pages in 3.2 seconds, PageSpeed performance of 94% (grade A) and YSlow of 90% (grade A); (3) usability, the percentage value is 84.69%; (4) security, with the level of vulnerability to attacks at level 1 (low); (5) reliability, with 100% session, hits and pages results; (6) maintainability has a maintainability index value of 68.28; (7) portability ran successfully on 5 different desktop browsers tested without error. PageSpeed performance of 94% (grade A) and YSlow of 90% (grade A); (3) usability, the percentage value is 84.69%; (4) security, with the level of vulnerability to attacks at level 1 (low); (5) reliability, with 100% session, hits and pages results; (6) maintainability has a maintainability index value of 68.28; (7) portability ran successfully on 5 different desktop browsers tested without error. PageSpeed performance of 94% (grade A) and YSlow of 90% (grade A); (3) usability, the percentage value is 84.69%; (4) security, with the level of vulnerability to attacks at level 1 (low); (5) reliability, with 100% session, hits and pages results; (6) maintainability has a maintainability index value of 68.28; (7) portability ran successfully on 5 different desktop browsers tested without error.

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## Corresponding Author:

Avidah Amalia Zahro,  
Engineering and Information Faculty,  
State University of Yogyakarta, Indonesia  
Jl. Colombo Yogyakarta No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia.  
Email: [avidahzahro@gmail.com](mailto:avidahzahro@gmail.com)

## 1. INTRODUCTION

The Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System emphasizes that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength,

self-control, personality, intelligence, noble character, and skills needed by the community, nation and state. Education cannot be separated from the interaction between students and teachers at school. Simply put, the teacher provides knowledge, skills and a commendable example of attitude, while students receive the knowledge, skills and imitate what the teacher has exemplified. "The teaching and learning process must go both ways" (Chatib, 2011: 27).

In the 2013 curriculum, teaching and learning activities consist of introduction (orientation, apperception, motivation), core learning (observing, asking, doing, associating, communicating) and closing (conclusion, feedback, assignment, next material). One of the main parameters for the successful implementation of the 2013 Curriculum is the achievement of learning effectiveness by achieving student learning objectives optimally according to graduate competency standards. To determine student understanding, the teacher carries out an evaluation of learning outcomes as outlined in a valid and objective assessment of student learning outcomes. Assessment of learning outcomes serves to monitor student progress, monitor learning outcomes and detect the need to improve student learning outcomes in accordance with graduate competency standards or methods for teachers in the following semester. The results of interviews with resource persons, Mr. Drs. Kuswandi, M.Si as the deputy principal of the curriculum section at SMK Negeri 1 Banyumas, processing grades at SMK Negeri 1 Banyumas at this time has not been able to detect the need for improvement in learning outcomes based on competence.

Based on the Regulation of the Minister of Education and Culture Number 66 of 2013 concerning Education Assessment Standards article 1, for its application "the assessment of student learning outcomes at the primary and secondary education levels is carried out based on national education assessment standards that apply nationally". Meanwhile, educational assessment standards are criteria regarding mechanisms, procedures, and instruments for assessing student learning outcomes (Permendikbud, 2013: 4). The results of teaching and learning activities are in the form of assessments reported in a report card, as one of the educational services. The report card is a book that reports the progress of student learning outcomes based on the results of the teacher's assessment within a certain time. All teacher assessment results will be used as material for compiling report cards submitted by the organizers of teaching and learning activities as reports to students and parents/guardians of students. The results of the assessment listed on the report card are a summary of the final assessment of all activities.

According to Mr. Drs. Kuswandi, M.Si, he stated that the data processing system for student scores was not fully computerized. The procedure carried out is the teacher fills out the student assessment sheet with the Ms. application. Excel according to the subject being taught, then the homeroom teacher receives a student assessment file from each subject teacher after that the homeroom teacher recaps and processes the grades of certain students in a separate file. After that, the data is saved, the report card is ready to be printed and shown to students and their parents/guardians at the time of submitting the report card. At the beginning of the new semester, students are asked to return a report card to their home teacher for each class. However, sometimes the condition of the report cards that are returned is wrinkled or dirty.

At this time, many online report cards applications for educational institutions have developed, because if you only rely on files stored on computers, there is a possibility that data is lost due to viruses, damaged hard drives or accidentally deleted. Online report cards can be applied in schools, but if done in full it will reduce the essence of receiving report cards, such as the results of an interview with Drs. Kuswandi, M.Si, he also stated that receiving student report cards is an important moment where homeroom teachers can meet and establish friendships with parents/guardians of students. It is important for all parents to make their children's teachers as friends and cooperation of two parties absolutely must occur (Chatib, 2011: 59).

The progress of science in the field of information technology is very rapid, so that access to the information needed is getting faster and easier with the support of technological devices. Technological devices can assist in processing data appropriately which makes information useful for the recipient. An agency requires information that can be accessed quickly and accurately, so that a leader can immediately make decisions for the sake of the continuity of his agency. Processing student grades requires a system that can process, store, review and distribute information efficiently. Software quality is defined as a software process to produce products that are useful for developers and users (Pressman, 2010: 5). The number of software products on the market with different qualities,

A software can be said to be of quality if it meets the standards that have been set. One of the international standard software quality testing models is the ISO 25010 model which includes aspects of functional suitability, performance efficiency, usability, security, reliability, compatibility, maintainability, and portability. "The ISO 25010 standard was developed to replace ISO 9126 based on the evolution of ICT enabling the development of new application systems, which in turn required different quality properties" (Veenendaal, 2014: 4). Based on the description of the problems above, we need an application as a solution, namely a web-based student learning outcomes report information system. The goal is to make it easier for users to process the value of student learning outcomes.

## 2. RESEARCH METHOD

The research method used is the Research and Development (R & D) research method. Sugiyono (2015: 26) in his book mentions "research and development (R & D) methods are research methods used to produce new product designs, test the effectiveness of existing products, and develop and create new products". Researchers develop web-based information system software for student learning outcomes reports. This information system development model uses the waterfall model.

**Development Procedure** The software development process using the Research & Development method refers to the rules of software engineering Pressman (2010) regarding the steps in software development, namely as follows:

### Analysis Stage

At this stage, the developer performs a problem analysis and needs analysis. Problem analysis by identifying various problems and looking for solutions to the problems found. Meanwhile, the needs analysis to determine the needs of the software to be developed. The analysis is carried out by observing similar software that already exists, conducting surveys and interviews with related parties, as well as conducting literature studies as support. The needs that need to be analyzed are:

- a) **Functional requirements** Functional requirements can be defined as requirements related to functions that can be run or can also be called features that will be provided in software development.
- b) **Development needs** Development needs are the requirements needed during the development process, which is meant here, namely the requirements in the form of software and hardware along with their minimum specifications.
- c) **User needs** User needs can be seen from software that is trending or in great demand, you can also conduct several surveys tailored to user targets, benefits and requests.
- d) **Data needs** Data requirements are about what data will be used in software development, can be in the form of image data, text, sound, animation and video. Usually the data is packaged in the form of a database or can also be directly entered into the program code.

### Design Stage

After conducting the analysis, the next stage is the design stage. At this stage, the developer has started to create UML diagrams and their relationships and create designs or assets needed, such as storyboards, paper prototyping, video mockups, and interface designs. The UML diagrams used are use case diagrams, sequence diagrams, activity diagrams and classes. diagram. The model design made in this study only focuses on the design of the data and interface models.

### Implementation Stage

At this stage, the implementation process takes place which translates the designs that have been made into lines of program code. Lines of program code are arranged to form parts of the system into a single unit which is later referred to as software. The program code is created using development software that has been adapted to the needs.

### Testing Stage

After the product has finished the implementation phase, it goes to the testing phase. Testing is done by blackbox and whitebox testing. "Blackbox testing focuses on the functional requirements of the software" (Pressman, 2010: 597). In addition, blackbox testing attempts to find errors in function, interface, data structure, performance, initialization and termination (Pressman, 2010: 597). Meanwhile, "whitebox testing is based on a careful examination of procedural details" (Pressman, 2010: 587). In line with this, another definition of whitebox testing is a test case design philosophy that uses the control structure described as part of the component ranking design to generate test cases (Pressman, 2010: 558). In this study, blackbox testing was carried out to test the functions,

performance and error checking on information systems from the developer and media expert side. Whitebox testing to test information systems to users with test cases After blackbox and whitebox testing, product quality measurements are carried out to determine whether or not the product is suitable for use in accordance with ISO/IEC 25010 standards, namely aspects of functional suitability, performance efficiency, usability, security, reliability, compatibility, maintainability, and portability. The media used for testing are questionnaires that are distributed to a sample of users who are the target of the product for the usability aspect and three media experts for the functional suitability aspect. In addition, software tests conducted by developers are also used to test the quality of the software from the aspects of performance efficiency, reliability, security,

### 3. RESULTS AND DISCUSSIONS

The web-based student learning outcome report information system has gone through a series of software development processes starting from the analysis, design, implementation to testing stages. The analysis phase is in the form of needs analysis, analysis of hardware and software used in the development and analysis of the minimum specifications to run the system. The design phase includes the design of UML design, database design and interface design. UML design is illustrated by use case diagrams, activity diagrams, sequence diagrams and class diagrams. The implementation phase uses Notepad++, XAMPP and Browser. The results of the implementation are then tested using blackbox, whitebox and stress testing techniques. The test is reviewed for quality based on the ISO 25010 standard which takes aspects.

#### Description of Trial Data

The trial data in this study were 30 samples consisting of 20 students and 10 teachers at SMK Negeri 1 Banyumas who acted as users. The study was conducted in May 2016 to collect respondent data by conducting an information system demo and filling out questionnaire data.

#### Software Quality Analysis

Aspects of Functional Suitability Functional suitability testing was carried out by 3 expert web developers, namely Ika Kusumawardani, S.Kom as IT staff at PT. Indonesia Power, Arya Wicaksana as a programmer at Rajashopping and Harjisito Dani Putra, S.Kom as a freelance web developer.

Performance Efficiency Aspect Testing the performance efficiency aspect using online tools from GTMetrix. The standard value given is from the range A to F with an average percentage of 79% seen from the PageSpeed Score and YSlow Score rules.

Table 1. Information System Test Results Student Learning Outcomes Report

No	Aspek	Hasil	Kategori
1	<i>functional suitability</i>	Seluruh fungsi dalam sistem dapat berjalan dengan baik dan tidak terjadi kesalahan	Baik
2	<i>performance efficiency</i>	Persentase PageSpeed sebesar 94% (A) dan YSlow sebesar 90% (A).	Grade A
3	<i>usability</i>	Hasil pengujian <i>usability</i> diperoleh persentase sebesar 84,69%	Sangat Layak
4	<i>security</i>	Tingkat kerentanan terhadap serangan berada pada level 1 atau "Low".	Sangat Baik
5	<i>reliability</i>	Pengujian dengan 20 <i>virtual user</i> dalam 10 menit dengan keberhasilan 100% untuk <i>session</i> , <i>pages</i> dan <i>hits</i>	Sukses
6	<i>maintainability</i>	Hasil perhitungan dari nilai <i>maintainability index modul controller</i> dan <i>model</i> sebesar 68,28 yang menunjukkan hasil normal untuk dirawat	Sedang
7	<i>portability</i>	Sistem dapat berjalan dengan baik dan tidak terjadi kesalahan pada lima jenis <i>browser</i> yaitu Internet Explorer, Google Chrome, Mozilla Firefox, Opera dan Safari.	Baik

#### 4. CONCLUSION

Based on the results of research and discussions that have been carried out, it can be concluded that, The development of an information system for student learning outcomes using the waterfall software development model and the Codeigniter framework. The waterfall development model consists of 4 stages, namely, needs analysis, design, coding and testing. The Codeigniter framework uses the MVC concept of models, views and controllers in its implementation. This research produces a web-based application that helps manage student learning outcomes reports at SMK Negeri 1 Banyumas. The application has the main features for importing, managing, printing, and displaying student report cards. The information system for student learning outcomes at SMK Negeri 1 Banyumas was tested based on the ISO/IEC 25010 software quality standard. In terms of functional suitability, the system has met the standard because the function runs 100%.

In terms of performance efficiency, the system has met the standard with an average page load time of 3.2 seconds and a PageSpeed performance measurement of 94% (grade A), YSlow of 90% (grade A). In the usability aspect, the system has met the standard with a user approval level of 84.69% which is categorized as very feasible. In the security aspect, the system has met the standard with a level of vulnerability to attack level 1 or which means a high level of security. In the aspect of reliability, the system has met the standard criteria with 100% session, hits and pages results. In terms of maintainability, the system has met the standard with a maintainability index value of 68.28. In the aspect of portability, the system has met the standard criteria because it was successfully run on 5 types of desktop browsers that were tested without any errors.

#### REFERENCES

- Acunetix. (2015). Acunetix Web Vulnerability Scanner v10 Product Manual. [Online] Tersedia: <http://www.acunetix.com/resources/wvsmanual.pdf>. pada tanggal 4 Februari 2016, jam 03.04 WIB.
- A.S, Rosa., & Shalahuddin, M. (2011). *Rekayasa Perangkat Lunak*. Bandung: Modula. Arief, M. R. (2011). *Pemrograman Web Dinamis menggunakan PHP dan MySQL*. Yogyakarta: Andi Offset.
- Azis, F. (2005). *Object Oriented Programming dengan PHP5*. Jakarta: Elex Media Komputindo.
- Chatib, M. (2011). *Gurunya Manusia: Menjadikan Semua Anak Istimewa dan Semua Anak Juara*. Bandung: Kaifa.
- Chatib, M. (2012). *Orang tuanya Manusia: Melejitkan Potensi dan Kecerdasan dengan Menghargai Fitrah Setiap Anak*. Bandung: Kaifa.
- Coleman, D. et al. (1994). *Using Metrics to Evaluate Software System Maintainability*. The Institute of Electrical and Electronics Engineers, Inc. Hlm.44-49. EllisLab. (2016) Model-View-Controller. Diakses dari [http://www.codeigniter.com/user\\_guide/overview/mvc.html](http://www.codeigniter.com/user_guide/overview/mvc.html). pada tanggal 01 Februari 2016, jam 23.32 WIB.
- EllisLab. (2016). *Welcome to CodeIgniter*. Diakses dari [http://www.codeigniter.com/user\\_guide/general/welcome.html](http://www.codeigniter.com/user_guide/general/welcome.html). pada tanggal 01 Februari 2016, jam 23.32 WIB.
- Guritno, S. Sudaryono. Rahardja, U. (2009). *Theory and Application of IT Research*. Yogyakarta: Andi Offset.
- Hidayatullah & Kawistara. (2015). *Pemrograman Web : Studi Kasus Web Sistem Informasi Akademik*. Bandung: Informatika.
- Hutahaean, J. (2014). *Konsep Sistem Informasi*. Yogyakarta: Deepublish.
- Kadir, A. (2003). *Dasar Pemrograman Web Dinamis Menggunakan PHP*. Yogyakarta: Andi Offset.
- Kristanto, A. (2003). *Perancangan Sistem Informasi dan Aplikasinya*. Yogyakarta: Gava Media.
- Kukreja, N. (2015). *Measuring Software Maintainability*. Diakses dari <https://quandarypeak.com/2015/02/measuring-software-maintainability/> pada 20 Oktober 2016, jam 02.02 WIB
- Kumar, S. (2015). *Digital Marketing Using Google Service*.
- Chennai India: LocSea Software Inc. Lépine, JF. (2015). *How to understand the PhpMetrics' metrics*. Diakses dari <http://www.phpmetrics.org/documentation/how-to-understandmetrics.html>. pada tanggal 19 Oktober 2016, jam 23.00 WIB.
- Lund, A. M. (2001). *Measuring Usability with the USE Questionnaire*. [Online] Tersedia: <http://documents.mx/documents/measuring-usability-with-theuse-questionnaire.html>. pada tanggal 4 Februari 2016, jam 06.03 WIB.

- Nielsen, J. (2012). Usability 101: Introduction to Usability. Diakses dari Nielsen Norman Group: <http://www.nngroup.com/articles/usability-101-introduction-to-usability/> pada tanggal 13 Oktober 2016, jam 11.06 WIB.
- Niranga, S. S. (2015). *Mobile Web Performance Optimization*. PACKT Publishing. Nugroho, A. (2011). *Perancangan dan Implementasi Sistem Basis Data*. Yogyakarta: Andi. Peraturan Menteri Pendidikan dan Kebudayaan Nomor 53 Tahun 2015 tentang Penilaian Hasil Belajar Oleh Pendidik dan Satuan Pendidikan pada Pendidikan Dasar dan Pendidikan Menengah. Peraturan Menteri Pendidikan dan Kebudayaan Nomor 66 Tahun 2013 tentang Standar Penilaian Pendidikan.
- Prasojo, L. D. dan Riyanto. (2011). *Teknologi Informasi Pendidikan*. Yogyakarta: Gava Media.
- Pressman, R. S. (2010). *SOFTWARE ENGINEERING: A Practitioner's Approach*, 7th ed. (REKAYASA PERANGKAT LUNAK – BUKU SATU, Pendekatan Praktisi Edisi 7). Penerjemah: Adi Nugroho, et al. Yogyakarta: Andi. Puntambekar, A. A. (2007). *Software Engineering*. India: Technical Publication Pune.
- Purwanto. (2009). *Evaluasi Hasil Belajar*. Yogyakarta: Pustaka Pelajar. Rasydin, H. & Mansur. (2009). *Penilaian Hasil Belajar*. Bandung: Wacana.
- Rumbaugh, J., Booch, G., & Jacobson, I. (1998). *The Unified Modeling Language Users Guide*. Pearson Education, Inc., Addison-Wesley.
- Rumbaugh, J., Booch, G., & Jacobson, I. (2005). *The Unified Modeling Language Reference Manual 2nd ed*. Pearson Education, Inc., Addison-Wesley.
- Schalles, C. (2012). *Usability Evaluation of Modeling Languages*. Wisbaden: Springer Gabler.
- Sommerville, I. (2003). *Software Engineering 6th ed*. (Rekayasa Perangkat Lunak edisi 6). Penerjemah: Yuhilza Hanum. Jakarta: Erlangga.
- Stair, R. M., & Reynolds, G. W. (2010). *Principles of Information Systems A Managerial Approach 9th ed*. Boston: Course Technology. Sugiyono. (2015). *Metode Penelitian Research and Development*. Bandung: Alfabeta.
- Sutarman. (2003). *Membangun Aplikasi Web dengan PHP dan MySQL*. Yogyakarta: Graha Ilmu.
- Tahaghoghi, S., & Williams, H. E. (2007). *Learning MySQL*. Sebastopol: Oreilly Media Inc. Tim Penyusun. (2015). *Panduan Penilaian pada Sekolah Menengah Kejuruan*. Jakarta: Direktorat Pembinaan SMK. Undang-undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional.
- Veenendaal, E. V. (2014). *Testing Experience*. Germany: The Magazine for Professional Testers.
- Weinman, W. E. (2001). *Web Design for Programmers, Part 1: Fundamentals*. Pearson Education, Peachpit. Hlm.1-8.
- Welker, K. D. & Oman, P. W. (1995). *Software Maintainability Metrics Models in Practice*. *Journal of Defense Software Engineering* 8. Crosstalk (11 November/Desember 1995). Hlm.19-23.
- Whitten, J. L., Bentley, L. D., & Dittman, K. C. (2004). *Systems Analysis and Design Methods 6th ed*. (Metode Desain dan Analisis Sistem edisi 6). Penerjemah: Tim Penyusun ANDI. Yogyakarta: Andi.