Abstract—The development of Outcome Based Education (OBE) Information System is done as a solution to academic problems related to the achievement of graduate learning for students. In addition, the OBE system is a form of effort to improve academic quality in order to be able to monitor and measure the development of student learning outcomes in a college study program. The Outcome Based Education system includes all grades processing based on Course Learning Outcomes which is related to Graduates Learning Outcomes so that the outcomes of each student can be measured. This information system is developed by the Rapid Application Development method, and uses the Yii2 Framework with the concept of MVC (Model, View, Controller) where system programming is separated based on application components, such as: manipulating data, controllers, and user interfaces. The use of the RAD method and the Yii2 Framework in making applications can be done quickly and in a structured manner making it easier for future developments. The developed system has been successfully tested and applied in the Electrical Engineering Study Program, Civil Engineering Study Program and Mechanical Engineering Study Program, and planned to be implemented in all study programs of the Faculty of Engineering, Sebelas Maret University. This information system can be applied not only in the engineering faculty of Sebelas Maret University but also outside the university which requires an information system to measure the learning outcomes of graduates.

Keywords—Information System, Yii2, Outcome Based Education

I. INTRODUCTION

The information system is a component that connects, collects, processes, stores, and distributes information to support decision making and supervision in an organization [1]. The use of a computerized system is expected to minimize errors made by humans and can streamline the time to complete work quickly and accurately [2]. In addition, a computerized system can function as a data manager to present interactive and communicative information [3].

Meanwhile, there are currently not many output-oriented learning methods and have not even been implemented in Indonesia, but this learning system has been implemented in various countries. Outcome Based Education (OBE) is a learning method that provides a foundation for what students should do. In OBE, learning outcomes or outcomes are identified first then planning learning methods and assessments are adjusted according to the outcome [4]. By adopting an output-oriented learning method and system, it is hoped that it can improve the quality of education, especially in the Electrical Engineering Study Program, Sebelas Maret University and in general in Indonesia.

The Outcome Based Education Information System using the Yii2 framework with the MVC concept (Model, View, Controller) can separate applications based on application components, such as: data manipulation, controllers, and user interfaces [5]. So that model components are easier to implement, test, and maintain, because all access to the model goes through these components. The main purpose of developing using a framework is to help developers work on applications faster. In addition to using the Yii2 Framework, this information system development uses the Rapid Application Development (RAD) method.

The development of the Outcome Based Education Information System is a form of effort to support the needs of the Electrical Engineering Study Program at Sebelas Maret University so that it can monitor the achievements of all students. This system consists of an achievement processing system per subject which contains the value of each Electrical Engineering student.

II. RESEARCH METHOD

A. Software Development Method

The method used in the development of the OBE (Outcome Based Education) Information System is the RAD (Rapid Application Development) method. RAD is a software development model that emphasizes a very short development cycle.

The reason for using the RAD method is because the application designed and developed is a simple application and does not require a long time. This is in accordance with the objectives of the RAD model, namely to shorten the time between designing and implementing information systems [6].
Fig 1. Information system development step

1) Requirement Plan
   a. Data and information requirements plan
   b. System user analysis

2) Workshop Design
   a. Entity relationship diagram (ERD) design
   b. Database design

3) Implementation
   a. Implementation and testing of information systems

B. Testing Method

In this study, the authors used black box testing techniques. Black box testing techniques are tests that are based on application details such as displays, functions on the system, and the suitability of the flow of functions with user needs. The purpose of this black box test is to find errors in function and output that are incompatible with the application program [7].

| No | Function         | Testing                                      |
|----|------------------|----------------------------------------------|
| 1  | Login Process    | Enter the account in the form of a username and password and inject the URL. |
| 2  | System Permissions | Inject URLs that are owned by other access rights and check the appearance and functions of the tasks that each permissions has. |
| 3  | CRUD Process     | Perform the process of create, read, update, delete from and to the database through the system being created. |
| 4  | KRS Import Process | Import KRS through excel files and check data in the database. |
| 5  | Grade Import Process | Import values through excel files and check data in the database. |
| 6  | CPL Evaluation Monitoring | Check monitoring calculations and display them in the form of radar charts and histogram graphs. |

TABLE II. SYSTEM PERMISSIONS

| No | Function         | Testing                                      |
|----|------------------|----------------------------------------------|
| 1  | Administrator    | Function                                         |
| 2  | Dosen            | Function                                         |

III. RESULT AND ANALYSIS

A. Design and Implementation of Internship and Final Project Management System

Implementation is done by writing program code (coding) according to the design that has been done. In the implementation section, a screenshot of the website page is displayed as a tool and material for research.

B. Software Testing using Black Box Method

1) Login Process

Login is done to find out whether the user can enter the dashboard page using the account they have.

2) System Permissions

Testing the system permissions function is carried out to find out whether the permissions are functioning according to their respective duties.
3) CRUD Process
CRUD function testing is done to find out whether the system can perform tasks create, read, update, delete from and to the database.

a. Create

Fig 2. Create Process

b. Read

Fig 3. Read Process

c. Update

Fig 4. Update Process

d. Delete

Fig 5. Delete Process

4) Import KRS File Process

a. KRS template file
Templates are downloaded from the system in the .xlsx extension. Each template has a unique code to differentiate files from one another.

Fig 6. KRS template file

b. Import Process
The system reads the unique code on the imported excel template, if the code is correct then the file will be processed by the system. Each student data is checked whether the NIM entered is in ref mahasiswa or not, this feature serves to reduce data entry errors. If the NIM is in the database, the student is entered into the broadcast course. The correct data will be entered into the database, then the student's NIM and broadcast courses are stored in the database in the form of ID. Data with errors are not entered into the database and will be given feedback to the user as "errors".

Fig 7. KRS Import Process

5) Grade File Import Process

a. Grade template file
Templates are downloaded from the system in the form of an .xlsx extension. Each template has a unique code to distinguish files from one another and contains data of students who take the broadcast course. The lecturer enters the value according to the CPMK amount listed on the template.

Fig 8. Grade template file

b. Import Process
The system reads the unique code on the imported excel template, if the code is correct then the file will be processed by the system. Each student data is checked whether the student entered takes the broadcast course or not, this feature serves to reduce data entry errors. If a student takes a broadcast course, the student's score will be checked whether the value entered matches the number of CPMK in the course. The correct data will be entered into the database, then the student's NIM and CPMK will be stored in the database in the form of ID. Data with errors are not entered into the database and will be given feedback to the user as "errors".
6) Monitoring Evaluation

CPL evaluation monitoring is broadly divided into two parts, namely monitoring the CPL evaluation for active students and monitoring the CPL evaluation for students with alumni status. In each monitoring evaluation consists of individual evaluation monitoring, monitoring evaluation per semester and monitoring evaluation per batch. In the implementation of CPL evaluation monitoring in this chapter, only CPL evaluation monitoring screenshots are displayed for active students because the monitoring display for alumni is not much different from the monitoring display for active students.

a. Transcript

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| NAME | Daniel Aquino Putra | | | | | | |
| YEAR | 2016 | | | | | | |
| MODULE | CRPAK | | | | | | |
| COURSE | | | | | | | |
| GRADE | | | | | | | |
| 1 | M3121209 | 90 | 90 | 90 | 90 | 90 | 90 |
| 2 | TKJ24085 | 70 | 67 | 65 | 60 | 60 | 60 |

b. Radar chart

![Radar Chart](image)

c. Grafik histogram

![Histogram Chart](image)

IV. CONCLUSION

The Outcome Based Education (OBE) information system was developed using the Yii2 web-based framework with the RAD (Rapid Application Development) method which includes the needs planning, workshop design and implementation stages. This OBE information system can display graduate learning outcomes in monitoring evaluation individually, per semester, per batch and monitoring evaluation for students who have graduated. The learning outcomes generated by this system can be one of the considerations for study programs to make policies related to student learning.

ACKNOWLEDGMENT

The team expressed the gratitude thanks to the Faculty of Engineering, Sebelas Maret University for providing financial and non-financial support and assistance in the development of this information system.

REFERENCES

[1] A. L. Yudanto, H. Tolle, and A. H. Brata, “Rancang Bangun Aplikasi Sistem Informasi Manajemen Laboratorium Biomedik Fakultas Kedokteran Universitas Brawijaya,” J. Pengemb. Teknol. Inf. dan Ilmu Komput., vol. 1, no. 8, pp. 628–634, 2017.
[2] I. Nugroho, “Sistem Informasi Penerimaan Siswa Baru Berbasis Web Dengan Php Dan Sql,” Database, vol. 6, no. 2, pp. 109–114, 2008, doi: 10.1615/CritRevPhysRehabilMed.v18.i1.10.
[3] H. Setya, “Penerapan Metode Load-Balancing Clusters Pada Database Server Guna Peningkatan Kinerja Pengaksesan Data,” Techno Nasa Mandiri, vol. IX, no. 1, pp. 97–108, 2013.
[4] H. Wahyudi and I. A. Wibowo, “Inovasi dan Implementasi Model Pembelajaran Berorientasi Luaran (Outcome-Based Education, OBE) dan Washington Accord di Program Studi Teknik Mesin Universitas Mercu Buana,” J. Tek. Mesin, vol. 7, no. 2, p. 50, 2018, doi: 10.22441/jtm.v7i2.4214.
[5] B. Siswa and D. Mvt, “Rancang Bangun Sistem Try Out Berbasis Paperless Untuk Evaluasi Hasil Belajar Siswa Dengan MVC,” vol. 6, no. 3, 2019, doi: 10.25126/jtiik.201961181.
[6] W. W. Widiyanto, “Analisa Metodologi Pengembangan Sistem Dengan Perbandingan Model Perangkat Lunak Sistem Informasi Kepegawaian Menggunakan Waterfall Development Model, Model Prototype, Dan Model Rapid Application Development (Rad),” J. Inf., vol. 4, no. 1, pp. 34–40, 2018.
[7] S. S. TIARA, “SISTEM INFORMASI GEOGRAFIS BERBASIS MOBILE UNTUK PENELUSURAN RUTE OPTIMAL TRANSPORTASI UMUM DI KOTA SURAKARTA DENGAN ALGORITMA A *,” 2016.