PBL Assessment Application Development Based on Microsoft Access

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Abstract. This research has the objectives of implementing PBL assessment that is carried out digitally by utilizing applications related to the PBL assessment application, making application prototypes that are easy to use in PBL assessments and testing application prototypes. This study uses a qualitative descriptive analysis method with data collection through interviews and research related to PBL assessment for course audits. The method for making application prototypes uses the SDLC method using Microsoft Access-based applications. The results of this study indicate that the prototype of the SIP-MB application is in accordance with the tests carried out such as; Black Box Testing, White Box Testing, Usefulness Analysis of the developed Application.

Keywords: Prototype, Application, SIP-MB, PBL.

1 Introduction

Batam State Polytechnic applies conventional learning methods from 2007 to 2018. Then from March 2020 until now, Batam State Polytechnic uses Project Based Learning (PBL) learning evenly in each department. PBL is learning that refers to constructivism theory. Namely, knowledge results from the achievement of students' scientific skills and attitudes obtained through real experience during the learning process [11]. In the PBL learning process, students need soft skills so that learning activities can be carried out optimally [2]. Soft skills are the ability of students to self-discipline, such as the ability to manage time and the ability to communicate with others [7]. Learning using the PBL method has a different assessment system from conventional learning methods. The PBL learning model focuses more on the assessment of soft skills, which is divided into two types of assessment: the review of life skills and the evaluation of learning skills.

The Batam State Polytechnic's Business Management (MB) Department has four study programs: the D4 Managerial Accounting Study Program, the D3 Accounting Study Program, the D4 Applied Business Administration Study Program, and the D4 International Trade

Logistics Study Program. Each study program in the MB department applies PBL learning for each subject they have.

PBL lessons in each course cause the assessment process to be complicated. This can happen because the MB majors still use Microsoft Excel-based manual assessment. This research has the objective to overcome problems regarding the PBL assessment system in the department that is not yet efficient and the need for a PBL assessment application prototype to meet that need through RPP which is a project implementation plan carried out with PBL by students and lecturers as project managers.

Fig. 1. RPP prototype PBL rubric assessment application.

With this request, the MB department provides human resources in the form of a PBL team from the Managerial Accounting Study Program to be able to develop a Microsoft Access-based PBL assessment system. The PBL team will produce output from a Business Management Assessment Information System (SIP-MB) application. The result is a SIP-MB application that is designed as efficiently as possible to be used by the user. In this application, we provide several features that make it easier for users to make an assessment. One of the features that we have designed is the option value feature, where lecturers do not need to make assessments manually like when using excel. The option value feature serves to facilitate lecturers in conducting PBL assessments. When a lecturer wants to conduct an assessment, only student data input is required, and a choice of PBL scores will be available to be used to conduct an assessment.

From the background above, there are several problems found by the author, namely: the demand for PBL assessment application needs from the Business Management department, the need for a prototype of an information system that makes it easier for users to input PBL assessments, and finally test whether the PBL assessment application prototype is feasible to implement. The author feels that the research problems raised need to be limited. This is so that research can be more focused, in-depth, and perfect. The author limits this research to only making SIP-MB applications using Microsoft Access. The subject used as a research sample is Auditing in the Managerial Accounting study program.

This study has several objectives: implementing PBL to meet the demands of the Business Management department regarding the PBL assessment application, making an easy-to-use assessment application prototype that is easy to use in PBL assessment input, and conducting a feasibility test of the assessment application prototype. In addition, several benefits are expected by researchers from this study. These benefits are: the SIP-MB application is an effective solution for PBL assessment in the Department of Business Management, the SIP-MB application can be used by all lecturers in the MB department in the future so that PBL assessment can be carried out efficiently, and finally this research is expected to be a means of in developing similar assessment applications, and can be used as a basis for reference for future research. Bruner. According to Bruner in Wiradintana (2018), the cognitive theory is a learning theory that prioritizes the learning process. A good learning process will determine the quality of a person's learning. Applying Bruner's theory will significantly help students understand the learning process. This process is what is meant by the cognitive revolution.

2 Literature Review

2.1 Project Based Learning

PBL is a learning method still relatively new in the development of education in Indonesia. In vocational colleges, PBL is recommended to be one of the best learning methods that can be applied [10]. Through the PBL method, students can have attitude skills, new insights, and other skills during learning [8]. In the PBL learning method, students are also trained to conduct authentic investigations, namely, to find real solutions to problems in project work. Students must be able to analyze and determine the problem, develop their assumptions and make estimates, collect and analyze information, make trials, and conclude the work results. Students can use the results of these authentic investigations to design and produce products that match the existing problems. PBL requires students to make products due to investigations[3].

2.2 Soft Skill

Based on research conducted by the Indonesian Ministry of National Education in 2009, it was stated that "85% of a person's success is determined by the soft skills they have". Soft skills are interpersonal attributes and personal qualities that include leadership, flexibility, initiative, productivity, communication, and professional ethics [5]. Research conducted by Harvard University also showed the same results. The study stated that 80% of a person's success is determined by how to control one's emotions. The study also confirmed that the ability to manage emotions also influences one's success apart from intellectual abilities [2].

2.3 Peer Evaluation

The MB department already has a template related to PBL assessments between students. Peer Evaluation, abbreviated as PE, is one part of the PBL assessment. PE is an internal quality control process of an institution. Assessment of a program is an internal quality control process for all higher education institutions [4]. Peer evaluation, also known as peer review, has proven to be a robust evaluation strategy with several advantages over classical methodologies. The

advantages of PE, for example, can facilitate an assessment of the development of student skills and capacity building of students gained from learning [12].

2.4 Microsoft Access

Software Development Life Cycle (SDLC) is the process of developing a software system using the development method used to create a previous software system based on well-tested practices [6]. The method that will be used is the waterfall development method. Where the waterfall method is a structured and sequential development method. According to Lucini et al. (2021), there are 6 (six) stages of SDLC, namely:

1) System analysis is an analysis of ongoing management performance.

2) System design is finding out what is needed in system development and planning a schedule to complete it.

3) System construction is carried out to develop information systems through the stages of making a performance management flow design and programming design.

4) System implementation is a stage in carrying out the functions of each system created.

5) System testing is a test of the system that has been made.

6) System maintenance is the implementation and maintenance of the system that has been created.

3 Research Methodology

In this study, there are several methods used by the author, namely:

1. Writing method
   In this study, the author uses a qualitative descriptive writing method, namely a method that aims to describe, describe, explain, explain and answer in more detail the problems to be studied by studying as much as possible an individual, a group, or an event [13].

2. Software Development Method
   The development of the SIP-MB application is carried out using the SDLC method with the waterfall model. Adapting from the research of Widarsono & Adhi Saputra (2017), the SIP-MB design applies the SDLC method with several stages, namely:

   1) Needs Analysis
      The stage of needs analysis contains research related to information system requirements. This research approach was obtained by interviewing lecturers in the MB department related to the PBL assessment process.

   2) System Design
      At the system design stage, starting with making a flowchart about the PBL assessment process in the MB department.

   3) Implementation
      At the implementation stage, it is done by creating a database on Microsoft Access to change the previously manual assessment using Microsoft Excel into the designed application.

4) Integration and Testing

The integration and testing stage takes three stages that must be passed, namely:

a. Black Box Testing

Testing Blackbox Testing is a method of testing software without having to pay attention to the details of the software [9].

b. White Box Testing

White box testing is a test of an application or software that is done by checking whether the code from the program created is correct [14].

c. Analysis of the usefulness of the developed prototype system

d. The analysis of the usefulness of the prototype system developed was carried out by interviewing users of the SIP-MB application with several questions that had been asked previously.

5) Maintenance

After the software can be used, the last process of the software development cycle is maintenance.

The making of the SIP-MB application prototype starts from April to June 2022, which starts from the stages of needs analysis, system design, implementation, integration and testing, and maintenance. The schedule for making a prototype of the PBL assessment application can be seen in Figure 2 below.
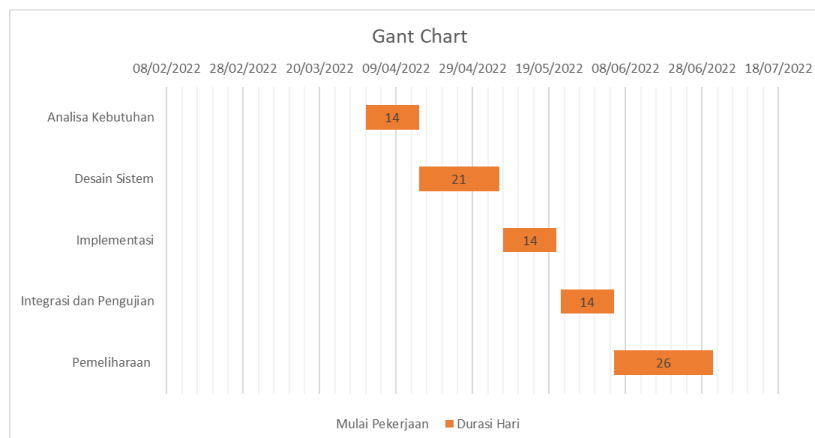

Fig. 2. Gantt chart SIP MB application development schedule.

4 Result and Discussion

The process of making the SIP-MB application uses the Waterfall model SDLC method. The stages of making SIP-MB using the waterfall model SDLC method will be explained as follows:

4.1 Needs Analysis

Documentation related to application design needs begins with the publication of the RPP document by the MB Department. At this stage, it aims to determine the needs of lecturers in the MB department. Furthermore, interviews were conducted with the head of the department secretary, 4 (four) heads of study programs, and 2 (two) lecturers of the Auditing course majoring in Business Management. From the results of interviews with a total of 8 people, 73% of lecturers needed a PBL assessment application, considering the importance of PBL assessment of the final score, while 27% of lecturers felt it was not too urgent. The percentage analysis of the needs for the PBL assessment application can be seen in Figure 3 below.
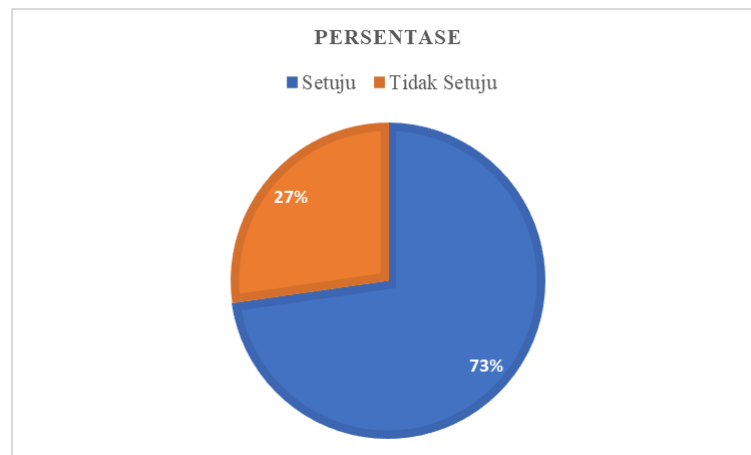

Fig. 3. Percentage of PBL assessment application needs analysis.

4.2 System Design

Designing the SIP-MB application system begins by analyzing the PBL assessment rubric in the MB department, which is still manual using Microsoft Excel. The next stage is to make a system design based on the assessment rubric in the MB department. In the design stage of this system, a collaboration between 4 related parties is needed, namely: 1) project managers who provide reports on PBL assessment results in Excel, 2) students who input assessments of fellow members via a google form, and 3) partners who provide student assessment data in Excel. With these data, lecturers of related subjects can input assessments on the SIP-MB application as shown in Figure 4, the flow of using the SIP-MB application below.
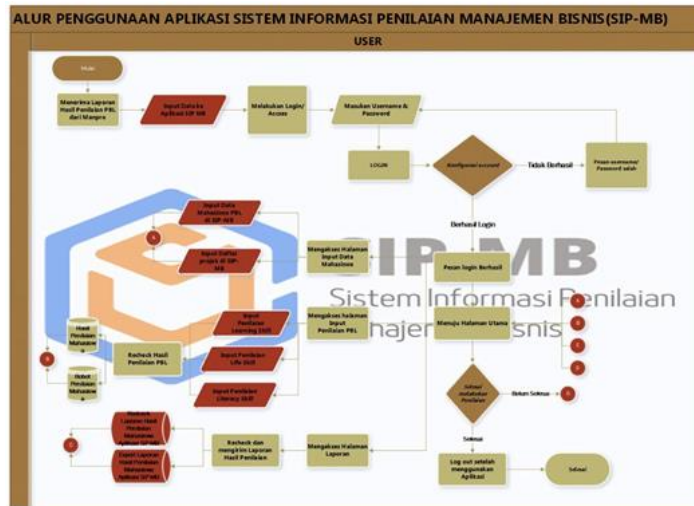
Fig.4. SIP MB application usage flowchart.

4.3 Implementation

The implementation of the SIP-MB application is to change the PBL assessment rubric, which initially still uses manual assessment with Microsoft Excel, to a Microsoft Access-based assessment application that can change the filling model and customize the form as needed. Based on the design made and then implemented into the SIP-MB application. The initial steps for creating a PBL assessment application in Microsoft Access are as follows:

1. Table Creation

   In making the SIP-MB application, a table is first created that serves as a place to accommodate the data to be processed. There are 9 (nine) database tables consisting of login tables, student data, project data, learning skill assessments, life skills assessments, literacy skills assessments, learning skills assessment weights, life skills assessment weights, and literacy skills assessment weights.

Table 1. Learning Skill Table Creation

Nama Tabel	Field Name		Data Type
Tabel 3-1(Penilaian Learning Skill	Primary Key	Nim	Large Number
		Nama Mahasiswa	Short text
		Kode Project	Number
		Subject Penilaian 1	Short text
		Nilai 1	Number
		Subject Penilaian 2	Short text
		Nilai 2	Number
		Subject Penilaian 3	Short text
		Nilai 3	Number
		Subject Penilaian 4	Short text
		Nilai 4	Number
		Subject Penilaian 5	long text
		Nilai 5	Number
		Total Learning Skill	Calculated

2. Query Creation

   Query serves to create a view of data from a table and combine several tables into one. There are 7 (seven) queries in the SIP-MB application.

3. Form Creation

   Making Forms in the SIP-MB application aims to make the data input page look more attractive than ordinary tables. Forms can be created using table data or queries that have been previously created and then designed as needed. There are 11 (eleven) forms in the SIP-MB application, namely:

   a. Main forms

   b. Student data form

   c. Assessment input form

   d. Report form

   e. Student data input

   f. Project data input form

   g. Assessment input form learning *skills*

   h. Assessment input form life *skills*

   i. Assessment input from literacy *skills*

   j. Assessment weight form Student assessment result form

4. Report generation
   Report generation in the SIP-MB application aims to create reports. The report is the result of student PBL assessment from the results of data processing from tables and queries that have been made previously. There are two stages in making a report, namely:

a. Click the table/query you want to make a report
b. After that, open the create menu in Microsoft Access and click the report icon
c. Test result

  After the application has been successfully created, the next step is testing the Microsoft Access-based PBL assessment application. Testing is carried out using several stages, namely:

  1. Black Box Testing

     The results of functional testing commonly referred to as Black Box Testing, begin when the system is first to run, from logging in to logging out of the SIP-MB application. It aims to test all the features of the SIP-MB application and show that the application can run properly.

  2. White Box Testing

     Structural testing of white box testing is carried out on the coding formula which aims to test the specified process flow and logic. There are 2 tests on the coding formula, namely the code builder and the macro builder. Code builder is coding that is done independently, while macro builder is a formula that has been provided in Microsoft Access.

  3. Usefulness Analysis of the developed Application

     The next stage is testing the user response, which aims to determine the usefulness of the Microsoft Access-based SIP-MB application. Testing is carried out by involving users of the SIP-MB application prototype. The users involved in this test are the head of the department secretary, four (4) heads of study programs, and two (2) lecturers of the Auditing course. The results of the use analysis of the application prototype are as follows:

     a) In general, the SIP MB application is easy to use

        The results of the convenience survey can be seen in the picture. From the survey results, six lecturers agreed regarding the application's ease of use. The lecturers feel that the SIP-MB application is easier to use than Microsoft Excel because excel requires caution in each input field, not to change the formula already in the department template.

     b) This application is beneficial in the PBL assessment process

        From the survey results, seven lecturers agreed with this application because it can help lecturers conduct assessments efficiently compared to using excel.

     c) The user interface (UI) of the SIP MB application is easy to understand

        From the survey results, six lecturers agreed that the UI was easy to understand by users. The UI of this application has an attractive color and appearance.

     d) Feedback regarding things that need to be added to this application

        From the results of interviews and surveys related to prototype analysis, seven lecturers answered that this application needed to be developed with several inputs, namely: 1) the expectations of the lecturers regarding this application can be applied in the odd semester of the 2022/2023 academic year, 2) holding socialization related to the use of the SIP application -MB and 3) this application is expected to be further developed into a web-based application
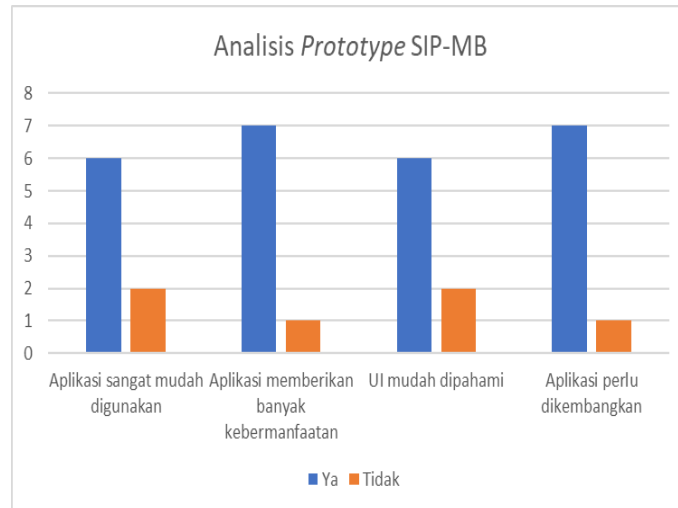
Fig.5. SIP-MB application survey results.

e) Maintenance

The SIP MB application is still in the prototype development stage, so the application's maintenance process has not been carried out.

5 Conclusions and Recommendations

Based on the background, problem identification, and discussion that have been written in the previous section, it can be concluded that:

1. With the request for a PBL assessment application from the MB department, a program was made Microsoft Access-based PBL assessment application called the SIP-MB application through PBL, which is carried out by 1 team consisting of 3 joint students from the Managerial Accounting study program. Making the SIP-MB application is designed for lecturers to input PBL student scores.

2. The need for a prototype of an information system that makes it easy for users to input PBL assessment is carried out through several stages using the waterfall model SDLC method. The design of the SIP-MB application begins with conducting a needs analysis followed by system design, implementation, integration and testing, and application maintenance. In addition, this application is also designed so that it is easy to use by lecturers as users.

3. Prototype resulting SIP-MB application has been tested on eight lecturers majoring in Business Management, with 73% answering that this application helps in the assessment with some suggestions for web-based application development.

Several inputs have been collected from the results of surveys and interviews with lecturers on the SIP-MB prototype, including:
1. The SIP-MB application is currently in desktop form and has not been integrated with the internet network. Through this research, the author hopes that the SIP-MB application can be developed again in the future.
2. There is a need for socialization among lecturers on applications that have been made so that they can be used in the upcoming 2022/2023 odd semester.

This assessment application will be even easier if it is used on the internet. In addition, the author also hopes that this assessment application will soon be developed with a web-based system. Development with a web-based system is expected to provide more significant benefits for lecturers in the MB Department and can also be developed again for other majors.

References

[1] Akbari, F., & Soepeno, B.: Penerapan Microsoft Acces Untuk Penjualan Barang Di CV Mega Prima Mandiri Mojosari Kabupaten Mojokerto. JAB Jurnal Aplikasi Bisnis, 3(1). pp.341 (2017)

[2] Anggraeni, I.: Profil soft skill siswa pada model pembelajaran Project Based-Learning (PjBL). (2017)

[3] Assidik, G. K.: Implementasi Pembelajaran Berbasis Proyek (Project Based Learning) pada Mata Kuliah Media Pembelajaran di Prodi Pendidikan Bahasa Indonesia Universitas Muhammadiyah Surakarta. Transformatika: Jurnal Bahasa, Sastra, Dan Pengajarannya, 2(2). pp.117. https://doi.org/10.31002/transformatika.v2i2.829 (2018)

[4] Constantinou, C., & Wijnen-Meijer, M.: Student evaluations of teaching and the development of a comprehensive measure of teaching effectiveness for medical schools. BMC Medical Education, 22(1). pp. 1–14. https://doi.org/10.1186/s12909-022-03148-6 (2022)

[5] Fernández-Arias, P., Antón-Sancho, Á., Vergara, D., & Barrientos, A.: Soft skills of American university teachers: Self-concept. Sustainability (Switzerland), 13(22). pp 1–25. https://doi.org/10.3390/su132212397 (2021)

[6] Firmansyah, Y., & Udi, U.: Penerapan Metode SDLC Waterfall Dalam Pembuatan Sistem Informasi Akademik Berbasis Web Studi Kasus Pondok Pesantren Al-Habib Sholeh Kabupaten Kubu Raya, Kalimantan Barat. Jurnal Teknologi Dan Manajemen Informatika, 4(1). https://doi.org/10.26905/jtmi.v4i1.1605 (2017)

[7] Manara, M. U.: Hard skills dan soft skills pada bagian sumber daya manusia di organisasi industri. Jurnal Psikologi Tabularasa, 9(1). pp. 37–47 (2014)

[8] Mayangsari, S. N.: Peningkatan hasil belajar mahasiswa dengan Project Based Learning (PjBL). LIKHITAPRAJNA Jurnal Ilmiah, 19(2). pp. 33–43 (2017)

[9] Ningrum, F. C., Suherman, D., Aryanti, S., Prasetya, H. A., & Saifudin, A.: Pengujian Black Box pada Aplikasi Sistem Seleksi Sales Terbaik Menggunakan Teknik Equivalence Partitions. Jurnal Informatika Universitas Pamulang, 4(4). pp. 125. https://doi.org/10.32493/informatika.v4i4.3782 (2019)

[10] Nurtanto, M., Nurhaji, S., Baser, J. A., & Yadin, Y.: Problem-Based Learning Implementation: Improvement in Learning Process and Results in Vocational Higher Education. Jurnal Pendidikan Teknologi Dan Kejuruan, 24(2). pp. 203–212. https://doi.org/10.21831/jptk.v24i2.19519 . (2018)

[11] Purwanto, A., Putri, D. H., & Hamdani, D.: Penerapan Project Based Learning Model Untuk Meningkatkan Sikap Ilmiah Mahasiswa Dalam Rangka Menghadapi Era Merdeka Belajar. Jurnal Kumparan Fisika, 4(1). pp. 25–34. https://doi.org/10.33369/jkf.4.1.25-34 (2021)

[12] Serrano-Aguilera, J. J., Tocino, A., Fortes, S., Martín, C., Mercadé-Melé, P., Moreno-Sáez, R., Muñoz, A., Palomo-Hierro, S., & Torres, A.: Using peer review for student performance enhancement: Experiences in a multidisciplinary higher education setting. Education Sciences, 11(2). pp. 1–21. https://doi.org/10.3390/educsci11020071 (2021)

[13] Sugiyono: Metode Penelitian Kuantitatif, Kualitatif dan R&D. PT Alfabeta, Bandung (2016)

[14] Suprapti, D., Kamisutara, M., & Artaya, P.: Analisa Pengujian Sistem Informasi Penjualan Menggunakan Metode White Box. Seminar Nasional Ilmu Terapan (SNITER). pp. 1–12 (2017)

[15] Wiradintana, R.: Revolusi Kognitif Melalui Penerapan Pembelajaran Teori Bruner Dalam Menyempurnakan Pendekatan Perilaku (Behavioural Approach). Jurnal Pendidikan Ekonomi Dan Ilmu Ekonomi Vol. 1. pp. 2549–2284 (2018).