Indonesian Journal of Community Engagement
Jurnal Pengabdian kepada Masyarakat
Vol. 11, No. 1, March 2025, Page. 30-35
DOI: http://doi.org/10.22146/jpkm.100850

The Development and Implementation of M-Edupayment: A Multi-Payment Platform for SMK Negeri 7 Bandar Lampung

Mugi Praseptiawan*, Meida Cahyo Utoro, Ilham Firman Ashari, Muhammad Habib Algifari, Aidil Afriansyah

Department of Informatics Engineering, Faculty of Industrial Technology, Institut Teknologi Sumatera, Lampung Selatan, Indonesia

Submitted: October 19th 2024; Revised: December 10th 2024; Accepted: January 15th 2025

Keywords:
Mini bank
Multi-payment education
Teaching factory

Abstract This community engagement activity aimed to develop a mini bank website, m-EduPayment, integrated with the iPaymu payment gateway as an Application Programming Interface (API). The project was implemented at SMK Negeri 7 Bandar Lampung. System development followed the Personal Extreme Programming (PXP) method, which included the stages of Requirements, Planning, Iteration Initialization, Design, Implementation, and System Testing. PXP, a variant of Extreme Programming, was specifically adapted for individual developers. The activity involved 31 respondents, consisting of 10th and 11th-grade students, who evaluated the system using the System Usability Scale (SUS) to measure its usability. Interviews with teachers (superadmins) and student administrators were also conducted to identify initial requirements and gather feedback on the system design. Data analysis utilized a Likert scale, where respondents rated various system aspects on a scale from 1 (strongly disagree) to 5 (strongly agree). SUS scores were calculated using standard formulas to determine a final score, which was then classified into usability categories. The average SUS score was 91, falling under the "Excellent" category (Grade A). The development of the mini bank website introduced new features, including online payment services for tuition fees (SPP), waste banks, and savings. System testing achieved a 99% functional success rate, demonstrating the platform's high usability in the school environment. Respondents provided overwhelmingly positive feedback, affirming the successful implementation and functionality of the website.

1. INTRODUCTION

SMK Negeri 7 Bandar Lampung implemented the teaching factory concept through the Mini Bank program as part of its efforts to enhance the competencies of accounting students (Praseptiawan et al., 2023). This program provided practical experience for students in managing financial transactions, such as tuition payments and student savings, while also introducing them to modern financial technology. The Mini Bank functioned similarly to a real bank within the school environment, allowing students to directly learn about financial management and basic banking services. The program was designed to equip students with skills relevant to the workforce while enabling them to apply the theoretical knowledge they had learned in the classroom.

The mini bank system used at SMK Negeri 7 Bandar Lampung had not yet functioned optimally due to the inadequate implementation of several key features. Features such as user data management, transaction activity logs, and login security were still limited, which hindered the system's functionality in supporting students' learning processes. Moreover, the absence of these essential features significantly affected the school's operational efficiency, particularly in managing tuition payments and student

ISSN 2460-9447 (print), ISSN 2541-5883 (online)
*Corresponding author: Mugi Praseptiawan
Department of Informatics Engineering, Faculty of Industrial Technology, Institut Teknologi Sumatera, Jalan Terusan Ryacudu, Ruang D105, Gedung D - Itera, Way Huwi, Lampung Selatan, 35365 Indonesia
Email: mugi.praseptiawan@if.itera.ac.id

savings transactions (Sari et al., 2023). As the demand for technology in education continued to grow, there was a pressing need for a system that could provide secure, fast, and integrated financial services. Without proper improvements, the system could not deliver maximum benefits to the school and students.

The development of the Mini Bank system was crucial to ensuring that financial transactions within the school environment could be conducted efficiently and securely (Maharditia, 2024). With the integration of the iPaymu payment gateway and enhancements to login security features, the system could offer a better user experience and support technology-based learning activities. The results of this development added value not only for students in practicing mini banking but also for the school in managing its finances more effectively.

2. METHOD

This community service activity was divided into two main tasks: (1) software development using Personal Extreme Programming (PXP), and (2) system evaluation using the System Usability Scale (SUS).

2.1 Software development using personal extreme programming

The development of the multi-payment platform followed the Personal Extreme Programming (PXP) approach, a variation of Extreme Programming tailored for individual developers. This method was selected for its flexibility in adapting to changing requirements without necessitating a complete restart of the development process. Personal Extreme Programming (PXP) is an adaptive software development methodology that emphasizes iterative processes and flexibility. It included stages such as requirements gathering, planning, design, implementation, and testing, all of which could be revisited as needed. PXP relied on skilled developers who had to clearly identify requirements and accurately estimate workloads to ensure the system's successful implementation. This method proved highly effective in accelerating project completion and improving organizational efficiency, making it suitable for IT-based application development. For instance, a study by Sulthoni et al. demonstrated the successful application of PXP in developing a meeting room reservation system for the Communication and Information Office of East Java Province [a]. The development process under PXP involved a series of structured stages, as shown in Figure 1, which ensured a systematic approach to achieving project goals.

The following is a detailed explanation of the stages involved in the Personal Extreme Programming (PXP) method:

1. Requirements
   In this stage, the developer gathered requirements through interviews and discussions with the client. The identified needs were documented in the form of user stories (Djamarullah & Kusuma, 2022).
2. Planning
   The developer planned and created a list of tasks to be performed in each iteration based on the collected user stories. These tasks were prioritized according to the order of the user stories and the estimated time for completion.
3. Iteration Initialization
   This was the initial stage where the tasks that would be the primary focus of the iteration were identified and selected.
4. Design
   During this phase, the system to be implemented in the iteration was planned and modelled. The design developed by the developer was based on the requirements gathered during the requirements collection phase.
5. Implementation This stage involved translating each design element into program code. The implementation process included three steps:
   I. Unit Testing: Ensuring individual components functioned as intended.
   II. Code Generation: Writing program code based on the design.
   III. Code Refactoring: Improving existing code for better efficiency and maintainability.
6. System Testing In this stage, the functionality of all system features was tested. The testing results were presented through unit testing and black-box testing. Further testing involved using the System Usability Scale (SUS) to validate user acceptance. Performance testing was also conducted to ensure that the software functioned well and met expected standards.

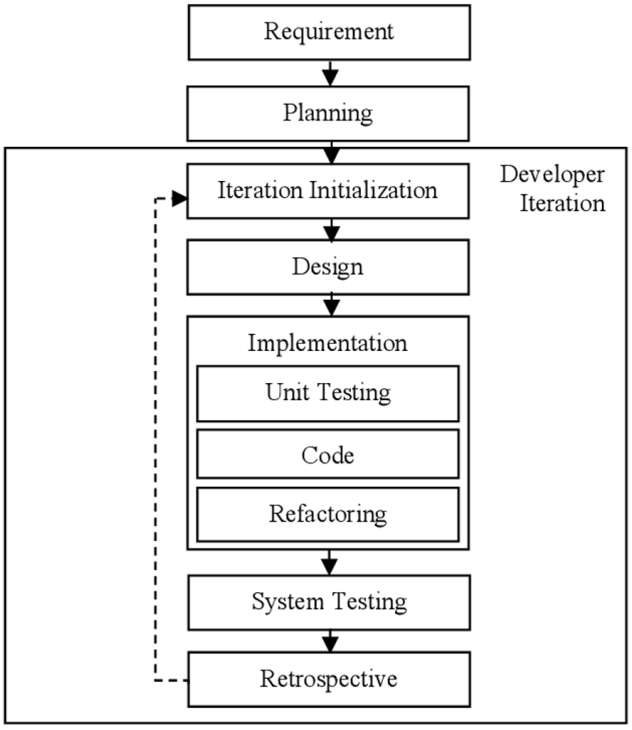

Figure 1 . Stages of the Personal Extreme Programming (PXP) method

Table 1 . System Usability Scale (SUS) Instrument

No.	Question	Scale				
		1	2	3	4	5
1	I think that I would like to use this system frequently					
2	I found the system unnecessarily complex					
3	I thought the system was easy to use					
4	I think that I would need the support of a technical person to be able to use this system					
5	I found the various functions in this system were well integrated					
6	I thought there was too much inconsistency in this system					
7	I would imagine that most people would learn to use this system very quickly					
8	I found the system very cumbersome to use					
9	I felt very confident using the system					
10	I needed to learn a lot of things before I could get going with this system					

2.2 System evaluation methods

The System Usability Scale (SUS) has been a widely used method for evaluating the usability of various systems and applications. Developed by John Brooke in 1986, SUS provided a reliable tool for assessing user satisfaction and system effectiveness through a simple questionnaire (Tuloli et al., 2022). This method had been applied in diverse contexts, including educational modules, management systems, and interactive applications, to measure user experience and identify areas for improvement. For instance, a study conducted by Desak et al., titled Usability Evaluation of a Database E-Module Using the System Usability Scale (SUS), reported an evaluation score of 80.7. This score indicated that the system was acceptable and fell into the "excellent" category for usability (Putra et al., 2024).

In its application, the System Usability Scale (SUS) employed a Likert scale ranging from one to five, where a score of 1 indicated "strongly disagree", 2 "disagree", 3 "neutral", 4 "agree" and 5 "strongly agree" (Table 1). Once the raw SUS data had been collected, the SUS score was calculated using Formula 1 to obtain the measurement results (Akbar et al., 2024).

$$SUS = ((A-1)+(B-5)) \times 2.5 \quad (1)$$

Description:

A = Odd numbered questions
B = Questions with even numbers

After obtaining the results of the calculation of the total score, the next calculation was to find the average of the entire SUS score using formula 2 below.

$$\bar{x} = \frac{\Sigma x}{n} \quad (2)$$

Description:

$\bar{x}$ = Average score
Σx = Sum of SUS scores
n = Number of Respondents

Furthermore, if the value was known from the calculation of the average SUS score, the results were categorized in Table 2.

Table 2 . Category final SUS score

Category Final SUS Score	Letter Grade	Rating
Above 80.3	A	Very good
Between 68 and 80.3	B	Good
68	C	Medium
Between 51 and 67	D	Bad
Below 51	F	Very Bad

3. RESULT AND DISCUSSION

3.1 Multi-payment software development

The outcomes of the community service activities were achieved through the development of multi-payment software. The following sections provide explanations of these activities.

1. Need Analysis
   The results of the system needs analysis were gathered through interviews with the school representatives, including teachers and administrative staff involved in the Mini Bank at SMK Negeri 7 Bandar Lampung, as found by Praseptiawan et al. (2023). The analysis revealed that key features such as user data management, transaction recording, payment processing, and login security were not functioning optimally. Additionally, the system required online payment integration to facilitate tuition and student savings payments.

2. Planning
   Based on the needs analysis, system development planning was carried out using the Personal Extreme Programming (PXP) method, where the development of persona supported the process (Djamarullah & Kusuma, 2022). The development tasks were organized into small iterations, with priority given to the most urgent needs, such as login security and the integration of the iPaymu payment gateway.

3. Interface design
   The system design comprised communication diagrams and transaction process flow diagrams, as well as the design of a database that supports Mini

Bank operations. Furthermore, the user interface (UI) design for both administrators and general users was developed with a focus on accessibility and ease of use (Figure 2).

4. Implementation
   During the implementation phase, the system was developed according to the design, starting with the development of secure login features, user data processing, and the integration of the iPaymu payment gateway. Each element was tested through unit testing and the refactoring process to ensure optimal code quality.

5. System testing
   Testing was conducted using Postman to ensure the API functioned correctly, as well as end-to-end (E2E) testing with Selenium IDE. The test results showed a 99% success rate, indicating that the system was operating effectively according to the specifications.

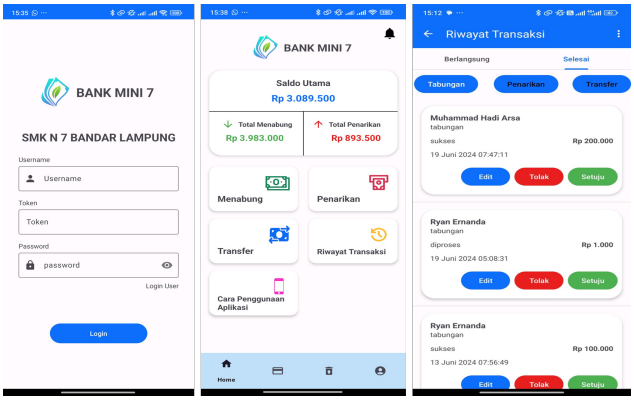

Figure 2 . Interface design of multi-payment software

3.2 Application evaluation with System Usability Scale (SUS)

The results of the usability evaluation using the System Usability Scale (SUS) method were obtained through assessments conducted with teachers, students, and educational personnel at SMKN 7 Bandar Lampung, as illustrated on Figure 3.

System Usability Scale (SUS) testing was used to evaluate the usability of the newly developed Mini Bank system at SMK Negeri 7 Bandar Lampung. This test involved 31 respondents consisting of teachers, students, and administrative staff who use the system to conduct various financial transactions, such as tuition payments and student savings.

Based on the testing results, the system achieved a System Usability Scale (SUS) score of 91, which falls into the excellent category (Table 3). This score indicates that the new system is highly valued by users, both in terms of ease of use and functionality, as also highlighted by Akbar et al. (2024). It also suggests that the majority of users felt comfortable using the system, with features that are easily accessible and support their transactional needs.

Figure 3 . Testing with administrative staff

The analysis of the System Usability Scale (SUS) results shows that a SUS score of 91 reflects a high level of user satisfaction. The system is considered user-friendly, enabling users to perform tasks more quickly and efficiently than with the previous system. Additionally, the adequate functionality demonstrates that the system successfully addressed previous issues, such as user data management, automatic transaction logging, and login security.

Similar to finding highlighted by Tuloli et al. (2022), the SUS testing results indicate that the new Mini Bank system has delivered an optimal user experience, with a very high usability score. This analysis confirms that the system has met expectations in terms of usability, functionality, and security, and has made a positive contribution to supporting technology-based learning activities at SMK Negeri 7 Bandar Lampung. Following the community service activity, an analysis of the conditions before and after the community engagement was conducted. Before

Table 3 . System Usability Scale (SUS) evaluation results

Respondent	Calculated Score										Total Score	Score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
Respondent 1	4	4	4	4	4	4	4	4	4	2	38	95
Respondent 2	4	4	4	4	4	4	4	4	4	3	39	98
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Respondent 31	4	4	4	4	4	4	4	4	4	4	40	100
Total Score SUS	**3.8**	**3.6**	**3.8**	**3.4**	**3.8**	**3.7**	**3.7**	**3.8**	**3.8**	**2.7**	**36.5**	**91**

the implementation of the Mini Bank at SMK Negeri 7 Bandar Lampung, the previous system had many limitations. User data management was still done manually, transaction logging was not automated, and login security was minimal, making the system vulnerable to unauthorized access. Additionally, the lack of online payment integration slowed down the process of handling tuition and student savings payments, causing inefficiencies and a risk of errors.

After the Mini Bank implementation, there were significant improvements in several aspects:

1. Data Management: The ability to upload data via Excel simplified and accelerated the process, while reducing errors.
2. Automatic Transaction Logging: The system now logs transactions automatically, improving the accuracy of financial data.
3. Security: The secure login feature using JSON Web Token (JWT) protects the system from unauthorized access.
4. Payment Integration: The integration of the iPaymu payment gateway allows for online payments, speeding up the payment process and reducing the manual workload.

In summary, the comparative analysis of the system before and after implementation revealed significant improvements. Initially, the system was slow, insecure, and relied on manual processes. After implementation, it became more efficient, secure, and integrated. This transformation was reflected in the SUS score of 91, indicating high user satisfaction. The implementation of the Mini Bank system significantly enhanced operational efficiency, security, and user experience, making the school's financial processes faster, safer, and more reliable.

4. CONCLUSSION

The implementation of the Mini Bank at SMK Negeri 7 Bandar Lampung demonstrated significant success in enhancing the efficiency and security of the school's financial operations. Before implementation, the system faced limitations in data management, transaction recording, and security. Post-implementation, features such as Excel data uploading, automatic transaction recording, secure login using JSON Web Token (JWT), and iPaymu payment gateway integration effectively improved the system's functionality.

The Mini Bank application has the potential to be adopted by various schools, both public and private, that require streamlined payment transaction systems. It also has the potential to evolve into a larger educational digital payment platform. The benefits of this application include reducing the complexity and cost of school payment administration, expediting the payment process for students and parents, and increasing the accountability and transparency of school financial transactions. The System Usability Scale (SUS) test results indicated high user satisfaction, and the system achieved a functional success rate that highlighted its optimal reliability.

ACKNOWLEDGMENTS

We extend our deepest gratitude to the Ministry of Education, Culture, Research, and Technology for their support and assistance in the development of the m-Minibank Platform Prototype as a multi-payment software for schools This support has played a crucial role in the success of this activity and has greatly contributed to enhancing the quality of technology-based educational services. We also express our sincere thanks to SMKN 7 Bandar Lampung for their collaboration and the facilities provided during the implementation of this community service program. The support from everyone at SMKN 7 Bandar Lampung has been instrumental in the successful execution of the program, allowing it to deliver tangible benefits to both students and the school environment.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

REFERENCES

Akbar, M. S., Nuryasin, I., & Chandranegara, D. R. (2024). Implementasi metode personal extreme programming dalam peracangan aplikasi pemesanan ruang rapat berbasis android diskominfo Jawa Timur. *Jurnal Teknologi Informasi, Komputer, Dan Aplikasinya (JTIKA), 6*(1), 308–315. https://doi.org/10.29303/jtika.v6i1.348

Djamarullah, A. R., & Kusuma, W. A. (2022). Elicitation of needs using user personas to improve software user experience. *Ultimatics: Jurnal Teknik Informatika, 14*(1), 28–35. https://doi.org/10.31937/ti.v14i1.2633

Maharditia, R. (2024). Perancangan sistem informasi bank mini siswa SMK Diponegoro Banyuputih dengan metode cash basis. *Jurnal Ilmiah Sistem Informasi, 3*(1), 43–50. https://doi.org/10.51903/juisi.v3i1.837

Praseptiawan, M., Ashari, I. F., Bahri, S., Untoro, M. C., Pangestu, A., Afriasnyah, A., & Algifari, M. H. (2023). Empowerment of partner schools through the development of the mini bank application (m-MiniBank) at SMKN 7 Bandar Lampung. *Jurnal Pengabdian Dan Pemberdayaan Masyarakat Indonesia, 2*(9), 468–480.

Putra, D. M. D. U., Kusuma, A. S., Willdahlia, A. G., & Pande, N. K. N. N. (2024). Evaluasi usability e-modul basis data menggunakan metode System Usability Scale (SUS). *Jurnal Ilmiah Global Education, 5*(2), 1800–1809. https://doi.org/10.55681/jige.v5i2.2764

Sari, N. N. K., Geges, S., & Hasanah, N. (2023). Penerapan sistem notifikasi chat dan payment gateway pada sistem

informasi pembayaran SPP berbasis website. *Jurnal Teknologi Informasi, 17*(1), 90–100.

Tuloli, M. S., Patalangi, R., & Takdir, R. (2022). Pengukuran tingkat usability sistem aplikasi e-rapor menggunakan metode usability testing dan SUS. *Jambura Journal of Informatics, 4*(1), 13–26. https://doi.org/10.37905/jji.v4i1.13411