Web-based development of HEPAS

Nurzawani binti Mohamad Zani*, Nurul Nisa binti Mohd Nasir1, and Herman Nordiadi bin Abd Wahab1

1Kementerian Pendidikan Tinggi, Politeknik Kuching, Sarawak, 93050 Kuching, Sarawak, Malaysia

Abstract. The HEPAS (HEP Application Letter Approval System) system was developed to facilitate HEP (Student Affairs) to generate approval letters efficiently and systematically. This system was developed because there are often dropouts in processing confirmation letters submitted by Polytechnic Kuching Sarawak students. The HEPAS system is a web-based system and has been developed using PHP, HTML, CSS and JavaScript programming languages. The development of this system also involves XAMPP as a server and PHPMyAdmin as a database used to store all the data sent through the HEPAS system. Application for a confirmation letter by students through the HEPAS system will be sent to the system administrator which is HEP for the process of generating the confirmation letter. Based on the results of the tests carried out, overall the HEPAS system is 100% working well. With this system in place, it can help the HEP to manage confirmation letter applications more effectively and efficiently, thereby increasing HEP's productivity in managing students.

1 Introduction

In the present time, the continuous growth of information technology has progressed significantly over time. Previously, all information was stored or recorded manually, leading to several issues. This is supported by Parameshwari and Kumar [1], who stated that manual methods of storing forms or papers in record files have various drawbacks such as misplaced records, theft, and loss. Hence, the utilization of information technology is seen as a crucial factor in storing and processing information, as it helps control and manage information appropriately [2].

Nuryana noted that the advancement of information and communication technology has brought about numerous changes, including within the field of education [3]. In the realm of education, the use of information technology involves not only the teaching and learning process but also administration. Referring to Egoeze et al., information technology is among the tools that can enhance administrative activities in higher education institutions [4]. Goldstein also stated that in the process of enhancing administrative effectiveness, information technology management is an integrated technological summary for storing and disseminating information among humans and between humans and machines [5].

A confirmation letter is an official approval letter issued by individuals or organizations. The confirmation letter signifies that an individual has agreed to a certain application or...
request. Therefore, student confirmation letters are seen as an essential requirement to aid the administration of the polytechnic. At present, management services at Politeknik Kuching still rely on manual methods for confirming student letters. Therefore, the objective of this system development is to assist the administration in ensuring that all student confirmation letters are processed using a fully integrated system.

2 Literature review

Based on the study by Schammo [6], the approval system is considered a serious matter and is regarded as a quality element. In fact, this approval system has positive effects on the economy and the environment by minimizing the use of paper printing [7].

Various fields have conducted studies on this approval system. In the field of education, Ta’yib stated that approval system can assist management staff in handling student data and reduce waiting time from the administration [8]. As evidenced by Cherkasova et al., they developed a conference approval system called eCoAS for lecturers [9]. This system was developed to replace manual processes. eCoAS is a web-based system that helps simplify, expedite, and streamline the conference application management.

Additionally, in the administrative field, Politeknik Mersing has developed an asset approval system. This system aids in expediting identity and location verification of assets. The asset approval system also helps supervisors who struggle to remember the registration numbers or codes of each asset in their respective locations [10]. In the banking sector, according to the study by Nugroho and Setiawan [2], the existence of a credit approval system has assisted banks in performing verification processes before granting credit to customers. Furthermore, in the business sector, a purchase approval system has been developed to aid an organization’s purchasing process. Through this system, users can approve or reject purchase verifications with just a click of a button. Therefore, this purchase approval system saves time and avoids lengthy processes [11]. Based on past literature studies, it can be seen that the approval system is a system that is widely developed and is seen as an important system in ensuring the smoothness of the work process in various fields.

3 Methodology

For the development process of the HEPAS application, the Agile methodology is employed. This is because, according to Firdaus [12], the Agile methodology is highly suitable for product development and can aid in finding better problem solutions. The Agile methodology consists of five phases, namely the planning phase, design phase, development phase, testing phase, and feedback phase, as illustrated in Figure 1.

![Agile methodology model](image_url)

**Fig. 1.** Agile methodology model.
The planning phase is the first phase in the Agile methodology. This phase aims to conduct a requirement analysis for developing this application. During this phase, the problem statement, proposed solutions, objectives, and scope of the application to be developed are identified. Interviews with the staff at HEP, Politeknik Kuching Sarawak, were conducted to gather all the requirements for the HEPAS application. Subsequently, in the design phase, the system design, software design, hardware design, and prototypes are created to ensure the development objectives of this application are met.

During the development phase, the HEPAS application was built using HTML, CSS, JavaScript, and PHP programming languages. This HEPAS application was tested in the testing phase, which involves several testing stages, including unit testing, module testing, and integration testing of the entire system. This testing phase is carried out to identify errors within the developed system and ensure its effective functionality.

The feedback phase is the final phase in the framework of developing this application, where feedback from users of the HEPAS system, including HEP staff and students, is collected for the purpose of improving the system in the future.

There are various methodologies used by past studies. Nugroho and Setiawan have used the waterfall methodology for the development of a loan verification system [2,13]. The methodology used focuses on all activities that need to be planned and formulated first before the next phase is carried out. While through the study of Simanungkalit [14] have developed an NTE dismantling verification system using the Rapid Application Development (RAD) methodology from James Martin [15]. Through the RAD methodology, the advantage is that any phase change can be done repeatedly without having to return to the previous phase. Next Murugaiyan has developed a course recommendation and validation system [16]. Prototyping methodology is used for the development of this system where the system can be designed and get a response from users quickly. This system chooses to use agile methodology because of the ability to make changes to each phase with flexibility and speed and users can also give feedback on each phase at any time.

3.1 Functional requirements

Based on the conducted requirement analysis, the identified functional requirements encompass users who act as administrators, referring to the HEP authorities, and also students. The system allows the administrative users to process and generate application letters submitted by students through the HEPAS system. Administrators are also permitted to reject applications if they are deemed inappropriate. The system also enables administrators to generate statistical reports based on student applications.

For users registered as students, they are authorized to submit letter requests through the system and subsequently download the approved letters after verification by the system administrators. Students are also allowed to update their profiles periodically using the HEPAS system.

Figure 2 illustrates the flowchart for the letter application module by users through the HEPAS system. Users need to register with the system before being allowed to make letter requests. Users must select the desired letter template and then provide detailed information about the requested letter before submitting it to the system for review and approval by the system administrators. Users are allowed to download the requested letter through the system if it is approved by the administrators.
The flowchart for the letter generation module can be referred to in Figure 3. The HEPAS system enables system administrators to support or reject requests for letter generation. Additionally, the HEPAS system will generate statistics on letter generation requests to assist system administrators in monitoring the total number of processed letter requests.
3.2 Interface design

Figure 4 displays the main system interface for users acting as students after the login process. In addition to making letter requests, students are also allowed to update their profiles and view the status of letter requests that have been submitted into the system.

![Main system interface for students.](image)

**Fig. 4.** Main system interface for students.

Figure 5, on the other hand, illustrates the system interface for users acting as HEP Officers cum system administrators. Apart from verifying letter requests from students as shown in Figure 6, system administrators are also allowed to view statistics of letter requests through the system. This can be referred to in Figure 7, which displays the statistical reports generated through the system administrator menu.

![Main system interface for HEP officer.](image)

**Fig. 5.** Main system interface for HEP officer.
4 Hardware and software requirements

The development of the HEPAS system uses the PHP programming language. This application is also integrated with HTML, CSS, and JavaScript programming code. Figure 8 shows an example of PHP programming code used in developing this system. The system uses the XAMPP application, and the database is managed through phpMyAdmin. Figure 9 displays the control panel view for the used XAMPP application. This system allows you to manage information and interactions through the user's web browser with an intuitive and user-friendly interface.
The developed HEPAS application has undergone several testing phases. These testing phases are crucial to ensure that the developed programming code is free from syntax errors as well as logical errors. Table 1 presents the results of the testing conducted on the HEPAS system.

5 Data analysis and discussion

The developed HEPAS application has undergone several testing phases. These testing phases are crucial to ensure that the developed programming code is free from syntax errors as well as logical errors. Table 1 presents the results of the testing conducted on the HEPAS system.
### Table 1. Testing results.

<table>
<thead>
<tr>
<th>No.</th>
<th>Unit</th>
<th>Description</th>
<th>Testing Objective</th>
<th>Results</th>
<th>% Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>User Registration</td>
<td>Registering new users</td>
<td>To ensure smooth user registration</td>
<td>System allows registration of new users</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>User Login</td>
<td>Verifying system accessibility</td>
<td>To ensure only authorized users can access the system</td>
<td>System permits users to access the system</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>Letter Application</td>
<td>Ensuring application form can be filled and submitted</td>
<td>To ensure the letter application process runs smoothly</td>
<td>System allows users to fill and submit application form</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Letter Download</td>
<td>Downloading generated confirmation letters</td>
<td>To ensure letters can be generated through the system</td>
<td>System allows users to download generated confirmation letters</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Letter Generation</td>
<td>Generating processed confirmation letters</td>
<td>To ensure generated letters follow the correct template</td>
<td>System generates confirmation letters accurately</td>
<td>100%</td>
</tr>
</tbody>
</table>

User registration testing is conducted to ensure the user registration process runs smoothly. This is because every user who wants to apply for a confirmation letter needs to log in to the system to continue the application process. The test results show that the user registration unit is 100% working properly. Login testing is also done to ensure that the system can only be accessed by legitimate users in addition to being able to ensure system security. Log testing is also found to work 100% well.

The system was also tested in terms of its ability to receive applications for confirmation letters from users. This testing will ensure that all information related to the letter including username, letter title, purpose of the letter, name and address of the recipient as well as the letter template is written on the generated letter. Referring to Table 1, 100% of letter application units are fully functional. The system was also tested in terms of its ability to allow users to download the confirmation letter that has been generated. This is to ensure that the generated letter can be downloaded smoothly. Based on Table 1, the download unit was 100% successful allowing users to download the generated confirmation letter. Testing is also done on the ability of the system to generate confirmation letters accurately. Test results show that this unit is 100% successful in generating letters according to the correct template.

### 6 Conclusion

This study presents the development of the HEPAS system to help ensure that the process of student confirmation letter applications at Politeknik Kuching Sarawak is managed more efficiently, avoiding the frequent inefficiencies in the existing process. Based on the results of the tests carried out, overall the HEPAS system is 100% working well. With a user-friendly interface, students can easily fill out application forms, submit their requests, and obtain confirmation letters more smoothly. Additionally, this system assists the Student Affairs Division (HEP) in generating confirmation letters swiftly, contributing to overall productivity in student management. Overall, the HEPAS system brings significant improvements to the management of confirmation letters among students at Politeknik Kuching Sarawak. In this
way, it contributes to enhancing the overall management of the HEP and benefits both students and staff involved in this process.

References

7. V. V Repin, (2013)
8. M. S. Ta’yib, (2011)