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The Implementation of Campus Bookstore Management System Integrated with WhatsApp and Google Services

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ABSTRACT

Campus bookstore management system integrated with WhatsApp and Google services is a new approach of the web-based development project, especially for students to purchase and sell vast quantities of books, mainly used books. This approach helps students obtain books quicker and more cheaply. The proposed system utilized Google services such as email, Google form and Google spreadsheet. While WhatsApp allows communication between admin and users for any transaction made. Meanwhile, ToyyibPay payment gateway lets students purchase books online without cash. Two experiments were conducted to evaluate the effectiveness of the system which is usability testing and network performance test. A usability testing was done with 30 respondents to assess the efficacy of the system by reviewing questionnaires, which was categorized into 4 categories included user interface satisfaction, usefulness and ease of use, usability of the system, and WhatsApp and Google services integration. The findings indicated most respondents were satisfied and positively accepted the proposed system. Meanwhile, the result of network performance on the website speed test for mobile and desktop devices was satisfactory. Therefore, it is a practical, cost-effective, trustworthy option that can help students in book sales transactions and subsequently can generate additional income for students.

1. INTRODUCTION

Technology integration into various aspects of daily life has dramatically transformed how individuals interact with their surroundings (Gołąb-Andrzejak, 2023; Loukili et al., 2023; Walek & Fajmon, 2023). One such area has seen significant technological advancements in the online retail industry (Lara & Wassick, 2023). The online retail industry has rapidly grown in recent years, and the introduction of online bookstore management systems has made it easier for individuals to purchase books from the comfort of their homes.

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Nowadays, there is a growing interest in web-based systems for managing bookstores, especially for campus students. Furthermore, the books now sold in stores are very expensive because the outside seller makes a very large profit from the books they sell. Meanwhile, according to Dr. Merrial M. Chase (2016), when you open a bookstore online, you can offer better prices to your customers. Large chain bookstores mark up the prices of the books they sell to make a greater profit. Therefore, a group of researchers (Prajwal et al., 2024) was developed an online bookstore, with the aim of creating a user-friendly, secure and efficient for purchasing books online. Key features of the online bookstore include user authentication, book browsing and searching, shopping cart functionality and order processing, with a focus on security measures to protect user data and ensure safe transaction. Another researcher (Acharya, 2024) also developed economic, quick and time convenient an online bookstore where customers can browse through the catalog and select books of interest. Besides, the system supports recommendations and feedback from the customer. Unfortunately, both groups of researchers did not focus on the online payment process for the purchase of books.

Meanwhile, many universities and colleges worldwide have implemented online systems to provide students with a more convenient and efficient way to purchase and sell books. For instance, Ajiboye et al. (2022) focused on developing a web-based bookstore management system for a university in Nigeria. The system was designed to provide students with a convenient way to purchase and sell books online and manage the bookstore's inventory. The study found that the system was well-received by students and helped improve the bookstore's efficiency. Similarly, a study by Othman et al. (2014) aimed to develop a web-based bookstore management system for Malaysia Higher Institute, and the system was designed to provide students and lecturers with an easy and convenient way to purchase the books. The system was expected to enhance the university's efficiency in delivering the learning process. Meanwhile, a group of researchers provide a systematically and safe medium for user to sell and buy used good items via an online and mobile-based management system which consist of interface and database (Kasim et al., 2017). The system provides a new way of selling used good items by providing three web applications, which is customer application, administrator application and seller application. The website is able to help students that want to buy cheaper items and also help students to make extra money by selling their used goods. Besides, the system provides a wider market and is more interactive compared to the traditional methods and it also saves time and cost.

These previous studies provide valuable insight into developing and implementing web-based bookstore management systems for universities. These systems can help improve the bookstore's efficiency and provide students with a convenient way to purchase and sell books. Besides, most of the online shopping websites, especially online bookstore websites lack of variety of payment methods. According to Baymard Institute, 70.19% of online shopping carts are abandoned a purchase if they are not able to pay their preferred way (Baymard Institute, 2024). Offering a range of payment methods can reduce friction at the checkout process and encourages the customer to complete their transaction. However, the present study takes these previous studies further by integrating the proposed system with WhatsApp, Google services and online payment. This integration aims to provide additional features and benefits for students and the bookstore staff.

The purpose of this study was to evaluate the effectiveness of the campus bookstore management system in meeting the needs of students. The study was based on thoroughly evaluating the system's functionality, usability, and user satisfaction. The results of this study provide valuable insights into the potential of web-based bookstore management systems in improving the online shopping experience for individuals and can serve as a reference for future developments in online retail. The campus bookstore management system was developed using a combination of web-based development technologies, including HTML, JavaScript, PHP and SQL to create an online platform that is both user-friendly and efficient in managing book information and transactions. The integration of WhatsApp and Google services into the system was crucial in enhancing the system's overall functionality, allowing for improved communication and information sharing between the bookstore and its customers.

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2. METHODOLOGY

2.1 The System Architecture for Campus Bookstore Management System

Fig. 1 shows the system architecture of campus bookstore management system, is designed to provide a secure, efficient, and user-friendly platform for customers to purchase and sell books. The system comprises several components: the front-end design, back-end database, WhatsApp, Google services, ToyyibPay payment gateway and email verification. The system's front end is designed using HTML, CSS, and JavaScript to provide a user-friendly interface for customers to navigate and make transactions. The front end is accessible from desktop and mobile devices. The system's back end is based on a database that stores all relevant information, such as user data, book listings and transaction records. The database is designed to be secure and scalable and is built using PHP and MySQL. The integration of WhatsApp enables real-time communication between the admin and customers. The WhatsApp enables the admin to send notifications to customers about the status of their refund requests and other important updates. Google forms and spreadsheets are integrated into the system to provide a secure and efficient means of collecting and tracking refund requests. Then, ToyyibPay payment gateway is integrated into the system to provide a secure and convenient means of making online payments. This enables customers to purchase books without the need for cash transactions. The system also includes an email verification feature to add an extra layer of security to transactions. This feature requires customers to verify their email addresses before making transactions. Therefore, the integration of WhatsApp, google services, email verification, and the ToyyibPay payment gateway ensured that transactions are fast, convenient, and secure.

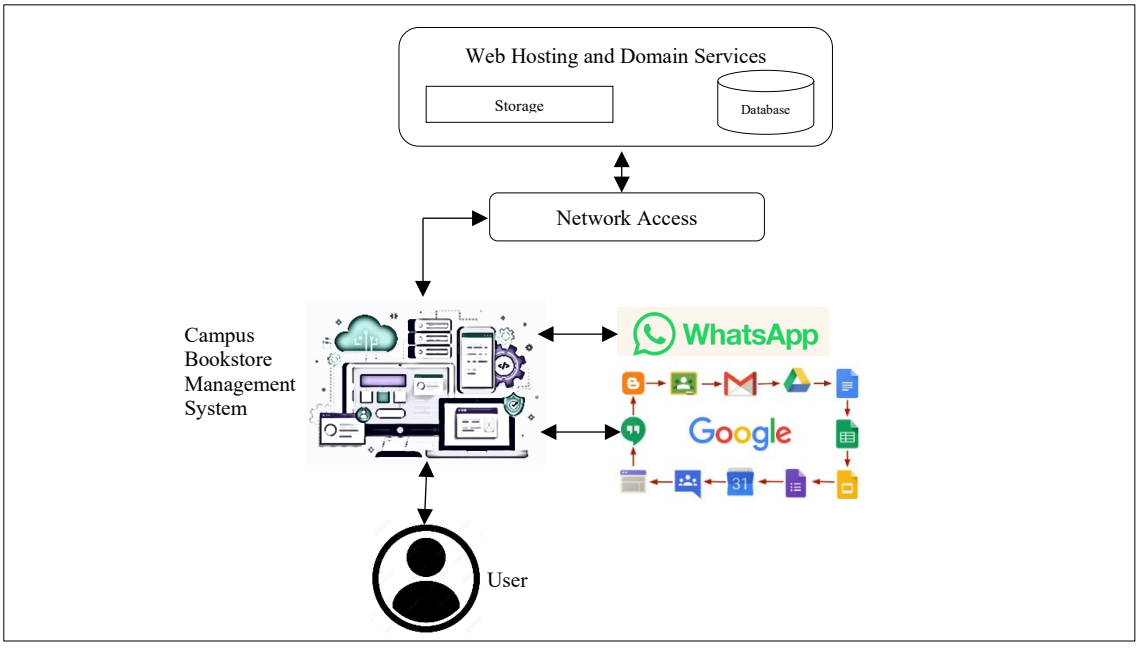

Fig. 1. Campus Bookstore Management System architecture

2.2 Model Used for the Developing of Campus Bookstore Management System

The System Development Life Cycle (SDLC) was used to develop a campus bookstore management system. SDLC is a project management tool used to describe overall processes and activities in a software development project. Besides, it also lists the responsibilities and activities carried out by web developers. The process is associated with the waterfall model (Bassil, 2012) which consisted of five phases such as

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analysis, design, implementation, testing and maintenance. The waterfall model is a systematic and sequential approach to software development. This model ensures that each stage of development is completed before moving on to the next stage and it ensures that the final product meets all requirements and is of high quality.

2.2.1 Analysis

The most important phase (Kazim, 2017) focused on gathering all information that needed for the project development. In this phase, all information, data, and problem statements were identified by reading articles, journals and theses from previous research. On top of that, the current technology was observed in order to understand how technology can be implemented during the project development. Furthermore, the activities included were the identification of hardware and software requirements, objectives, scope of project, schedule of activities such as gantt chart and the total budget. The result of this phase is feasibility report and a logical system design.

2.2.2 Design

Since system design converts a logical design into a physical design and it is a crucial part of the system development life cycle. To ensure that the application is secure, reliable, and maintained, this step briefly outlines its functionality and features. The web-based application's initial design was based on data flow diagram (DFD), sitemap and entity relationship diagram (ERD). The interface flow of the web-based application was represented using DFD, Sitemap and ERD. On the other hand, the initial design of the sitemap was deliverable, as shown in Fig. 2.

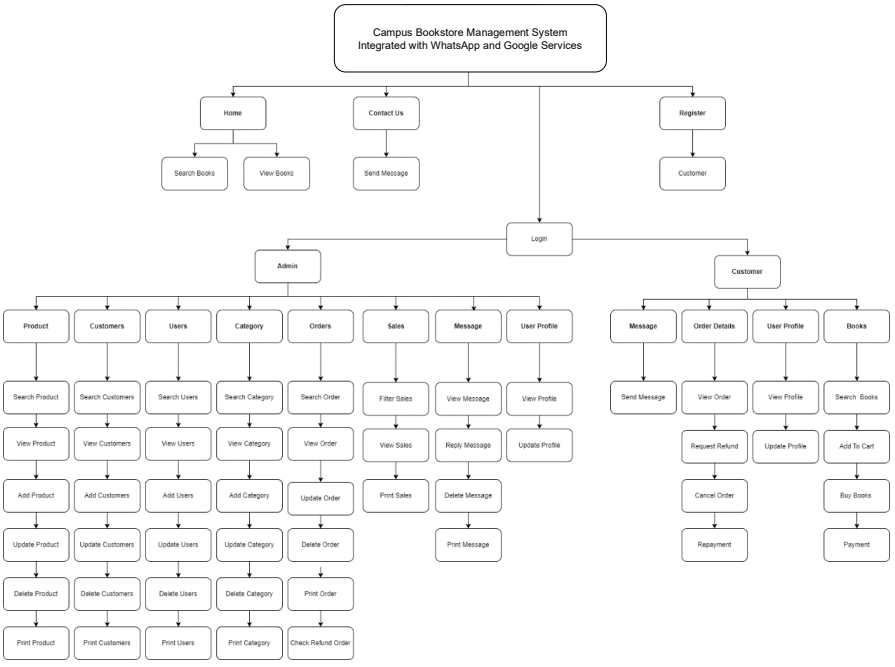

Fig. 2. Sitemap of Campus Bookstore Management System

2.2.3 Implementation

System implementation is the process flow project created, tested, and implemented in the SDLC. This phase also details how the program was run and how the PHP language was used. The proposed system was created utilizing a variety of software combinations, including Notepad++, a web hosting and domain

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server. Then this system integrated WhatsApp, ToyyibPay payment gateway and google services such as email, Google sheets and Google form. The proposed system will be carried out at this stage, and a connection to the database will be made. Information such as the specifics of the user detail, admin detail, book product, and other data will be recorded in the database. Users can view the information more interactively by integrating the interface and database. Fig. 3 shows the main page of the campus bookstore management system. There are six tabs: Book, Contact, Login, Register, Admin and Cart and each tab will redirect the user and admin to another page according to its tab's name. Meanwhile, Fig. 4 shows the integration of WhatsApp page, Fig. 5 illustrates the integration with ToyyibPay payment and Fig. 6 depicts the integration of Google Services within the proposed system.

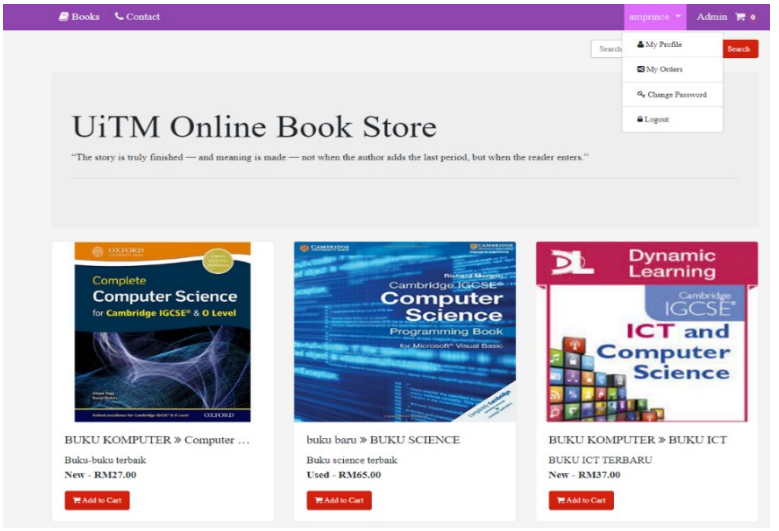

Fig. 3. Home Page for Campus Bookstore Management System

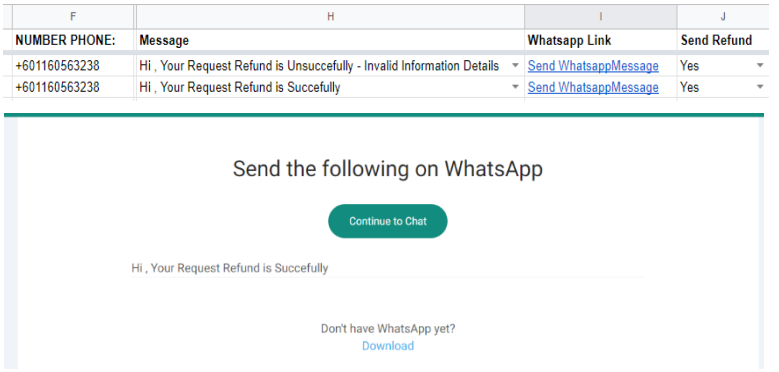

Fig. 4. Page to Send WhatsApp message to User

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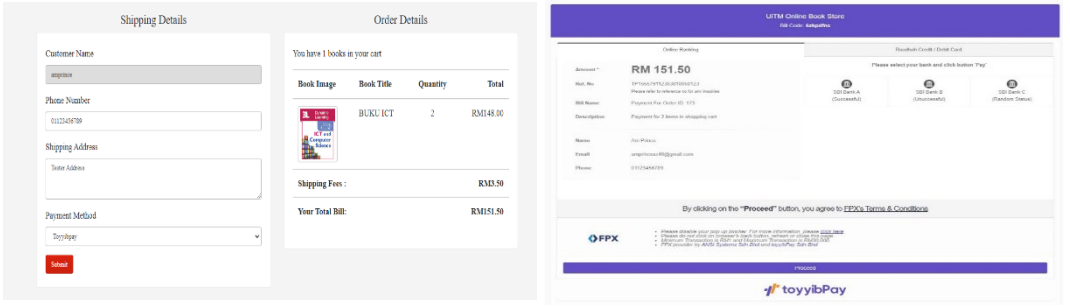

Fig. 5. Page for the integration of payment transaction using ToyyibPay payment gateway

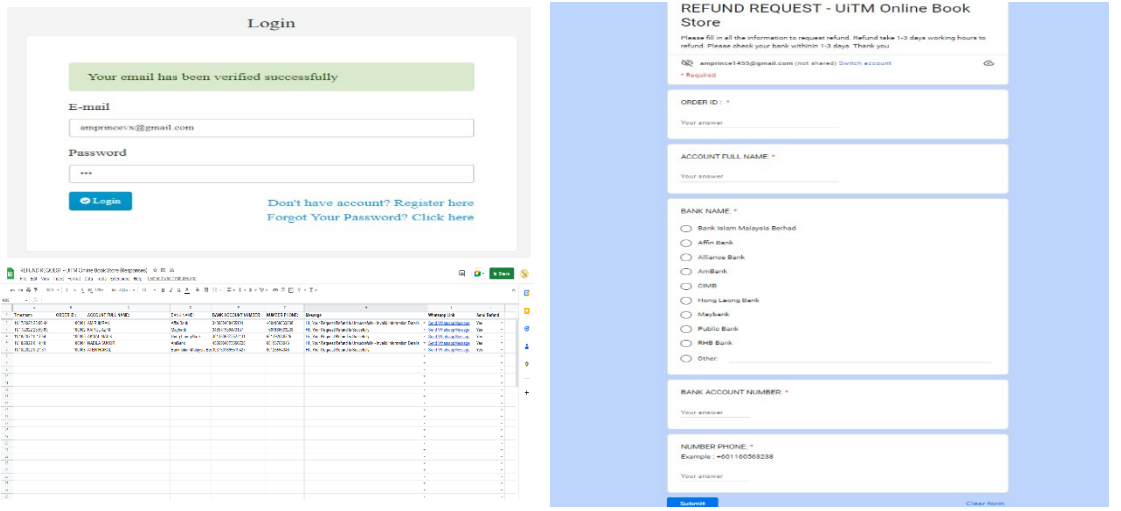

Fig. 6. Page for the Integration of Google Services (Email, Google Sheet, Google Form)

2.2.4 Testing

To show that the campus bookstore management system meets and conforms to the requirements that have been set, the testing process for the web-based application has been completed. To assess the application's usability and simplicity, usability testing was carried out. The learning process included usability testing, and after participants used the web application, an evaluation was recorded. After that, various factors, website speed tests for desktop and mobile, were used to assess the network performance of web hosting services and web-based applications. This test's goals were to increase system usability, ensure that participant or user actions and feedbacks are tracked and documented, and ensure that network performance testing across web hosting companies can be done successfully.

2.2.5 System Maintenance

During the maintenance phase, new data is added to the system, backups are created and any system issues are found. Therefore, by including this step, the system can keep running even if an error occurs later.

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3. FINDINGS AND DISCUSSIONS

3.1 Usability Testing

The usability testing of campus bookstore management system was conducted to assess its effectiveness and user experience. The test involved thirty (30) randomly selected respondents from the College of Computing, Informatics and Mathematics, UiTM Perlis. These respondents were chosen because they could provide accurate feedback on the system's interface and functionality. After testing the system, the participants were given a set of fifteen (15) questionnaires and categorized into four (4) parts to provide their feedback. The first part comprised of the user interface satisfaction. The second part focused on the usefulness and ease of use. The third part analyzed the usability of the system and finally, the fourth part investigated the integration of WhatsApp and Google services. The data were analyzed using arithmetic mean technique based on ranking score value. The participants were required to rate the answer with the scale of 1 to 5, which was strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). Then, overall mean was calculated and classified into 3 categories, which is negative, neutral and positive based on the range of mean value in between zeros to five as shown in Table 1.

Table 1. Range of mean value

Category	Range of Mean
Negative	0.00 - 1.66
Neutral	1.67 – 3.33
Positive	3.34 – 5.00

From the results acquired, the total mean from all the categories calculated from the questionnaire was illustrated in Table 2. The results showed that the target respondents were satisfied and positively accepted all functionalities and features provided by the campus bookstore management system. This can be proven when the total mean for each category was calculated above the point of 4.00. Furthermore, the integration of WhatsApp and Google services obtained a score of 4.70, which indicated that the respondents were satisfied and it can help them complete their task easier and faster. Besides, the overall total mean for usability testing is 4.66 which means positive feedback from the respondents. Based on the feedback received, it was determined that the campus bookstore management system was manageable, usable, and reached participants' targets.

Table 2. The usability test results

No	Criteria	Mean	Mean Category
PART 1: USER INTERFACE SATISFACTION			
1	The management system's user interface is easy-to-use and well-organized.	4.60	Positive
2	The characters shown on the screen of this system are simple to understand and read.	4.73	Positive
3	The navigation or connections are user-friendly.	4.80	Positive
4	In this system, completing tasks is always uncomplicated.	4.60	Positive
5	System error messages are informative and straightforward.	4.40	Positive
	TOTAL MEAN		**4.63**
PART 2: USEFULNESS AND EASE OF USE			
6	This system eliminates the requirement for I to visit a physical bookshop to purchase books.	4.73	Positive
7	Learning how to run the system would be simple for me.	4.60	Positive
8	By using the system, I was able to avoid crowded bookstores while purchasing books.	4.80	Positive
	TOTAL MEAN		**4.71**

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PART 3: USABILITY OF THE SYSTEM			
9	I am satisfied with the system's user-friendliness.	4.60	Positive
10	The system provides functions relating to online bookshop payment.	4.70	Positive
11	The technology makes it simple to choose and get the books I need.	4.73	Positive
12	I found the system's functionalities to be well together integrated.	4.60	Positive
	TOTAL MEAN		**4.70**
PART 4: INTEGRATION WITH WHATSAPP AND GOOGLE SERVICES			
13	Integration with email, WhatsApp and Google services is useful for this system.	4.63	Positive
14	I found that integrating email, WhatsApp and Google services in this system is beneficial to users.	4.63	Positive
15	I am pleased with how this system works.	4.70	Positive
	TOTAL MEAN		**4.70**
	OVERALL TOTAL MEAN	**4.66**	**Positive**

3.2 Network Performance Test

The website speed test tool was used to evaluate the network performance of campus bookstore management system. The tool performs a full-page speed test and returns the results in requests, content size, and loading time, as well as providing a detailed breakdown of each asset's timings and HTTP headers. The speed test was conducted on desktop and mobile devices, and the results were recorded and analyzed. Tables 3 and 4 show the result after testing the website speed test for desktop and mobile devices about five times repeatedly. The results showed that the website's performance was better when tested on a desktop than on a mobile device. The website speed test results helped identify areas where the system can be improved to ensure optimal performance.

Table 3. Website speed test using desktop device

Number of Tests	Website Speed Test Using Desktop Device (S)
1	1.6
2	1.0
3	1.0
4	1.0
5	1.1
Average	**1.14**

Table 4 Website speed test using mobile device

Number of Tests	Website Speed Test Using Mobile Device (S)
1	4.9
2	3.3
3	3.3
4	3.3
5	2.2
Average	**3.4**

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4. CONCLUSION

This paper successfully presents a solution and the potential use of campus bookstore management system integrated with WhatsApp, Google services and ToyyibPay payment gateway as a major center for buying and selling books. The system was designed to provide a secure, efficient and user-friendly platform for customers to purchase and sell books. This approach was created to save time and effort for customers by allowing them to purchase books online.

To measure the effectiveness of the proposed system, usability testing was applied to the proposed system by evaluating the system's performance using a questionnaire based on test cases. Thirty (30) respondents took part in the usability testing. The effectiveness of the proposed system was evaluated, and the majority of the respondents were satisfied, appreciated, and well received with the proposed system. Meanwhile, the website speed test was also used to evaluate the online bookstore management system's network performance on mobile and desktop devices. The result has shown that the website speed for each device was improved when tried repeatedly. Therefore, the outcomes of the system evaluation reveal that users generally approve of all available options. Besides, the overall proposed system was measured to be positively accepted by the users. Hence, it was able to assist, enhance and enrich the buying and selling process of books using the current technology such as web-based, WhatsApp and Google services.

Furthermore, the campus bookstore management system that integrates WhatsApp and google services is the most practical, cost-effective, and trustworthy option. In conclusion, the campus bookstore management system integrated with WhatsApp and Google services is a prime example of how technology can be leveraged to enhance the online shopping experience. The integration of various technologies and the utilization of user-centered design principles have resulted in a system that meets the needs of students and provides a convenient and efficient platform for buying and selling books online. This study contributes to the ongoing discourse on integrating technology into the online retail industry and highlights the potential of an online bookstore management system in improving the online shopping experience for individuals. Future enhancement can be considered to provide a live chat with the admin, that can improve user service since it allows administrators to reply immediately to inquiries from the customers.

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6. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interest.

7. AUTHORS' CONTRIBUTION

Mohd Nizam Osman and **Amir Imran Ahmad** conceived of the original and presented idea. Both of them developed the theory and performed the development process. **Khairul Anwar Sedek**, **Mushadah Maghribi** and **Nor Arzami Othman** verified the analytical methods. Mohd Nizam Osman encouraged Amir Imran Ahmad to investigate a specific aspect and supervised the findings of this work. Amir Imran Ahmad carried out the experiment supported by Mohd Nizam Osman. Mushahadah Maghribi contributed to the interpretation of the results. All authors discussed the results and contributed to the final version of the manuscript.

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