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Development of the E-BIGV System

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Abstract: The study aims to develop the Bina Insan Guru Vokasional (BIGV) management system for the course's management, lecturers, and students involved. The system will be developed to manage files, information search, and information dissemination. The study seeks to achieve three main objectives: 1) to design an E-BIGV management system; 2) to develop an E-BIGV management system; and 3) to evaluate the functionality of the E-BIGV system by experts. The prototype model methodology used to develop this system is the design-and-development research methodology, which consists of four phases: planning, analysis, design, and implementation. A qualitative method was adopted using interviews to gather information. The platform adopted to develop the system is Adobe Dreamweaver, which is used to write programs in the HyperText Preprocessor (PHP) and to store the user's database using the XAMPP platform. The development of the E-BIGV system was evaluated by three (3) experts consisting of two (2) lecturers with a background in information technology and a BIGV coordinator in charge of the BIGV administration. All three (3) experts were given an expert checklist according to their expertise. The expert checklist contains four (4) main sections: demographics, interface design, system functionality design, and system content design. Analysis of the expert checklist responses indicates that the design aspect of the interface received 66.7% of agreement. In comparison, the system's design aspects and the system's content design received 100% agreement in terms of appropriateness. These findings indicate that the E-BIGV system developed can facilitate information management and retrieval.

Keywords: Management system, BIGV, information dissemination

1. Introduction

The Bina Insan Guru Vokasional (BIGV) courses are among the compulsory courses at institutions offering education-related courses, such as Institut Pendidikan Guru (IPG), Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Pendidikan Sultan Idris (UPSI), and Universiti Teknologi Malaysia (UTM). The courses are designed to strengthen selected future teachers' physical and mental capabilities regarding the Ministry of Education (MOE) criteria, which aspires to produce professional and international-standard teachers.

The courses consist of three phases. In the first phase, the students must prepare paperwork to suggest the activities during the course. In the second phase, they must attend lecture and theory sessions, physical and camping activities, and community service. In the third phase, they have to produce an activity report and file a scoring form for evaluation by their lecturers. The lecturers must submit these report files according to their respective measurements. A coordinator is also involved in collecting the students' report files, as the former needs to select students who achieved outstanding results for each semester for auditing by UTHM. By this phase, the coordinators and lecturers involved might need more storage space, hence the risk of losing important files. Without a systematic management system, human errors such as document mismanagement and misplacement will occur (Boon et al., 2019). Storage capacity can be very limited, and documents and files have to be stored in a safe place. Major problems will be encountered when the staff is drastically transferred to another unit (Ismael & Okumus, 2017).

Interviews with the course coordinators of BIGV revealed some problems with the course management process. Among the problems concern the information management processes, such as students' and lecturers' data storage and registration process. Scoring and reporting are still implemented manually, and all documents are kept for UTHM's

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auditing purposes. These documents need to be stored and extractable by educational institutions (Isa & Said, 2016).

The next problem BIGV coordinators and lecturers faced was disseminating information on activities, which could not be fully addressed to students. Information on the BIGV course is only communicated through the faculty's announcement boards and group representatives formed before the course. Students need to praise information better, and the possibility of misunderstanding and misinterpretation of the information they want to convey is very likely to happen. According to Che Daud (2015), the issue of delays in information delivery, information overload, information leakage and failure to properly convey information is a serious problem faced by departments within the government.

The third problem is the cost of reporting for students. This is because students need to print their assignments, activity reports and scoring forms for assessment by the lecturer, which need to be compiled in one file. If a student submits a report file with complete documents, the student is considered successful and must retake the BIGV course next semester. As a result, students must spend a lot of money to print all the documents as proof, which also causes paper waste. As a result, the student will be pressured, and the process of submitting the report will take a longer time. According to Redhwan et al. (2009), one of the sources of stress that students face is financial problems, followed by family problems and a healthy lifestyle. In addition, paper is an organic waste of plant and animal waste. This organic residue will produce a foul odour. If paper use is not controlled, problems such as the spread of the odour to the surroundings will develop (Abas et al., 2017). With the development of information and communication technology, all information will be made more accessible, enabling smooth delivery of e-learning content materials and applications and interactivity between the two users (Gañán et al., 2014).

According to Dahaman (2011), the highlight of the study is the information based on previous research for reference and comparison. Studies on equivalent systems mean that the existing systems can serve as a reference for the current analysis process. The existing systems also enabled the developers to identify the advantages and disadvantages of the existing system, hence guiding the implementation of the system to be developed. Among the systems being studied are *Sistem Pengurusan Maklumat Politeknik (SPMP), Sistem Ulearn by Universiti Teknikal Malaysia Melaka (UTeM), Edmodo platform, and E-BIGV*. Interviews with the BIGV course coordinators revealed that the main problem encountered was unsystematic data management. The activity information regarding the BIGV course was not well communicated; files were "dumped" into the BIGV course files, and the use of large amounts of money to print reports and documents as evidence was the problem faced by the management and students. These problems can be solved by having an integrated computer system that can assist the management in adding data, updating data, deleting data, searching for data, and informing students. As for students, the system can facilitate uploading reports, viewing all information provided by the management, viewing attendance and engagement status, and downloading score rubrics. Therefore, the E-BIGV management system facilitates the management and students to carry out activities more smoothly and systematically and to solve the problems stated at a considerably high level. Table 1 shows a comparison between three (3) management systems that have been developed and features that will be integrated into the E-BIGV system.

Table 1: System comparison

System / **Features**	**SPMP**	**ULearn**	**Edmodo**	**E-BIGV**
Programming language	PHP	PHP	HTML	PHP
Log in	Available	Available	Available	Available
Sign up	None	None	Available	Available
Announcement	Available	Available	Available	Available
Users	Coordinators, lecturers & students	Lecturers & students	Lecturers, students & parents	Coordinators, lecturers & students
Email notification	None	None	Available	Available
User manual	None	Available	None	Available

After a thorough review, the researcher found a few management systems to act as a reference before developing the E-BIGV system. For example, SPMP does not have a few features such as sign-up, email notification and user manual. While U-Learn does not provide sign up and email notification features in its system. Edmodo is also a management system, a social media look-alike platform that does not provide a user manual. In this study, the E-BIGV system will try to integrate all the unavailable features in another system, such as sign-up, email notification and user manual features.

Given the problems with implementing BIGV, the present study seeks to develop a system for the BIGV courses taken by FPTV students. During the development, the study identified the system's functionality developed for students, coordinators, or lecturers. The objectives of the study are to 1) design an E-BIGV management system for BIGV coordinators, lecturers, and students; 2) develop an E-BIGV management system for BIGV coordinators, lecturers, and students; and 3) evaluate the functionality of the E-BIGV system based on experts' opinion.

2. Methodology

The prototype model methodology was used to develop the E-BIGV management system. A prototype provides a general perception and early understanding of the basic process of a system to be developed, the purpose being to ensure good communication between the developer and the system's user (Widiyanto et al., 2018).

This study chose the prototype model methodology for its features of building a system. As noted by Purnomo (2017), this methodology can be 1) used to develop a large- or small-scale system; 2) implemented efficiently and orderly; and 3) completed in a predetermined period (Purnomo, 2017). Another study that used the prototype methodology is the work of Wang et al. (2020), who found that the methodology facilitated problem-solving and exploration of opportunities for the next generation of Tianhe systems. Tianhe system is an open-access system for large-scale scientific calculations using the Linux operating system.

The prototype model methodology has four interrelated phases: planning, analysis, design, and implementation (Dennis et al., 2015). These phases will involve elaborating on the methods, equipment, and procedures adopted in building the E-BIGV management system.

The developer prepared an expert checklist for device testing and evaluation. The experts were asked to give their opinions and suggestions on the space provided. After the assessment phase, the data analysis was carried out according to the specified sections. The developer selected three (3) expert respondents consisting of two (2) system experts and one content expert, the latter with experience in systems, BIGV management, and multimedia. The expert checklist concerned the following three aspects: the interface design, the system functional interface design, and the system interface content design. The experts selected had experience and expertise in systems, graphics, and content related to the BIGV course.

The findings were derived from analyzing the data obtained from the expert evaluation. The expert checklist concerned the following three aspects: the interface design, the system functional interface design, and the system interface content design. The interviews sought to gain responses for Section A (Expert/user demographics), Section B (Interface design), section C (System functional design), and Section D (System content design) of the expert checklist.

The data were analyzed using frequency and percentage agreement for each item. The experts also provided feedback.

3. Results

Table 2 shows except for item six (6), all the items about the interface design were considered by the experts to meet the criteria. About item six (6), one of the experts disagreed that the background graphic used is clear and appropriate (acceptance level 66.7%). According to Ibrahim and Redwan (2010), the design phase is a framework that can facilitate the systematic development of a system or software. Hadi (2008) also notes that the main objective of a design is to encourage interaction between users; the design must be user-friendly, effective, and can achieve the user's purpose, hence the name "user-centred design." The design of a user interface could impact the perceived quality of a multimedia recommender system (Deldjoo et al., 2020).

Table 2: Evaluation of the system's interface design

No	Item	Frequency		Percentage (%)
		Yes	No	
1	The system interface looks systematic and interesting	3	-	100
2	Selection of navigation and position of the navigation placed in the system is appropriate	3	-	100
3	Appropriate text types are used	3	-	100
4	The text size used in the system is appropriate	3	-	100
5	The system display size is appropriate and clear	3	-	100
6	The background graphic used is clear and appropriate	2	1	66.7
7	Users can see the full view of the developed system	3	-	100
8	User manual is easy to understand	3	-	100

Regarding the system's functional interface, all the experts agreed that the design of the system's functionality interface meets the given criteria (acceptance rate = 100%), as shown in Table 3. To optimize the system's functionality, the developers created connection designs or multimedia elements such as buttons, icons, images, and text to encourage users' interaction with the system and enhance their skills. According to Ma et al. (2020), message

delivery using multimedia applications such as graphics, videos, or pictures will be more effective. Including multimedia elements in a system can increase user interest and a faster and more engaging retrieval of information (Prasetya et al., 2018).

Table 3: Evaluation of the system's design of functional interface

No	Item	Frequency		Percentage (%)
		Yes	No	
1	The system displays the user's login page	3	-	100
2	The system displays the user manual on the front page	3	-	100
3	Users can contact the management by filling in the form provided	3	-	100
4	Users can view announcements made by the coordinator	3	-	100
5	System menu navigation direct users to the right page	3	-	100
6	The coordinator can add in lecturer's subject involved with BIGV	3	-	100
7	The lecturer's registration process can be done by the coordinator	3	-	100
8	Details of the lecturer will be displayed and viewable by the coordinator	3	-	100
9	Students name list and approval statuses can be viewed by the coordinator	3	-	100
10	The coordinator can view all students who are enrolled in the system	3	-	100
11	The coordinator can respond to queries on the contact us screen	3	-	100
12	Recent announcements can be made by the coordinator	3	-	100
13	Coordinator can upload student scoring rubrics	3	-	100
14	Adding in lecturer's subject that are related with BIGV can be done by the coordinator	3	-	100

Table 4 shows the evaluation results on the system's interface content design. All the experts agreed that the design of the system's functionality interface is met (acceptance rate of 100%). With a systematically developed design with an acceptable structure, users can use this framework better use this framework better. The findings correspond with those of Yao et al. (2020), who found that using a good interface can help maintain employees' performance in a state of fatigue. The materials used in the design have undergone several selection phases to ensure that all the materials used meet the requirements. With careful planning guidance and systematic design, a developer can maximize resource use and reduce waste (Shamsuddin et al., 2007).

Table 4: Evaluation of the system's interface content design

No	Item	Frequency		Percentage (%)
		Yes	No	
1	User manual is easy to understand	3	-	100
2	The content of uploading BIGV reports is clearly stated	3	-	100
3	The content of the BIGV approval status viewable by students is easy to understand	3	-	100
4	The content of uploading scoring rubrics is clearly stated	3	-	100
5	The content of the lecturers	3	-	100

Table 4: Evaluation of the system's interface content design (Continued)

No	Item	Frequency		Percentage (%)
		Yes	No	
	downloading the BIGV report is clearly stated			
6	The content provides students with easy to understand BIGV point approval status	3	-	100
7	The content of the lecturer viewing the list of student names is easy to understand	3	-	100
8	The content of the coordinator registering courses is easy to understand	3	-	100
9	The content of the coordinator registering lecturers are easy to understand	3	-	100
10	The content of the coordinator viewing the list of lecturers' and students' name clearly stated	3	-	100
11	The content of the coordinator uploading rubrics is clearly specified	3	-	100
12	The content of the coordinator making announcements is easy to understand	3	-	100
13	The content of the coordinator responding to queries is clearly stated.	3	-	100
14	Content in this system can meet the needs of users in the process of the BIGV course	3	-	100

4. Discussion

In the first phase, the planning phase, the developer wrote the project proposal to present the background, problem statement, project purpose, project objective, project scope, project importance, and terms of definition. The developer will also conduct a preliminary analysis of the system and interviews with the management, lecturers, and students involved in undertaking the course. This phase aims to identify the study's problems and objectives.

In the analysis phase, the developer presented an analysis of the requirements of the E-BIGV management system. The data collected through the interview and expert validity sessions were analyzed to identify the problems faced by the users. According to Alim and Abdullah (2010), the interview has several advantages regarding time, cost, and energy savings. In this phase, all the advantages and disadvantages of the system's functions were discussed so that all problems could be resolved. The developers also identified equivalent systems by highlighting relevant writing highlights. Based on the analysis, the developer compared the contrasted the system to determine the best E-BIGV management system. Then, the developers studied the software to develop the application. The software selected to be used were Adobe Photoshop CS6; Adobe Illustrator CS6; Hyper Text Preprocessor (PHP); Hyper Text Markup Language (HTML); JavaScript (JS); and mySQL.

The design phase was crucial for determining how the system works and how it will be created. The system display will be presented as a user interface for each user. This step includes the development phase of the application. Designing steps involves several separated steps, such as designing the application's structure, applying the theory, developing the multimedia elements, creating storyboards, creating flowcharts and navigational structures, and the learning content. The storyboards and flowchart were prepared earlier as a preliminary guideline for the developer during the development. In addition, this phase is where the database and raw data design will be created. Each function that will be executed in the system has its attribute.

The developer finalized the expert checklist for evaluation to three experts. The expert checklist has 5 (Five) sections: part A is the expert demographic, part B is the interface design, part C is the system functionality design, part D is the system content design, and finally, part E is suggestions or comments.

The final phase, the implementation phase, informs the developer of the software development process. This E-BIGV management system was developed through a program code to develop the database and system interface. Once the developer completed the development process, the testing and verification processes were implemented to ensure that all the built-in functions worked properly. In the event of any problem encountered by the management, the developer continuously improves the E-BIGV management system to ensure that it runs smoothly. Fig. 1 illustrates the

system's interfaces and the login interface for students, lecturers, and coordinators on the main display.

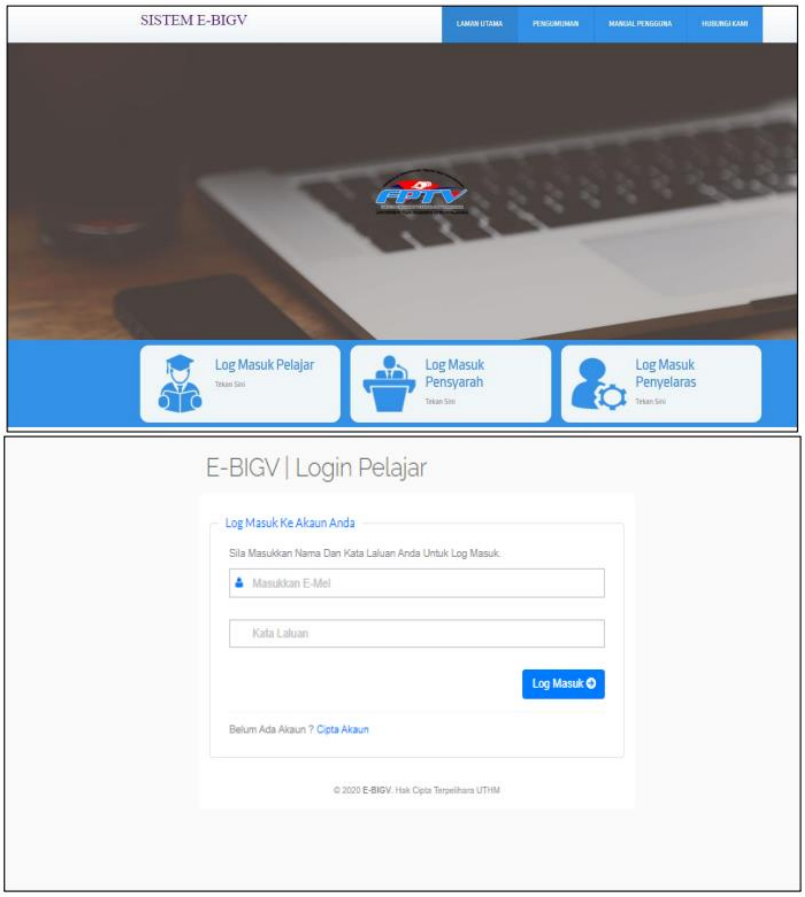

Fig. 1: Interfaces of main interface of E-BIGV management system

Fig. 2 shows the Report submission interface, where students can upload and submit their BIGV for each course. They also need to complete the form provided and upload the BIGV report in PDF format.

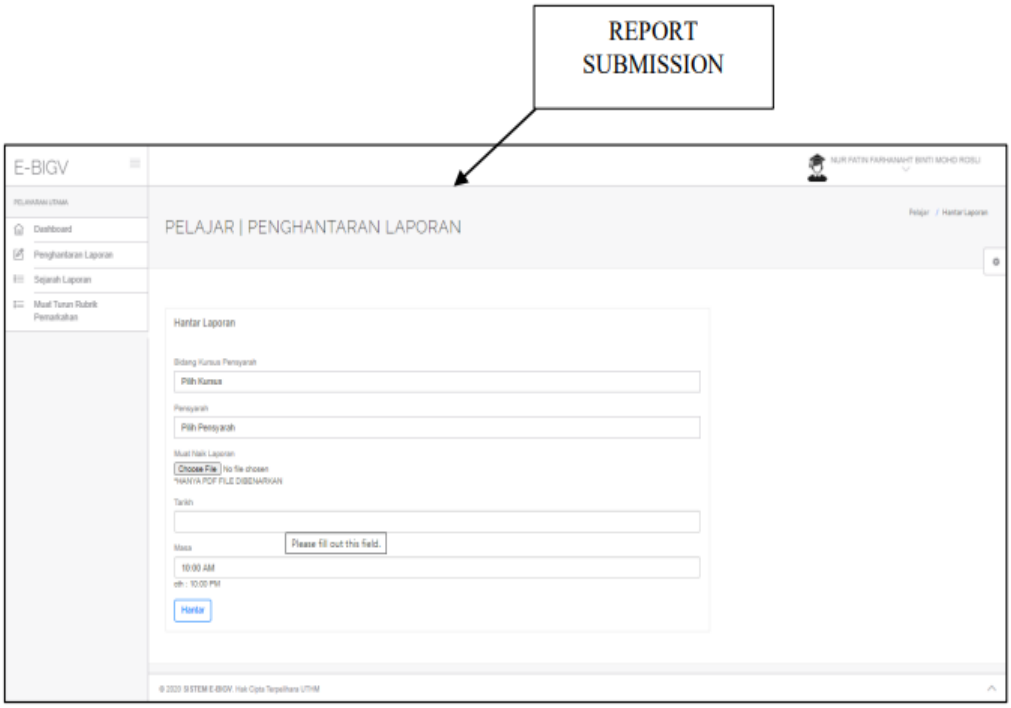

Fig. 2: Interfaces of report submission interface

Fig. 3 illustrates the BIGV Approval Status Update display. On the BIGV approval status update interface design is a display of students' details and a form to give approval status to students.

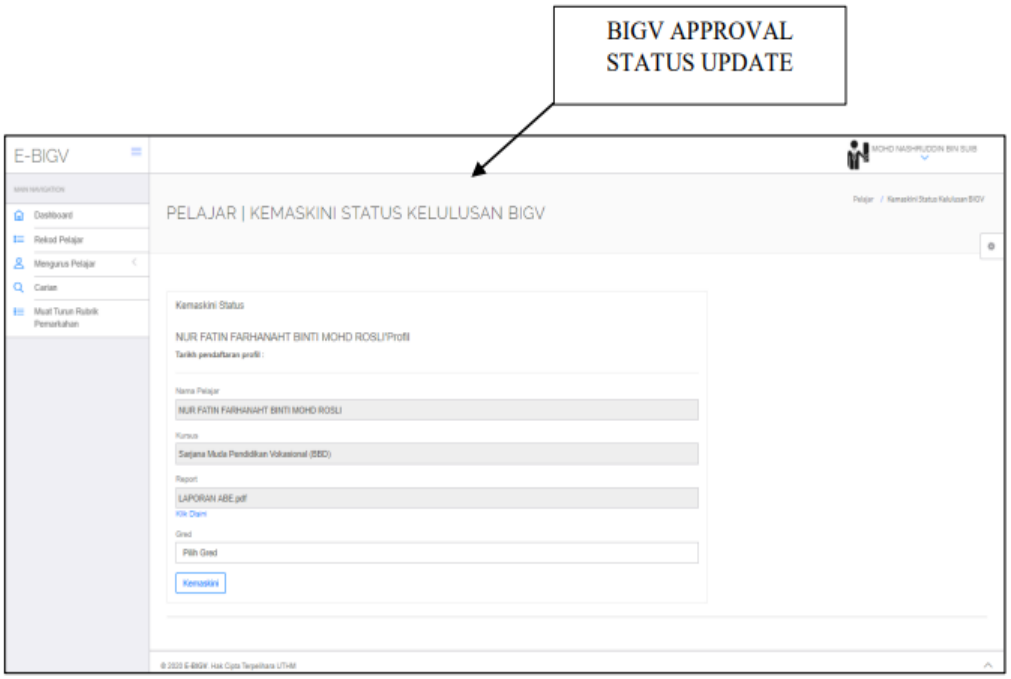

Fig. 3: Interfaces of the BIGV approval status update display

Fig. 4 and Fig. 5 show the Registrar Lecturer and Add Announcement. The admin can register the lecturer into the system and add an announcement on this interface.

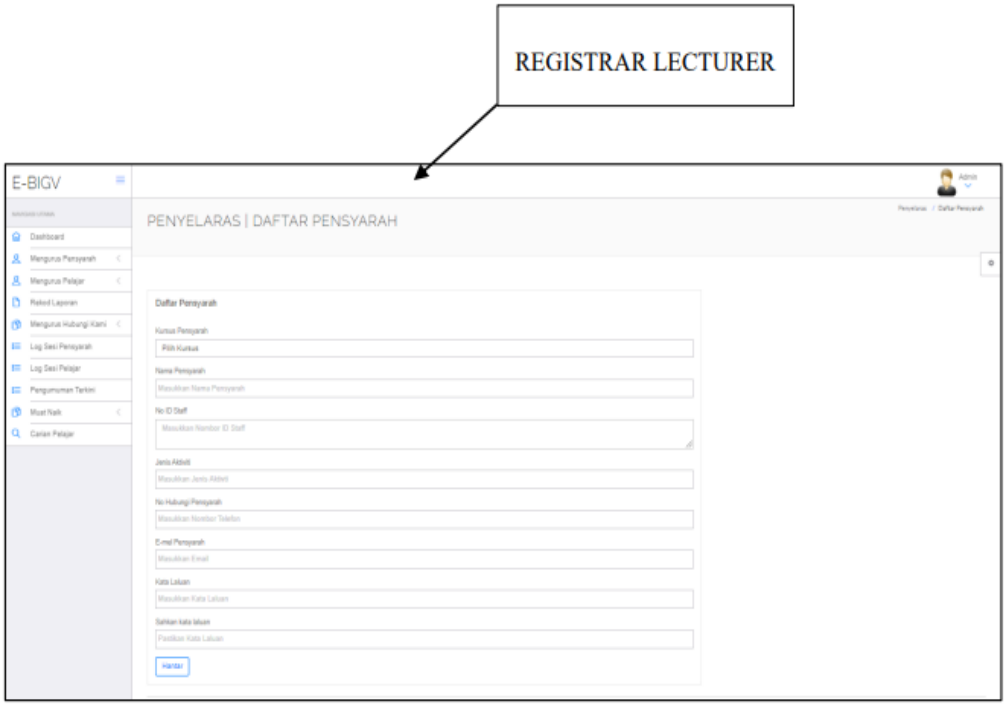

Fig.4: Interfaces of registrar lecturer

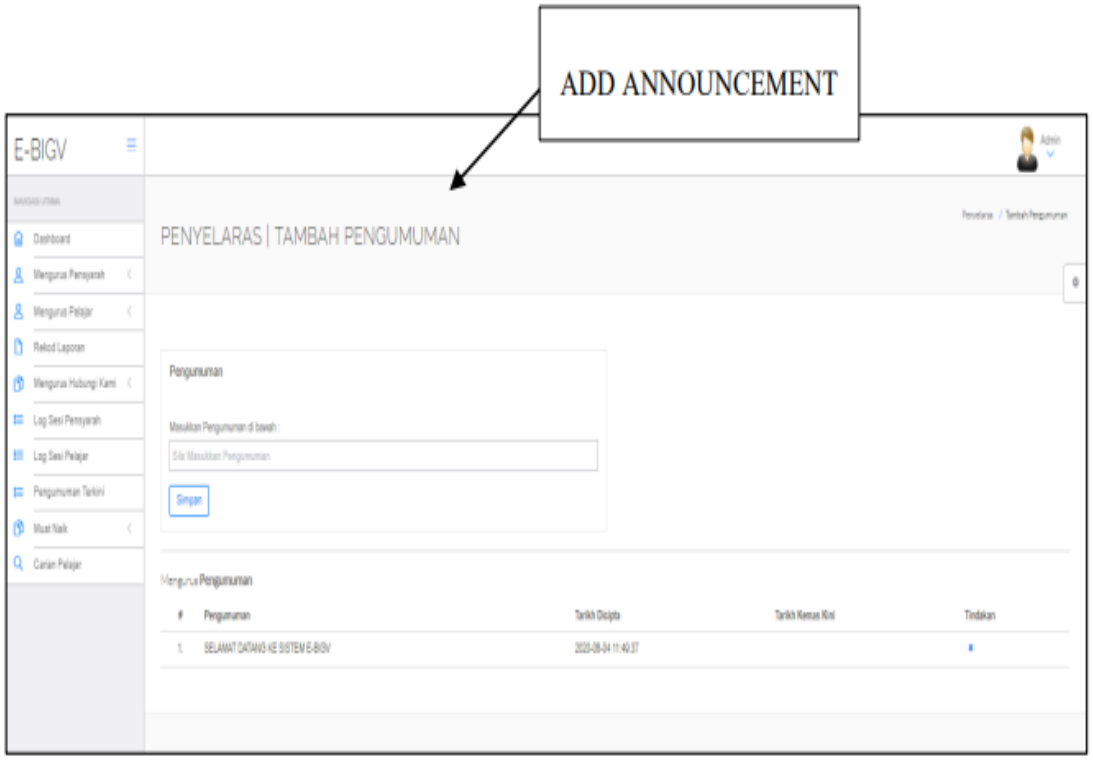

Fig. 5: Interfaces of add announcement

Fig. 6 displays the scoring rubric upload, on which the coordinator can upload the scoring rubric.

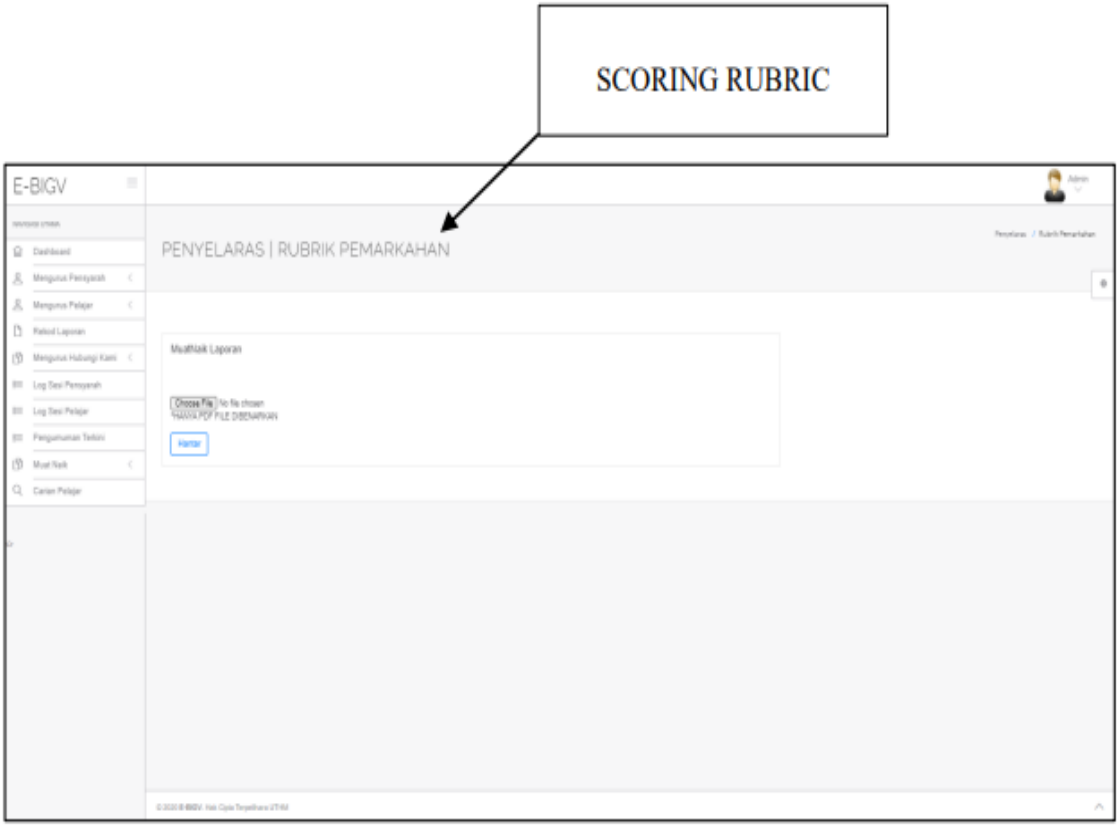

Fig. 6: Interfaces of scoring rubric upload

5. Conclusion

In conclusion, the E-BIGV management system can successfully implement and meet the set objectives. A high percentage of the acceptance rate indicates that the development of this system is acceptable but requires some improvements. This system is hoped to benefit the management, namely the coordinator, lecturers and students in conducting the *"Bina Insan Guru Vokasional"* courses.

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