Interactive Web-based Learning System for Human Resources Management

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Abstract: Learning system through the application of web or mobile-based e-learning that has been used in schools and the industry successfully brought many changes in the world of education. This makes the teaching and learning process no longer required to meet face to face and can be done not only in the classroom but can be done anywhere as long as an internet connection is available. E-learning makes students or instructors can do the teaching and learning process in their respective places. PT ABC Bintan, one of the companies engaged in electronic manufacturing, has implemented an e-learning system to train employees to increase understanding of what they do with certain materials. But over time, this system requires development both in terms of appearance and function so that the system becomes more interactive for its employees to use. The development process used waterfall as the system development model. To evaluate the performance of the web-based learning system we used a functionality test. Additionally, to evaluate the user acceptance of the system a usability testing was conducted. The results show the addition of features on e-learning was successful and made it easier for users to understand, work on, and manage training assessments.

1 INTRODUCTION

Human resources qualification is the primary concern of a good company (Gontkovicova & Spišáková, 2015; Purcărea, Popescu, & Gheorghe, 2018; Blaga & Gabor (2018); Wulandari, Maharani, Young, & Winoto, 2020). In industries, operator certification is needed through program in-house training. At PT ABC, this program previously was carried out using the face-to-face method in the classroom where the instructor was required to arrange the schedule and administration of the employee to conduct training and assessment in that session as well. A one-on-one training session containing one material can take up to 4.25 hours (Yonharista, 2018). Automatically during this time, employees also leave their jobs in the production area to attend this training, which will result in reduced company productivity. Therefore, in 2018 by following the advances in information technology, a web-based e-learning system was made as a new method of implementing certification that is more effective and flexible.

Meanwhile, the existing e-learning system is not adequate to fulfill the needs of operator certification and training, both in terms of appearance and functional. Therefore, this study aims to develop an interactive e-learning system of PT ABC by adding multimedia features to the material along with the training questions. This study also aims to evaluate the system. So that employees will be able to more easily understand the training material presented to improve the quality of human resources at PT ABC.

2 STUDY LITERATURE

There have been numerous studies conducted about e-learning. Lin, Liang, Tsai & Hu (2018) examined the factors that influence continuing web-based learning at work. It used exploratory analysis to validate three surveys conducted. Then, a path analysis was used to reveal a significant correlation among variables. This study considered perceptions of both personal online learning and work-related variables. Meanwhile, Sarabadani, Jafarzaeh, & ShamiZanjani (2017) proposed a conceptual research model based on UTAUT to understand the underlying factors that influence the intention of employees using the web-based learning system. Then, Baleghi-Zadeh, Ayub, Mahmud, and Daud (2017) developed and tested a

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model that predicts LMS acceptance based on Technology Acceptance Model.

Furthermore, Armstrong and Landers (2018); Crow and Parsons (2018); Shehadeh, Felfernig, Stettinger, Jeran, & Reiterer (2017); Oliveira, Jorge, Assocado, Leal, & Auxiliar (2016) concerned about the technical aspect of e-learning. Armstrong and Landers (2018); Crow and Parsons (2018); Shehadeh, Felfernig, Stettinger, Jeran, & Reiterer (2017) took advantage of gamification in their study while Oliveira, Jorge, Assocado, Leal, & Auxiliar (2016) used a recommender system to handle the adaptability issue of an e-learning platform. The study provides recommendations on e-learning content for its users using a hybrid technique of collaborative filtering and precedence graph.

Different from previous studies, this study was born from a company's need to improve its existing e-learning platform, from its existing static model to an interactive web-based learning system. It is expected to help the employee training process by adding a more complete, accurate data presentation and also with a more interesting display.

3 METHOD

This study used the waterfall method, or what is often referred to as the classic life circle model as a system development model. Further explanation about this method can be seen in Figure 1.

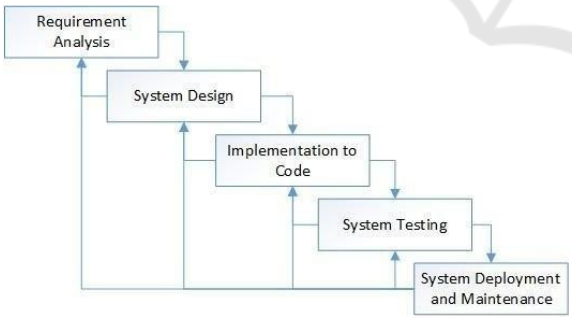

Figure 1: Development method.

The description of the steps in this model are as follows:

1. Requirements Analysis. The consultation stage with the user about application requirements, which aims to understand the software expected by the user and the limitations of the software.
2. System Design. Determine its' hardware and system requirements and assist in defining the overall system architecture.
3. Implementation. The system was first developed in a small program called a unit where the functions of the system are created, which are integrated into the next stage.
4. Testing. This stage is testing the entire function that has been created.
5. Maintenance. It consists of the improvement of system unit implementation and improvement of system functions as new needs.

Furthermore, functionality and usability testing were conducted to evaluate the performance of the system and its usability. There are 18 test cases used for functionality testing and 4 aspects for usability testing (learnability, the efficiency of use, satisfaction, facilitating condition).

3.1 Usability Model

This study used a modified usability model developed by Nielsen et al. Nielsen identified five attributes of a usability model; efficiency, satisfaction, learnability, memorability, and errors. The model proposed by Nielsen was modified by substituting error with facilitating conditions as a usability attribute of this study. Facilitating condition has a powerful role in the acceptance of a learning management system (Barnard, Bradley, Hodgson, & Lloyd, 2013; Yulius, Santosa, & Hartanto, 2016). We also eliminated memorability from the model. Memorability was eliminated from the model because some previous studies conducted by Agustina (2020); Hedegaard and Simonsen (2013); Al-Shamsi and Andras proved that it is not significant to influence the system usability.

3.2 Instruments and Participants

This study used quantitative methodology particularly the survey technique using a questionnaire to collect data. A total of 58 participants were asked purposively to contribute to this study.

4 RESULTS AND DISCUSSION

4.1 Results

E-learning that has been built uses PHP as a programming language and MSSQL as database storage. Furthermore, the web-based learning system was evaluated using functionality and usability testing. Functionality testing was conducted by the

researchers to check if the system performs as expected. There are 18 test cases used for functionality testing. Table 1 shows the results of functionality testing.

Table 1: Functionality testing results.

No	Test case	Target	Result testing
1	The operator can log in to the system	Operator successful to log into the system using their employee number	Passed
2	The operator can read teaching material theory	The operator can read that document concerning training material	Passed
3	The operator can watching video tutorials	The operator can watch the material training video	Passed
4	The operator can take the exam training	The operator can take the multiple-choice exam training	Passed
5	The operator can see the results of the exam	The operator can see the calculation of the exam results accurately	Passed
6	The operator can look at their test history privately	The operator can see all their test history	Passed
7	The operator can log out from the system	The operator successfully log out from the system	Passed
8	The supervisor can log in to the system	The supervisor successfully log in to the system using a windows account	Passed
9	The supervisor can look at the test history of operators	The supervisor can see all test history from any operator	Passed
10	The supervisor can log out from the system	The supervisor successfully log out from the system	Passed
11	Admin can log in to the system	Admin successfully log in to the system using windows account	Passed
12	Admin can manage all materials	Admin can see, add, change and remove materials	Passed
13	Admin can manage all exam questions	Admin can see, add, change and remove the exam questions	Passed
14	Admin can manage all emails	Admin can see, add, change and remove the email	Passed
15	Admin can look at the test history of all operators	Admin can see all test history from any operator	Passed
16	Admin can logout the system	Admin successful to logout the system	Passed
17	The system can automatically compress the uploaded videos	Every video file can be uploaded, And will be compressed for suitable size videos	Passed
18	System can automatically compress the uploaded images	Every images file can be uploaded, and will be compressed for suitable size videos	Passed

The functional testing result shows that all functional requirements for a web-based learning system work properly and can be continued for further testing.

To evaluate the performance of a web-based learning system from a user perspective, descriptive statistics of user perception toward the web-based learning system was carried out. It considered some usability aspects such as learnability, the efficiency of use, satisfaction, facilitating condition.

4.2 Usability Testing Results

A total of 58 respondents consisting of 56 operators from different departments and 2 admins was involved in this testing. There are 12 items (Agree or Disagree-scale) that should be filled in by respondents. Means of user responses to item statements in the usability questionnaire were computed. Table 2 shows the results of usability testing.

Table 2: Usability testing results.

No	Statement	N	Results
1	E-learning speeds up the process assessment and administration	58	85.1 %
2	E-learning increases the productivity company	58	81.7 %
3	Display of the e-learning more complete, accurate, and interesting	58	81.4 %
4	The use of e-learning is easy to understand	58	82.4 %
5	The use of e-learning for assessment is easy	58	82.8 %

6	Multimedia features like the picture inside the questions and video materials can help to understand the material assessment	58	83.8 %
7	The use of e-learning to conduct an assessment is support all materials that have been taught in the classroom	56	81.3 %
8	There is always a person or group to give support for help using e-learning	56	77.9 %
9	Resources to use the e-learning is available (computer and network).	58	83.4 %
10	I access e-learning almost every year	58	75.5 %
11	I access e-learning at least 30 minutes each time	58	74.5 %
12	The company requires me to use e-learning	58	79.7 %
Average			80.8 %

After carrying out a usability testing of all sample employees, the average result was 80.8%. It can be considered that the application is quite satisfying for users.

5 CONCLUSIONS

The objectives discussed in this study have been achieved as results show that the developed web-based learning system is interactive with multimedia features. By conducting system evaluation, we also can conclude that the web-based learning system has the expected functionality and usability. All functional features work properly and the system is satisfying from its user's perspective.

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