

Development of Digital Learning Pre-Commissioning Supervision of 150 KV Power Transformers at PLN UPMK I Project Management Center

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Abstract

This paper has the objective of developing a supervisory Digital Learning to improve supervisor competence in supervising pre-commissioning 150 kV power transformers at PT PLN (Persero) UPMK I Project Management Center by analyzing the basic competence of supervisor knowledge, ensuring the feasibility and effectiveness of the Supervision Digital Learning Application. This research is a development using the Research and Development approach with the Agile development method by applying the Scrum framework which consists of 7 stages. Data collection techniques used in this study were observation, interviews, and questionnaires. The method used to measure product feasibility is through validation from experts, namely webdesign, material, and media experts as well as performing a function test of the Digital Learning Monitoring Application using Black Box Testing (Boundary Value Analysis) and White Box Testing (Cyclomatic Complexity) instruments. The method used to measure product effectiveness is the System Usability Scale (SUS) and the User Experience Questionnaire (UEQ). The results showed that the supervision Digital Learning Application was considered feasible to use based on the percentage results from web design/application experts, material experts and media experts, based on the results of the functionality test with a success percentage of 85.25% and no code errors were found on each form. Then the Digital Learning Monitoring Application is considered effective for use based on the number of samples in this study as many as 25 respondents, with details of 10 respondents from office employees and 15 respondents from field supervisors, starting with a successful functional test with 10 different devices and 5 different operating systems.

Keywords

digital learning; pre commissioning 150 kv power transformer; supervision.



I. Introduction

In carrying out the Construction Management Business Process, PT PLN (Persero) Project Management Center (Pusmanpro) Construction Management Implementing Unit I has the main task of carrying out Construction Supervision in whole or in part of the work of electricity projects, both Power Plants and Networks. Furthermore, in carrying out the supervision of construction work, PLN Pusmanpro formed a Project Site Team (PST) spread over the scope of the work areas of the Provinces of Banten, DKI Jakarta, West Java, and Central Java with contracts and work instructions so as to achieve the planned cost, quality and time as well as the implementation of K2 and K3 in a project. Therefore, one of the main needs of supervisors today is engineering knowledge and work experience,

The implementation of the evaluation of the supervision of the installation and testing of transformers, transformer bays, bay lines, as well as erection and stringing

transmissions with a large number of project supervision photographed by weaknesses in the skills and competencies of supervisors through the Google Form application, mainly for the supervision of the electromechanical field of network projects as follows:

Table 1. Resume Evaluation of Network Electrical Supervisor's Understanding

Bidang	Sipil KitJat	Mekanikal Pembangkit	Inst&Elek Pembangkit	Elmek Jaringan	HSE	Sub Total	Spv Kons &Kontrak
Unit	Total	Total	Total	Total	Total		Total
UPMK I	86	7	3	93	66	255	196



Weaknesses in efforts to increase supervisory competencies at PLN Pusmanpro UPMK I currently do not utilize digital technology in their management so that it has an impact on the lack of monitoring of supervisors' knowledge, lack of supervisory knowledge causes supervisory competencies that are not optimal, data from supervision results are not valid so that it has the potential to decrease the quality of supervision.

The component that plays an important role in the supervision process is supervisory competence. Therefore, during the process of independent supervision at the site office, supervisory competence plays a very important role in creating good quality and quality of work and one source of proper supervisory knowledge is the Digital Learning Application for Supervision of Pre-Commissioning 150 kV Power Transformers. Based on the data and experience above, the researcher hopes that with the application, supervisors can understand and carry out supervision whenever and wherever with the right sources, as well as experts, project team leaders, management can still control the completeness of supervisors in carrying out their supervision.(Putra et al., 2019). The Supervision Digital Learning application is a source of supervisory knowledge that is compiled from various materials in the textbooks studied, international and national standards and there are questions to train supervisors' abilities. using artificial intelligence technology(E-learning et al., 2005). In this study, a trial of the use of the Digital Learning Application will be carried out by ensuring the feasibility and effectiveness of the application by testing the feasibility of the application function using Blackbox Testing with the type of testing used Boundary Value Analysis with a focus on analyzing the input process by testing the upper and lower limit values.(Snadhika Jaya, 2018)and Whitebox Testing with the type of testing used cyclomatic complexity by determining the number of independent paths in the base set of a program and providing the minimum number of tests that must be performed to ensure that all statements have been executed at least once.(System, 2008). Furthermore,

effectiveness testing with usability level will be carried out with analysis using scenario testing and direct interviews with users and comparing user experience using the User Experience Questionnaire (UEQ). In addition, user satisfaction will be calculated using the SUS (System Usability Scale) questionnaire.(Surahman et al., 2021).

II. Review of Literature

2.1 Digital Learning

Digital Learning is learning using a digital method that provides mandatory professional learning according to the competency needs of supervisory staff. The terms e-learning, online learning, virtual learning and digital learning, are often used to describe the same concept, namely learning that uses or is based on information and communication technology, or technology enhanced learning. But there is an opinion that these terms have different meanings. Online learning is referred to as learning using online tools for learning, which includes e-learning and blended learning, while the term digital learning is broader, covering all learning terms that use online and digital tools, both online digital and off-line digital, for example using online learning tools. laptop to open video programs off-line(Moore et al., 2011).

The tools and practices in question can include (a) interactive learning processes using various digital learning resources, in the form of learning objects or software, which can engage students/workers in studying academic substance, (b) the availability of digital access to various information data. and documents for students/workers, (3) personalized learning, (4) assessment of computer-based and online learning outcomes, (5) learning scenarios that intensify collaboration and communication between students/workers and with tutors and experts (Alliance for Excellent Education, 2012, p. 11).

2.2 Pre-Commissioning Supervision

Furthermore, the notion of supervision is a systematic effort by management to compare the performance of predetermined standards, plans or goals to determine whether performance is in line with these standards and to take corrective actions needed to see that human resources are used as effectively and efficiently as possible in achieving destination. According to (George R. Tery, 2006:395), Supervision is to determine what has been carried out, meaning evaluating work performance and if necessary, implementing corrective actions so that work results are in accordance with a predetermined plan.

According to (Handoko, 1998), the supervision process usually consists of at least five stages (steps), namely: (1) determination of implementation standards, (2) determination of measurement of the implementation of activities, (3) Measurement of implementation of activities, (4) Comparison of implementation with standards and analysis of deviations, (5) Taking corrective action when necessary.

In the implementation of supervision, Pre-Commissioning is a test carried out on an equipment in the field in a condition after arriving at the installation location (pre-assembled) and after components and accessories are reassembled (assembled). With the continued handover test in the field witnessed by the authorized officer.

According to(Silakhuddin, 2016)Pre-commissioning is a stage that aims to ensure that individual subsystems that have been completed in the design stage and are integrated into the system can work properly according to the specifications that have been previously designed. These activities include testing the function of individual subsystems after the construction and integration stages are declared complete.

2.3 Learning Development Model

SCRUM is a software engineering method using the principles of the AGILE approach, which relies on the power of team collaboration, incremental product and process iteration to realize the final result. In the world of Scrum technical education, it starts from a discussion of learning between the Product Owner and related stakeholders, namely Create backlog and Mapping Curriculum Needs Planning and Learning/Training which consists of 2 stages, namely performance analysis and needs analysis, then the Scrum Master and Team Development are formed. The first step taken by the Scrum master is to make all learning lists which are also called User Stories, the User Stories are made on a media called Backlog which is pasted on the Task Board (kompasiana, 2016). Development is a systematic and continuous effort made to realize something that is aspired. Development is a change towards improvement. Changes towards improvement require the mobilization of all human resources and reason to realize what is aspired. In addition, development is also very dependent on the availability of natural resource wealth. The availability of natural resources is one of the keys to economic growth in an area. (Shah, M. et al. 2020)

In the application of the scrum method, small groups are needed to play a role and framework for learning and supervision. In this case cooperative learning and supervision are involved. The relationship between learning outcomes and supervision by supervisors on small group learning strategies and the independence of supervisors in studying learning materials has been found (Stump et al., 2011).

2.4 Blackbox Testing

Black box testing, performed without detailed knowledge of the internal structure of the system or component being tested. also referred to as behavioral testing, specification-based testing, input/output testing or functional testing (System, 2008).

Black box testing focuses on the functional requirements of the software, based on the requirements specification of the software. Black box testing is a complementary approach in covering errors. The error categories that will be identified through black box testing include missing or incorrect functions, interface errors, data structure errors or external database access, performance or behavior errors, initialization and termination errors.

Digital Learning Monitoring Application Functionality Testing will be carried out using one of the Black Box Testing methods based on Boundary Value Analysis, namely functionality testing on FormProfile data and this method tests the quality of the application for which software testing documentation will include design, specifications, and coding with the testing process carried out to knowing the error rate that occurs in the software by determining the normal value, minimum value and maximum value of the data to be tested (Snadhika Jaya, 2018). The results of this test are to show that the application is able to handle data, both normal data and abnormal data.

2.5 Whitebox Testing

White Box Testing used to test an application or software by looking at the module to be able to research and analyze the code of the program that is made is wrong or not. If the module that has been produced is in the form of output that is not as expected, it will be recompiled and re-checked the code until it reaches what is expected. (System, 2008).

Testing an application or software that often uses white box testing will be tested in several stages, namely testing all decisions that use logical, testing all existing loops according to their limits, testing internal data structures and guaranteed validity.

The following are some of the requirements in white box testing, including defining all logic flows, building cases for use in testing, evaluating all test results, conducting thorough testing.

Testing the Functionality of Digital Learning Applications Supervision will be carried out using one of the White Box Testing methods based on Cyclomatic Complexity, namely testing the functionality of the code in the program and this method testing the quality of the application that will be carried out by looking at the module to be able to research and analyze the function of the code from the program that was created. wrong or not. The results of this test are to show that the application is successful with no code errors found in each form so that this Digital Learning Application is worth testing and using.

2.6 System Usability Scale (SUS)

System Usability Scale (SUS) is one of the usability testing methods that provides a fast and reliable measuring tool (Izabal et al., 2018), with a simple scale, in which there are 10 statement items. provides a global view of usability subjectivity assessment. From the 10 item statements, there will be 5 answer options for each statement, ranging from agree to strongly disagree.

2.7 User Experience Questionnaire (UEQ)

User Experience Questionnaire (UEQ) is an instrument used to process survey data related to user experience that is easy to practice, reliable, based, and used to conduct subjective quality assessments. (Laugwitz et al., 2008).

UEQ allows for a rapid process of assessing the user experience of interactive products. The parameters contained in the UEQ questionnaire are structured to address the overall user experience perception. The form of the UEQ questionnaire was built in order to get user responses to immediately express feelings, impressions, and attitudes that arise when using a product. (Rauschenberger et al., 2013).

III. Research Method

3.1 Research Type

The method used in this study uses a qualitative approach, through the Research and Development (R&D) strategy using the Agile Methodology by applying the Scrum framework. In this study, data collection will be carried out to support the process of developing a Digital Learning Supervision Application for supervisors in order to improve user experience in relation to efficiency and effectiveness when carrying out learning and supervision by using new developments, namely web and android based with MySQL. Data collection techniques that will be used in this study are observation, interviews, and questionnaires.

3.2 Research Stages

The stages carried out in this study are shown in Figure 1.

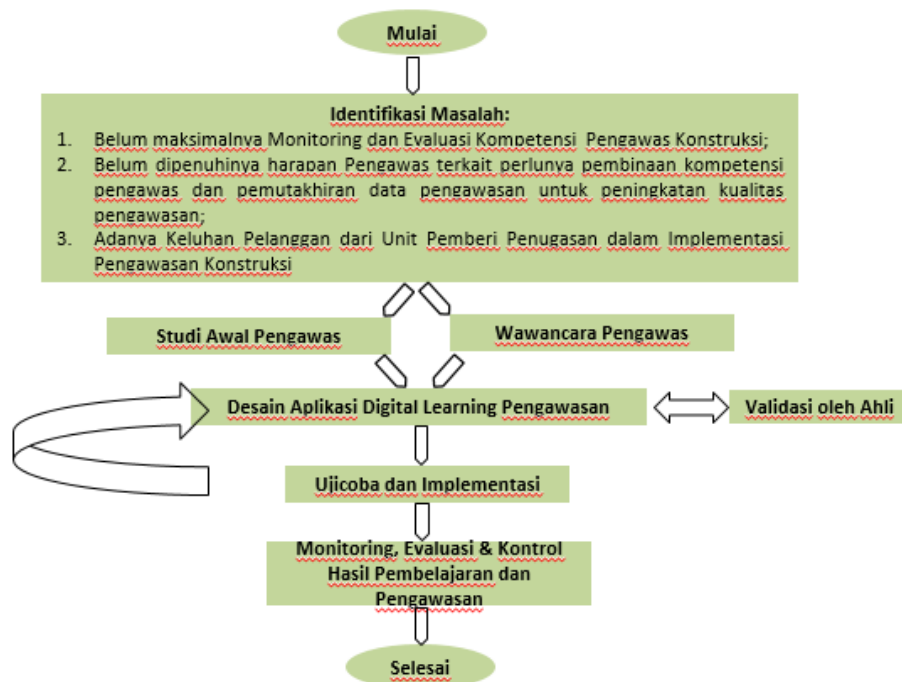


Figure 1. Research Flowchart

This research begins by identifying the problem, by mapping all problems related to the management of supervisory competence and the results of supervision used to support the research. Next, an initial supervisor study was conducted in the form of survey data and supervisor interviews which were used as research instruments in designing a digital learning supervision application and validated by experts. Next, a product feasibility test is carried out by testing functionality with Blackbox Testing based on Boundary Value Analysis and Whitebox Testing based on Cyclomatic Complexity and product effectiveness through measuring the level of user satisfaction (satisfaction) using a System Usability Scale (SUS) questionnaire and the level of efficiency and effectiveness using a questionnaire. User Experience Questionnaire (UEQ).

In objective research, as mentioned above, there are several factors that will be tested, namely product feasibility tests and product effectiveness tests, for the feasibility to be used in testing, namely:

1. *Blackbox Testing* based on Boundary Value Analysis;

The functionality that will be tested in the Digital Learning Monitoring Application test is the functionality on the FormProfile data. In this form there are 23 entry fields, namely id_sdm, name, NIP, qualification, stat-peg, assignment, education, major, role, place of birth, date of birth, gender, religion, goldarah, date of work, address, telephone, nohp, email, password, ktp, npwp, description.

The “my exam/quiz” function consists of one data entry panel as shown in Figure 3. In this form there are 10 entry fields, namely id, category, Opt1, Opt2, Opt3, Opt4, Answer, Date, Status with Acceptance Criteria for each field. tested.

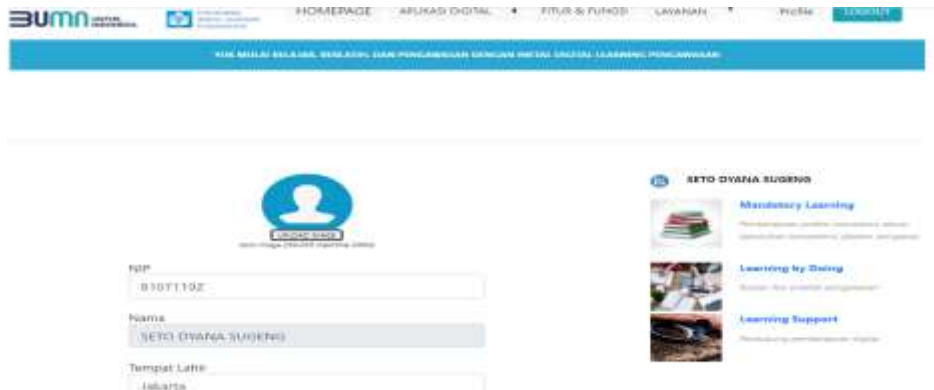


Figure 2. Profile Form



Figure 3. My Exam Form

2. *Whitebox Testing* based on Cyclomatic Complexity.

The White Box Testing method is based on Cyclomatic Complexity by measuring software that provides a quantitative measurement of the complexity of the program logic. In the context of the basis path testing method, the value calculated for cyclomatic complexity determines the number of independent paths in the base set of a program and provides the minimum number of tests that must be performed to ensure that all statements have been executed at least once. An independent path is each path in the program that represents a new set of new process or condition statements.

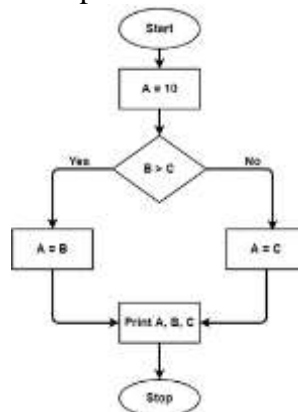


Figure 4. TestCyclomatic Complexity

In measuring the level of satisfaction (user satisfaction) used the System Usability Scale (SUS) questionnaire. SUS uses 10 questions in the questionnaire which will later be distributed to respondents as a benchmark in testing.

User Experience Questionnaire (UEQ) with research parameters obtained from 6 scales and consists of 26 statement items. Subjective research will use a questionnaire with questions obtained based on the 6-scale UEQ questionnaire. This study uses a testing

method, namely testing through the UEQ questionnaire which will be distributed to several respondents, the data is taken when the test is carried out using the Indonesian User Experience Questionnaire table which is based on 6 quality aspects measured. The application was tested with the same 25 respondents. Digital Learning application test results will be generated based on the value of 3 test factors, namely efficiency, effectiveness and satisfaction (user satisfaction).

UEQ was given to the same 25 respondents (10 respondents from Project Team Leaders and 15 respondents from supervisors who took the UEQ test). Respondents who take this test are selected based on respondents who have never used the application being tested with an age range of 24-45 years and have different backgrounds/competencies.

IV. Result and Discussion

4.1 Product Feasibility Test Results

1. The results of testing functionality with Blackbox Testing based on Boundary Value Analysis.

Table 2 shows the results of functionality testing with Boundary Value Analysis-based Blackbox Testing that the application is able to handle data, both normal data and abnormal data with a success percentage of 85.25%. Two fields need to be improved in order to improve the application's ability to process data under normal or abnormal conditions on each form so that this Digital Learning Application is worth testing and using.

Table 2. Recapitulation of BVA Test Results

No	Field	Tingkat Kesuksesan
1	Kategori	66%
2	Pertanyaan	100%
3	Jawaban	75%
4	Tanggal	100%
Rata-Rata		85,25%

2. The results of the Whitebox Testing functionality based on Cyclomatic Complexity

Figure 5 shows the results of the Whitebox Testing functionality based on Cyclomatic Complexity that the function test on the code function of the program that was created has been successful with no code errors found in each form so that this Digital Learning Application is worth testing and using.

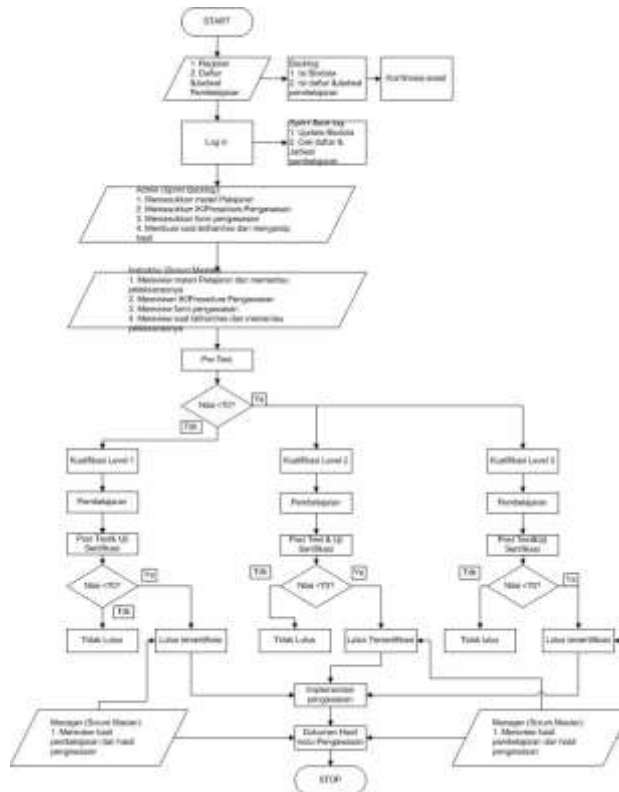


Figure 5. Test of -based Application Functionality Cyclomatic Complexity

4.2 Product Effectiveness Test Results

1. Test Results of Software and Hardware Functions

Table 3 and table 4 show Product effectiveness tests were carried out using software and hardware functional tests with the following successful statuses:

Table 3. Software Test Results Table 4 Hardware Test Results

No	Proses	Hasil yang diharapkan	Status	No	Proses	Hasil yang diharapkan	Status
1	Open XAMPP Control Panel dan local host dapat berjalan dengan baik	Ketika server dihidupkan aplikasi Open XAMPP dan local host dapat bekerja dengan normal	Berhasil	1	Server terpasang perangkat keras	Komputer server terpasang perangkat keras yang sesuai dengan spesifikasi sehingga komputer server dapat diinstal dengan sistem operasi server	Berhasil
2	Berhasil login	Pengguna login menggunakan Email, password dan captcha untuk login Aplikasi Digital Learning Pengawasan	Berhasil	2	Komputer server terhubung dengan perangkat jaringan	Komputer server terhubung dengan perangkat jaringan (switch, titik akses nirkabel) dengan menggunakan kabel UTP	Berhasil
3	Open XAMPP dan local host memantau pengumuman yang dipakai pengguna	Open XAMPP dan local host melakukan proses monitoring data pengawas. Data yang dimonitor berupa data pengawas, pembelajaran yang dapat dilakukan, waktu pembelajaran, hasil evaluasi pembelajaran, pelaksanaan dan hasil pengajaran, sertifikat pembelajaran.	Berhasil	3	Open XAMPP Control Panel dapat berjalan dengan baik	Ketika server dihidupkan dapat bekerja dengan normal	Berhasil
4	Dapat mengakses aplikasi	Pengguna dapat memanfaatkan internet untuk mengakses fitur aplikasi seperti <i>Academy Learning Learning Support</i> dan lain-lain	Berhasil	4	XAMPP Control Panel dapat berjalan dengan baik	Titik Akses XAMPP Control Panel bisa diakses dari gawai/laptop pengguna	Berhasil
5	Dapat mengakses materi pembelajaran dan ujian pembelajaran	Pengguna dapat memanfaatkan Aplikasi untuk membaca materi pembelajaran dan pelatihan	Berhasil	5	Akses Aplikasi Digital Learning terhubung dengan wireless LAN controller	Akses Aplikasi Digital Learning terhubung dengan wireless LAN controller untuk manajemen titik akses Aplikasi Digital Learning secara terpusat	Berhasil
6	Dapat mengakses pelatihan hasil pengajaran	Pengguna dapat memanfaatkan Aplikasi untuk menerima dan menerima hasil pengajaran	Berhasil	6	Wireless LAN Controller mengkonfigurasi titik akses	Wireless LAN Controller dapat mengelola titik akses Aplikasi Digital Learning secara terpusat	Berhasil
7	Aplikasi stabil	Perangkat terhubung ke Aplikasi melalui internet tanpa kendala	Berhasil				
8	Berhasil logout	Apabila selesai mengakses Aplikasi, pengguna dapat logout dari Laptop	Berhasil				

Table 4 shows the results login trials using various devices and operating systems to test the compatibility of the Digital Learning Application system against all devices of various types, both types of devices and operating systems from the results of trials conducted at the PST Central Java I Site Office building on December 28, 2021 with fixed devices and operating systems can function and run properly with a perfect success status and it can be concluded that the Monitoring Digital Learning Application system with the XAMPP Control Panel system is compatible with all devices as follows:

Table 4. Compatibility Test

No	Jenis Perangkat	Merek	Koneksi Jaringan	OS	Status
1	Laptop	HP Probook 440 G5	Wifi	windows 10	Berhasil
2	Laptop	Thinkpad ultrabook T460S	Wifi	Windows 7	Berhasil
3	Laptop	Asus Ultrabook TP412FA	Wifi	Windows 10	Berhasil
4	Laptop	ASUS A456U i7	Wifi	Windows 8	Berhasil
5	Laptop	Lenovo IdeaPad 5	Wifi	windows 10	Berhasil
6	Tablet	Samsung Tab S6	Wifi	Android 11	Berhasil
7	Laptop	Lenovo Ideapad 3 Slim 3	Wifi	Windows 11	Berhasil
8	Laptop	Macbook pro M1	Wifi	mac OS Big Sur	Berhasil
9	Laptop	MacBook Air	Wifi	macOS Big Sur	Berhasil
10	Laptop	HP Probook 440 G5	LAN	windows 10	Berhasil

The results of the next trial stage are the results of small-scale trials carried out above, the following are the details of Login Date, Material opened, User Name, Wifi, Auth status, Device Type which can be seen in table 5 below:

Table 5. Devices and materials and User Status for Small-Scale Trials

Tanggal Login	Materi yang dibuka ppt/pdf/video	WIFI	User Name	Auth	Device Type
28 Desember 2021	Pdf	JatengIreborn	0000 Hanindyo	Yes	Laptop/PC
28 Desember 2021	Video	JatengIreborn	Niam F	Yes	Laptop/PC
28 Desember 2021	Pdf	JatengIreborn	Budi Cahyono	Yes	Laptop/PC
28 Desember 2021	Ppt	JatengIreborn	Chandra Yanuar	Yes	Laptop/PC
28 Desember 2021	Video	JatengIreborn	Esurrudo	Yes	Laptop/PC
28 Desember 2021	Ppt	JatengIreborn	Easy Samadbatu	Yes	Laptop/PC
28 Desember 2021	Video	JatengIreborn	Brianca Aldy	Yes	Laptop/PC
28 Desember 2021	Pdf	JatengIreborn	Saka Sukarno	Yes	Laptop/PC
28 Desember 2021	Pdf	AP Bratoo	Seto Dyana Suseno	Yes	Laptop/PC
28 Desember 2021	Ppt	JatengIreborn	Evan Arief	Yes	Laptop/PC

2. System Usability Scale Questionnaire Results(SUS)

Table 7The following shows the results of the System Usability Scale questionnaire which was distributed to 25 respondents "Trial-Application Digital Learning Supervision" obtained an average System Usability Scale score of 84.6 where the score can be interpreted as follows:

- The level of acceptability range obtained is in the acceptable category.
- The grade scale obtained is in category A.
- Adjective rating obtained are included in the Good category.

It can be concluded from the results of the average System Usability Scale score that it shows that a Test-Application Digital Learning Monitoring system from the point of view of the satisfaction aspect using a usability testing tool with tools using the System Usability Scale questionnaire has been able to meet the satisfaction aspect and is accepted for use by users/ supervisors in this study can be used by supervisors in the scope of PLN Pusmanpro UPMK I Jakarta.

Table 6. SUS Test Results

No	Responden	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Juml Score Hasil hitung	SUS Score (Juml x2,5)	Grade
1	Responden 1	5	1	5	1	5	1	5	1	5	1	40	100	A
2	Responden 2	5	2	4	3	3	4	4	2	4	3	26	65	D
3	Responden 3	5	2	5	3	5	1	5	1	5	1	37	92,5	A
4	Responden 4	5	1	5	1	5	1	5	1	5	1	40	100	A
5	Responden 5	5	1	5	1	5	1	5	1	5	1	40	100	A
6	Responden 6	4	2	4	4	4	2	4	2	4	4	26	65	D
7	Responden 7	5	2	5	5	4	2	4	2	5	2	30	75	B
8	Responden 8	5	1	5	5	5	1	5	1	5	1	36	90	A
9	Responden 9	5	2	5	2	5	2	5	2	5	4	33	82,5	A
10	Responden 10	4	1	5	1	5	3	4	1	4	2	34	85	A
11	Responden 11	4	3	3	1	3	5	3	1	5	3	25	62,5	D
12	Responden 12	5	1	5	1	5	1	5	1	5	1	40	100	A
13	Responden 13	5	3	5	1	4	1	4	1	5	2	35	87,5	A
14	Responden 14	5	1	5	1	5	1	5	1	5	5	36	90	A
15	Responden 15	5	1	2	2	5	2	4	2	4	2	31	77,5	B
16	Responden 16	4	2	4	1	4	3	4	2	5	2	31	77,5	B
17	Responden 17	4	2	5	1	4	2	4	2	3	4	29	72,5	B
18	Responden 18	5	1	5	1	5	2	5	2	5	1	38	95	A
19	Responden 19	4	3	4	2	4	2	4	2	4	2	29	72,5	B
20	Responden 20	4	2	4	2	3	2	4	2	4	1	30	75	B
21	Responden 21	3	2	4	1	4	2	5	2	4	2	31	77,5	B
22	Responden 22	5	1	5	1	5	1	5	1	5	1	40	100	A
23	Responden 23	4	1	3	1	3	1	4	1	3	1	32	80	B
24	Responden 24	5	1	5	1	5	2	5	1	5	1	39	97,5	A
25	Responden 25	5	1	5	1	5	1	5	2	5	2	38	95	A
Rata Rata Skor System Usability Scale													84,6	A

3. Questionnaire Results *User Experience Questionnaire (UEQ)*

Figure 6 shows The results of the UEQ evaluation questionnaire were determined using the data analysis tools provided by UEQ as follows:

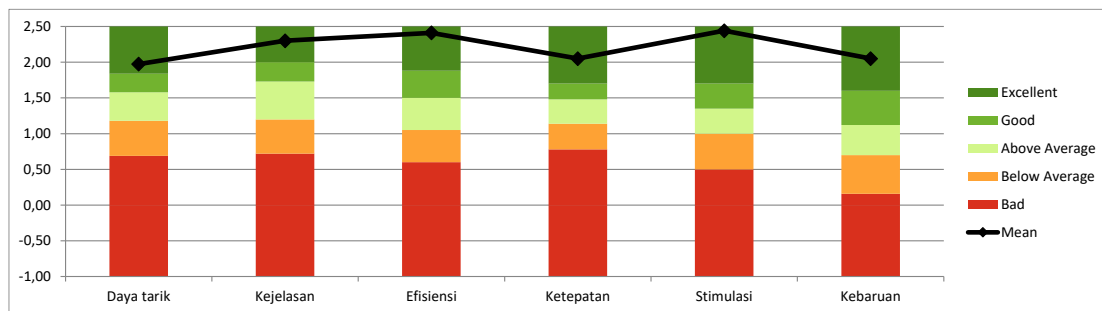


Figure 6. UEQ Assessment Result Diagram

Figure 6 shows that of the six scales, attractiveness with a score of 1.97 predicate excellent, clarity with a score of 2.30 predicate excellent, efficiency with a score of 2.41 predicate excellent, accuracy with a score of 2.05 predicate excellent, stimulation with a score of 2.44 predicate excellent, and novelty with a score of 2.05 predicate excellent. These results indicate that the six UEQ test scales are in an excellent (very good) position. The subjective test results show that the Digital Learning Supervision Test-Application user interface can provide the best experience for users/supervisors.

4.3 Discussion

Based on the test results above The Digital Learning application for supervision with the XAMPP Control Panel system is accepted, it supports Maman Surahman, Nur Widiyasono, Rohmat Gunawan research entitled Usability Analysis and User Experience Online Health Consultation Application Using Usability Scale System and User Experience Questionnaire (Surahman et al., 2021), then supported the research of Ike Kusuma Putri, Satrio Hadi Wijoyo, Yusi Tyroni Mursityo entitled Analysis of Usability and User Experience on Budget Hotel booking applications using the User Experience Questionnaire (UEQ) (Case Study on Airy Rooms) (Putri et al., 2019), as well as supporting the research of Irma Rofni Wulandari, Lilis Dwi Farida entitled User Experience Measurement in E-Learning in University Environments using the User Experience Questionnaire (UEQ). (Wulandari & Farida, 2018) In this study, the UEQ results showed that respondents gave positive perceptions of the three applications tested. This can be seen from the average value obtained by the three applications on each UEQ questionnaire scale, which almost all reach and even exceed the number 0.8, where this number is the limit value that is considered a normal and positive result in the UEQ questionnaire, and in research This result and predicate also show positive results.

V. Conclusion

Based on the results of the analysis, the results of product development, the results of testing and product revisions as well as the discussions that have been described previously, the following conclusions can be drawn:

1. The result of this research is a product The Digital Learning Monitoring application has been successfully developed into a ready-to-use product. The results of the tests carried out by authenticating the application run well and can be used for all devices, including computers, laptops, tablets. With this system, users can seamlessly connect to the network to access the application wherever they are.
2. Based on the assessment of webdesign/application experts, materials, and media as well as the results of application functionality testing using the Boundary Value Analysis-based Blackbox Testing method and the Cyclomatic Complexity-based Whitebox Testing method, this Digital Learning Monitoring Application product is declared suitable for use by the PT PLN (Persero) Electromechanical Construction Supervisor.) UPMK I Jakarta Project Management Center on the subject of pre-commissioning supervision training and 150 kV transformers;
3. The effectiveness of this new Digital Learning Application (Localhost) using PHP programming and My SQL database measured on the aspect of satisfaction using the System Usability Scale (SUS) questionnaire which got an average System Usability Scale score of 84.6. This has met the satisfaction aspect and is accepted for use by users. For subjective testing, a User Experience Questionnaire (UEQ) was used to calculate user experience in using the system. The results obtained in this new Digital Learning

Application (Localhost) using PHP programming and My SQL database that get results on a scale of attractiveness, efficiency, accuracy, stimulation, novelty, and clarity in excellent positions (excellent).

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