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Expert Analysis of the User Interface of an Academic E-Supervision Application Based on Vocational Education Character

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Abstract— Designing information systems to accommodate the unique needs of various users receives a lot of attention in contemporary software engineering. One such distinctive requirement in the educational context is academic supervision. Academic supervision encompasses activities to assist educators in enhancing their skills for managing the learning process and achieving educational objectives. In vocational high schools, the primary educational goals are to prepare students for the job market and empower them to initiate their businesses. These goals can only be realized if teachers incorporate technical and entrepreneurial skills into learning. The main goal of this study is to assist school supervisors and principals in assessing and directing teachers as they incorporate ideas of vocational education into the teaching and learning process. The research methodology used in this study is research and development, which includes several stages: initial needs analysis and assessment of the current state of academic supervision; development, which involves the creation of a conceptual system model; system interface design; model validation and revision; and evaluation, which requires system testing, implementation, and deployment. Based on the initial investigation and analysis of academic supervision, particularly in the context of vocational education, this research presents a conceptual model and system interface design. The outcomes of this research encompass the interface, system architecture, and user guide for the academic e-supervision system. An expert analysis of the user interface design indicates that the interface received positive evaluations from experts, with an overall average rating of 88%.

Keywords— Academic e-supervision; vocational education character; graduate quality; user interface.

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I. INTRODUCTION

In the last three decades, the development of information systems has made rapid progress, and currently, information system applications have permeated nearly every aspect of human life [1], [2], [3]. One crucial domain that requires implementing information systems is education, especially in the context of academic supervision. Several actions are included in academic supervision to assist teachers in improving their capacity to oversee the learning process and accomplish educational objectives [4].

The primary goal of vocational higher education is to equip graduates with the skills necessary for entering the workforce or launching their businesses [5]. This objective can only be achieved if educators successfully integrate both technical knowledge and soft skills into the teaching process [6]. This study aims to help school principals and other administrators evaluate teachers' performance and direct them as they

incorporate vocational education ideas into their instruction and learning methods.

To achieve this objective, the research employs a research and development methodology, encompassing various phases such as needs assessment, the development of a conceptual system model, the design of the system interface, model validation, and an evaluation phase that includes system testing, implementation, and deployment. This research results in creating an interface for an academic e-supervision system, which consists of the system's architecture and user instructions.

In developing this system, it is crucial to ensure that vocational education values are well integrated into the learning process [7], [8]. This can be achieved by adopting an approach encompassing content and teaching strategies. Additionally, school principals and supervisors need to implement creative supervision that includes three stages, pre-supervision, implementation, and follow-up, to ensure the achievement of educational goals.

To address the previously identified issues, an innovative solution incorporating information technology is required. The Academic E-Supervision Information System based on vocational education values is a crucial step in meeting vocational school users' needs, understanding, and capacity. The results of the entire system need to be explained and published in a scientific paper.

II. MATERIALS AND METHOD

The Central Statistics Agency (BPS) of Indonesia reports that graduates of Vocational High Schools (SMK) have grown to be a significant factor in Indonesia's unemployment rate. According to the data, it contributed 10.36% in 2019 before rising to 13.55% in 2020 and then slightly down to 11.13% in 2021. In contrast, it decreased to 9.42% in 2022. The high unemployment rate reflects an imbalance between job requirements in the workforce and the qualifications of graduates from educational institutions [9]. One of the reasons for this is the lack of character development and mentoring, as well as graduates' limited understanding of the soft skills required [10], [11]. This issue is also related to teachers' inadequate quality and competence and their difficulties in optimizing their roles as educators [12], [13].

Therefore, SMK, as a key stakeholder in the commercial and industrial sectors, needs to produce graduates who possess not only strong technical skills but also the soft skills needed to adapt to the ever-changing market demands [14] [15]. In vocational learning, students must be well-equipped in technical and character skills [16]. This includes values such as honesty, responsibility, time management, workplace safety, perseverance, resilience, stress management, and the ability to accept feedback [17]. Additionally, the industrial environment demands other skills such as leadership, teamwork, and organization [18], [19], [20]. Attributes like a strong work ethic, tolerance, and patience are highly valued in today's industrial world. Cultivating good character traits such as good behavior, perseverance, integrity, communication skills, and teamwork [21]. Further success can be achieved through initiative, courage, morality, hard work, adaptability, self-control, quick learning ability, a desire to continue learning, high learning capability, flexibility, and entrepreneurial spirit. By fostering respect for individual freedom, the character education process is crucial to implant these values in children and change societal norms.

Character education may be included in every topic and learning activity by introducing moral principles [22]. Teachers must prepare character education throughout the learning stages, from planning to assessment [23]. Teachers support students throughout their educational journeys in addition to serving as instructors. According to John Hattie's research from the University of Auckland, teachers can influence student learning results by up to 30% [24]. Therefore, teachers must constantly reflect on their teaching practices, make improvements, develop creative and innovative ideas, and promote student character in all subjects by understanding the importance of soft skills. Teacher competence is highly influential in maintaining educational quality [25].

To deliver quality education only highly qualified teachers can achieve this [26]. The ability of principals to oversee teachers' professional development and evaluate their performance is crucial, given the role of principals as leaders responsible for quality learning implementation [27]. One of the key instruments for empowering teachers and raising the standard of learning is academic monitoring. Teachers can undergo a series of management training known as academic supervision to improve their classroom management skills, which ultimately helps enhance their pedagogical and professional skills and produce higher-quality graduates. Planning, implementation, and follow-up must be well-executed for effective academic supervision. For example, school principals or supervisors can employ various strategies, including direct classroom observation. However, in the era of information technology, more efficient academic supervision requires an information system that enables online supervision, addressing challenges such as a limited number of supervisors and scattered school locations.

Considering the multiple concerns highlighted, it's apparent that there is a significant scarcity of research concerning incorporating character education into vocational training. Consequently, this research strives to evaluate the utilization of academic e-supervision by teachers in incorporating vocational character education throughout all phases of the educational process. These steps are crucial as a response to the demands of the industrial world to reduce unemployment rates and assist school principals or supervisors in conducting academic supervision. The research and development method is used in this study, focusing on the initial stages of needs analysis and the actual conditions of educational supervision, as well as the development stage involving the design of the academic e-supervision interface that aligns with the characteristics of vocational education. Active collaboration with school principals and teachers from SMK in Padang is also integral to the interface development process to ensure relevance and practicality in real-world situations. With this approach, this research is expected to significantly contribute to addressing the challenges of vocational education in Indonesia.

This study employs research and development methodology, focusing primarily on the initial, developmental, and evaluative phases. Figure 1 provides an overview of these research stages, emphasizing the initial and developmental phases. During the initial stage, the research assesses the requirements of character-based academic supervision within vocational education.

Additionally, an examination of the current conditions of academic supervision is carried out. Moving to the developmental stage, the academic e-supervision interface is crafted, considering the distinctive attributes of vocational education [28]. The interface development process also includes active participation from a school principal and a teacher from SMK in Padang. They collaborate in making decisions regarding the layout of individual web pages, menu structures, color schemes, and the interrelationships among various activities. The Yii framework and MySQL are used to implement this interface's design.

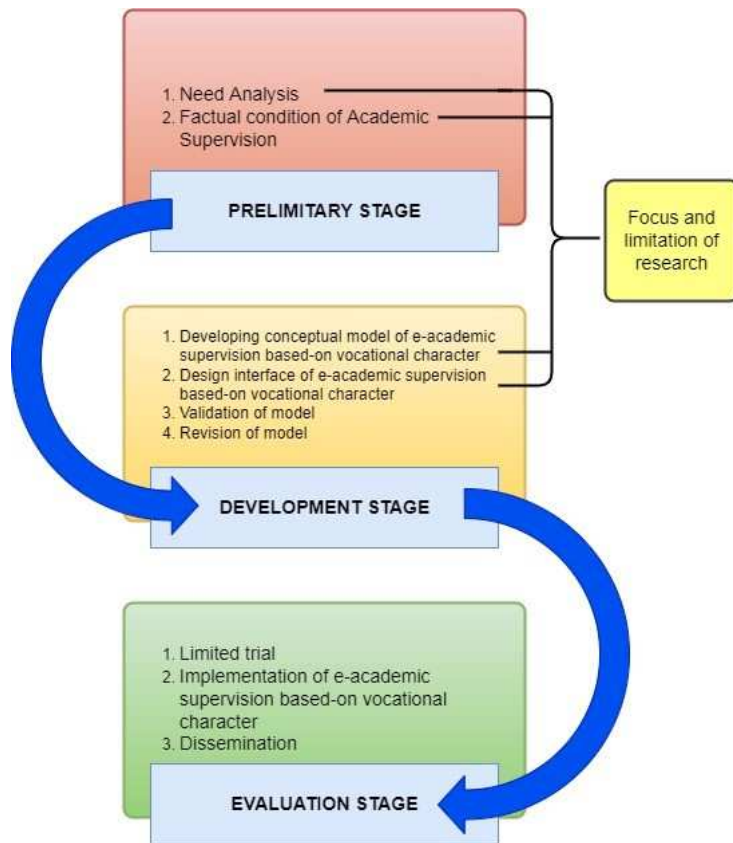


Fig. 1 Focus and Research Limitations

Figure 2 shows the conceptual framework for Academic E-Supervision. According to this illustration, the key participants in the system are the administrator, school principal, supervisor, and teachers. The administrator is responsible for overseeing the overall management of the

system to guarantee the efficient execution of its operational procedures. The school principal is tasked with developing the supervision schedule, overseeing its execution, and delegating responsibilities to supervisors.

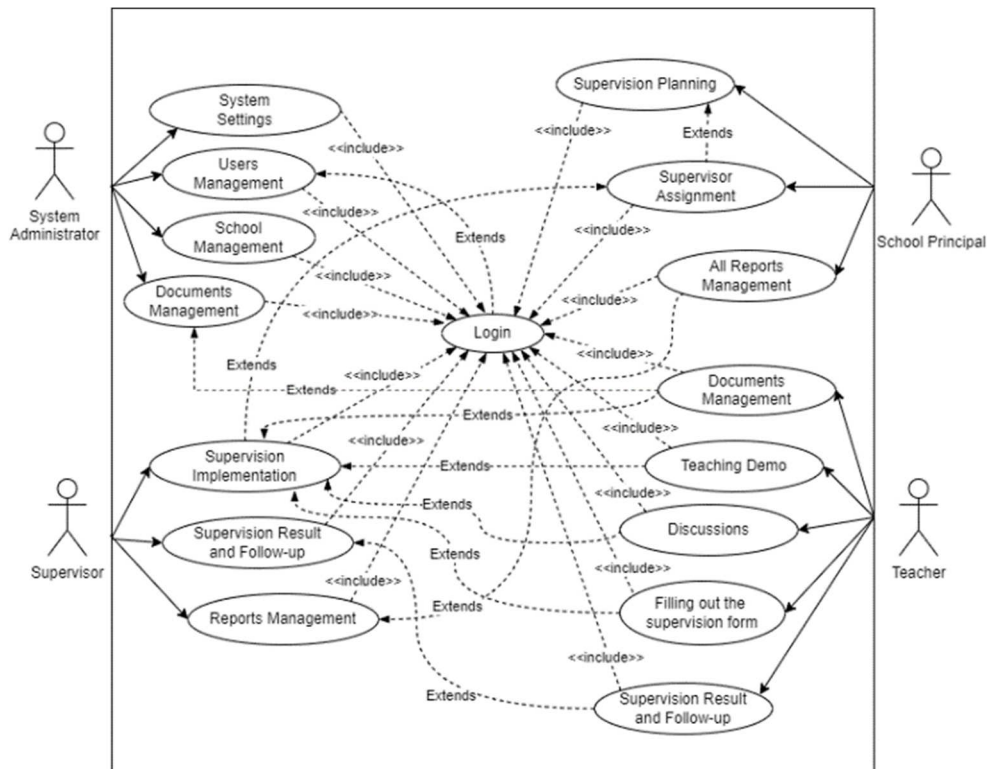


Fig. 2 Use case diagram of Academic E-Supervision

Supervisors perform their supervisory functions by checking all documents and teaching materials uploaded by teachers, conducting classroom observations through shared or uploaded instructional videos, and communicating with teachers through discussion forums. Meanwhile, teachers upload all documents and teaching materials, share or upload classroom instructional videos, and communicate with supervisors through discussion forums. Teachers are also required to complete the supervisory implementation instruments. The school principal has access to reports on the entire supervisory process.

The expert analysis method used in Designing the Academic E-Supervision Interface is qualitative and quantitative, utilizing and modifying the eight golden rules method [29], [30], [31]. In this study, interviews and quantitative questionnaires were used to collect data. Table 1 shows the expert assessment components.

TABLE I
GRID OF EXPERT ANALYSIS IN DESIGNING THE INTERFACE OF ACADEMIC
E-SUPERVISION INSTRUMENTS

No	Assessment Aspect
1	Objective Identification
2	User Understanding
3	Overall Review
4	Aesthetic Evaluation
5	Readability and Clarity Analysis
6	Usability and Navigation
7	Consistency
8	User Experience
9	Conclusion and Recommendations
10	Feedback

[29] (With modifications)

III. RESULT AND DISCUSSION

This section explains how the academic e-supervision user interface and expert assessment results use the eight golden rules

A. User Interface of Academic E-Supervision

There are three stages in the implementation of academic e-supervision: planning, execution, and follow-up on supervision results. Each user must create a personal account and log in to the system to access it. Users must submit their username, which is typically an email address, and a password while checking in. Administrators, instructors, supervisors, and school principals are just a few user categories that can access this application, each with varying levels of access depending on how they function in the supervisory process. Figure 3 provides a graphic representation of the interface for the login page.

In the planning phase of e-supervision, administrators and supervisors can plan the supervision activities to be conducted, specify the aspects to be evaluated, and schedule supervision sessions. Subsequently, in the execution stage, teachers who undergo supervision will receive notifications regarding the supervision schedule. The supervision process

proceeds according to the predefined plan and supervision-related data is recorded in the system.

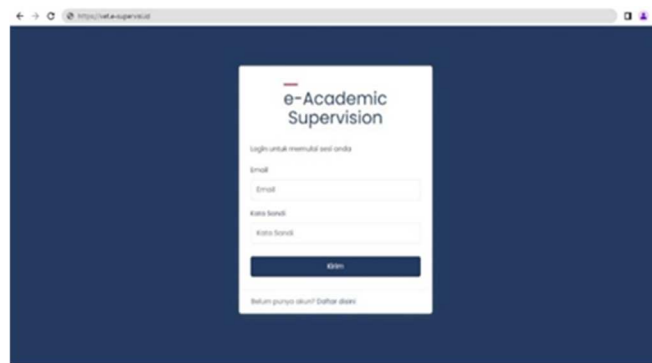


Fig. 3 Interface login of Academic E-Supervision

After the supervision process is completed, the follow-up stage on supervision results is carried out. Administrators and supervisors can access the supervision results data, analyze findings, and recommend improvements or necessary follow-up actions. Teachers can also view the supervision results and take appropriate corrective measures. Thus, this e-supervision system becomes an effective tool in supporting the development and enhancement of education quality.

After successfully logging into the system with their unique credentials, each user will see an interface customized for their role, functions, and permissions. Figure 4 depicts the entire system user interface design. The school principal's page contains several menus: Dashboard, Supervision Planning, Implementation, Assessment and Results, Follow-up, and Report Management. The supervision planning menu, which consists of four submenus: Supervision Scheduling, Supervisor Assignment, Supervision Materials, and Supervision Instruments, can initiate the planning and implementation of supervision processes.

First, in the Supervision Scheduling submenu, the school principal must determine the schedule for supervision implementation. This stage is a crucial initial step in the supervision process. The school's principal will draw out and assign teachers and supervisors whose work will be evaluated using the Supervisor Assignment submenu. Here, the school principal must also specify the supervision materials to be used, and this step is carried out through the Supervision Materials submenu. Finally, the school principal needs to establish the supervision instruments teachers will use for their assessments, which is done through the Supervision Instruments submenu. Teachers will later complete these instruments as part of their evaluation process.

Figure 5 shows the UI for the supervision planning stage as a visual reference. After logging in, teachers can access the interface's menu options, including the Dashboard, Supervision Schedule, Learning Documents, Teaching Demonstrations, Discussion Forums, Supervision Forms and Results, and Follow-Up menus. The first step for teachers subject to performance evaluations is to submit files and instructional materials using the Learning Documents menu.

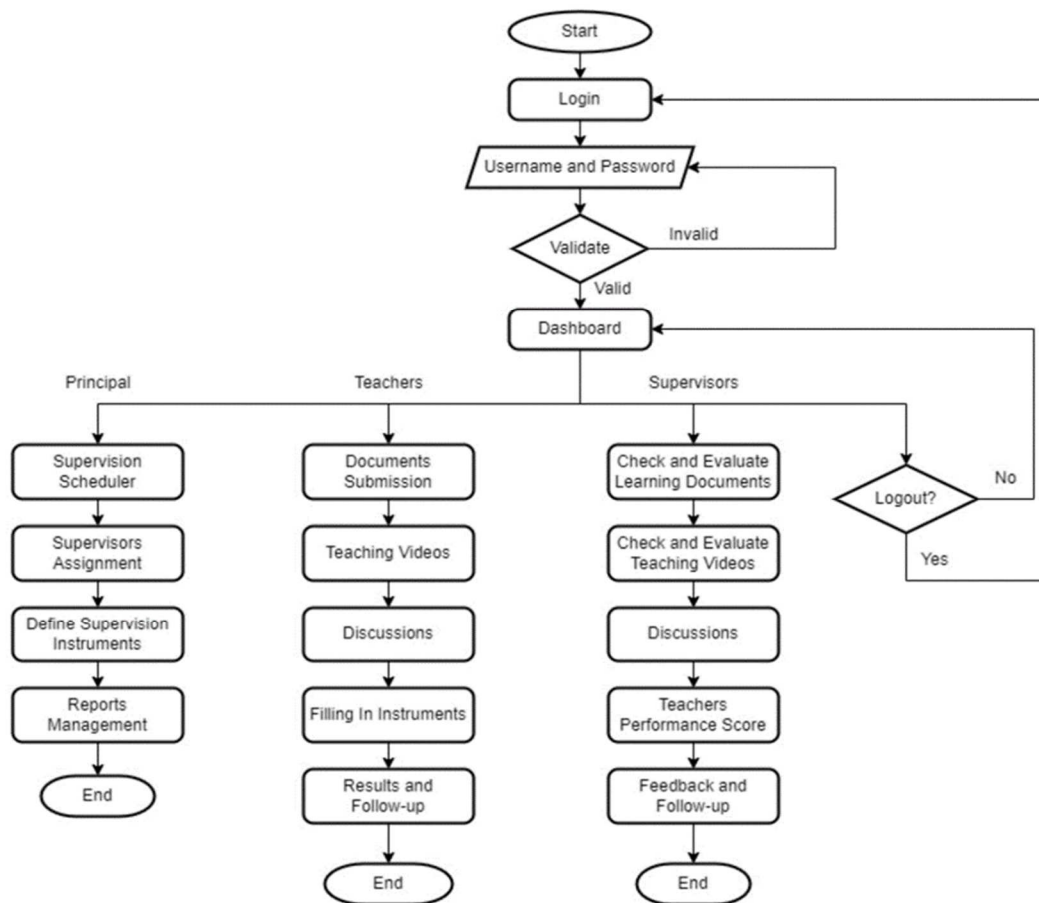


Fig. 4 Flowchart of Academic E-Supervision

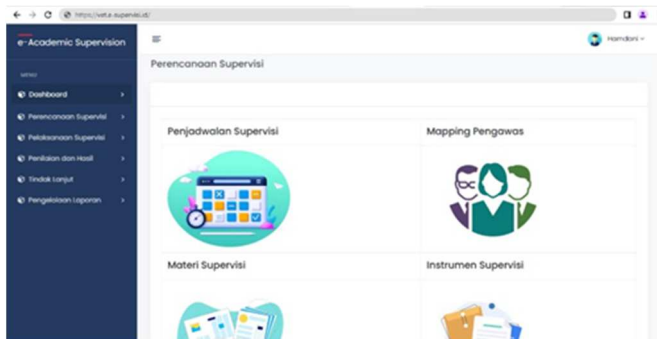


Fig. 5 Interface supervision planning by Principal

These documents include academic calendars, annual programs, semester schedules, effective weeks, teaching timetables, progress records, and standard graduation documents. Standard content documents include curriculum, subject syllabi, lesson plans, and teaching materials. In the category of graduation documents, teachers are required to upload Competency Standards & Basic Competencies (SKKD) analyses, Graduation Competency Standards (SKL), completeness criteria, and standard grading data, which includes daily grades, assignment grades, mid-semester exam grades, and final exam grades [14]. For further visualization, Figure 6 illustrates the specialized interface for teachers undergoing supervision.

Besides the document uploads, teachers must also share or submit video recordings of their teaching during the classroom observation phase. This action can be performed

using the functionalities offered within the Teaching Demonstrations menu. Additionally, teachers can use the features available in the Discussion Forums menu to facilitate communication and discussions with supervisors regarding any issues arising during the teaching process. Teachers must complete the supervision instruments via the Instrument Forms menu as part of the evaluation process. Following the conclusion of all assessment stages, the supervisors' supervision evaluations will be accessible through the Results and Follow-up menu. Hence, this system offers comprehensive tools to support teachers in the supervision process, communication, and tracking of evaluation outcomes.

The Dashboard, Supervision Information, Teacher Document Check, Classroom Observation, Discussion Forums, Assessment Results, and Follow-up are just a few of the menu options available to the supervisor. A supervisor's primary responsibility is to monitor and assess teachers' performance. To this end, supervisors inspect the documents and teaching materials uploaded by teachers, conduct classroom observations to observe the teaching process directly, communicate with teachers regarding issues that arise during teaching, and conduct comprehensive evaluations of teacher performance.

Additionally, supervisors are responsible for providing notes related to the implementation of supervision, such as recommendations or necessary follow-up actions to improve the quality of teaching. The Discussion Forums feature in this system plays a crucial role in creating intensive and open

communication among the school principal, supervisors, and teachers undergoing evaluation. This feature is expected to address any discrepancies in perception between the school principal, supervisors, and teachers during the supervision process.

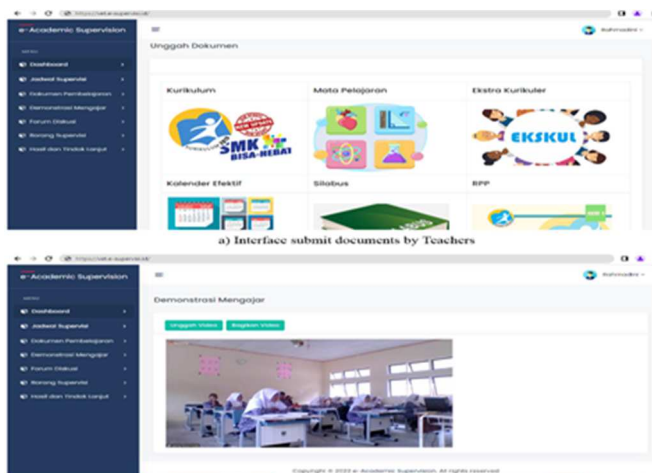


Fig. 6 Interfaces for teachers: (a) Documents; (b) Videos

For visual reference, Figure 7 shows the specialized interface for supervisors to evaluate the documents and teaching materials uploaded by teachers.

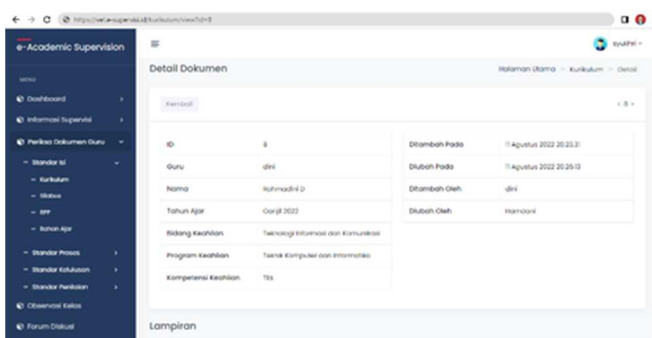


Fig. 7 Supervisors' interface for document evaluation and teacher learning resources

In Figure 7, you can see a section of the tool used by supervisors when they evaluate academic supervision in the learning process. The purpose of using this tool is to assist teachers in improving their ability to manage and oversee the learning process and achieve the established learning objectives. In other words, this tool serves as a means of providing constructive feedback to teachers.

Furthermore, the supervision evaluation process is expected to contribute to the improvement of SMK and Academic E-Supervision as part of Technical Education. Because both play a critical role in ensuring that graduates are prepared for the workforce and able to compete in a competitive work environment, these two entities are interrelated and cannot be distinguished. Therefore, implementing this system is expected to bring significant benefits in enhancing the quality of education and preparing students for the world of work.

B. Expert Analysis in Designing Interface of Academic E-Supervision

User interface expert analysis is the process of evaluating and assessing a system or product's interface or appearance by

experts with expertise in user interface design or related fields. This analysis aims to identify strengths and weaknesses from an expert's perspective, focusing on quality aspects such as aesthetics, user experience, and usability.

In the Academic E-Supervision research, this analysis involved five experts with in-depth knowledge in this field. They were tasked with evaluating the system based on predefined instruments. The assessment results provided by the experts can be found in Tables 2 and 3, which offer valuable insights regarding the quality and sophistication of the system from the experts' point of view.

TABLE II
DESCRIPTIVE QUALITATIVE EXPERT USER INTERFACE ANALYSIS DESIGNING THE INTERFACE OF ACADEMIC E-SUPERVISION

No	Assessment Aspect	Conclusion
1	Objective Identification	The identification of objectives for supervision needs improvement to be clearer.
2	User Understanding	User understanding is quite good, and user considerations have been considered.
3	Overall Review	The interface requires some improvements, especially in layout.
4	Aesthetic Evaluation	The interface aesthetics need significant improvement.
5	Readability and Clarity Analysis	Text readability and clarity need to be enhanced.
6	Usability and Navigation	User experience needs improvement in navigation.
7	Consistency	The level of interface consistency is adequate.
8	User Experience	User experience should be improved in terms of navigation and readability.
9	Conclusion and Recommendations	Constructive feedback with some improvement suggestions.
10	Feedback	The feedback contains suggestions for improvement, mainly related to navigation and aesthetics.

Several conclusions can be drawn based on the assessment results of various aspects of the academic e-supervision system interface. First, identifying supervision goals needs improvement to be more transparent to users. Although users have a reasonably good understanding of the system, improvements in navigation are needed to enhance the overall user experience. Furthermore, the interface requires some improvements, especially in layout and aesthetics, which require significant enhancement—additionally, text readability and clarity need improvement, including text size and contrast. Interface consistency has been adequately implemented, but there is room for improvement. The conclusions and recommendations from the experts include constructive feedback and suggestions for improvement, especially concerning navigation and aesthetic aspects. By implementing these recommendations, the academic e-supervision system interface is expected to better meet user needs and enhance their experience.

Table 3 illustrates the results of the assessment of various aspects of the academic e-supervision system interface by experts. These assessment results reflect a positive interface evaluation, with an overall average score of 88%. Some

assessment aspects even received very positive ratings, such as "Overall Review" with a score of 96% and "User Experience" with a score of 96%. This indicates that the experts provided excellent ratings for the overall interface and user experience provided by the system. Although some aspects received slightly lower ratings, such as "Readability and Clarity Analysis," with a score of 80%, and "Conclusion and Recommendations," with a score of 82%, the overall assessment remains positive.

TABLE III
QUANTITATIVE EXPERT USER INTERFACE DESIGN ANALYSIS DESIGNING THE INTERFACE OF ACADEMIC E-SUPERVISION

No	Assessment Aspect	Average	Interpretation
1	Objective Identification	92%	The identification of supervision objectives is considered good.
2	User Understanding	92%	User understanding has been well taken into account.
3	Overall Review	96%	The overall interface is rated positively.
4	Aesthetic Evaluation	84%	The interface aesthetics are rated good.
5	Readability and Clarity Analysis	80%	Text and information are easily readable and clear.
6	Usability and Navigation	84%	The interface is user-friendly, but navigation needs improvement.
7	Consistency	88%	The level of consistency in design is adequate.
8	User Experience	96%	User experience is very positive.
9	Conclusion and Recommendations	82%	The conclusion is positive, but there are suggestions for improvement.
10	Feedback	84%	Constructive input from experts.
	Average	88%	Overall, the interface receives a positive assessment from experts.

The experts provided constructive feedback that will help improve the system in the future. By implementing these suggestions, the academic e-supervision system interface is expected to continue to meet user needs and provide an even better experience [32]. For further details, please refer to Figure 8. We suggest the readers follow up on this reference [33].

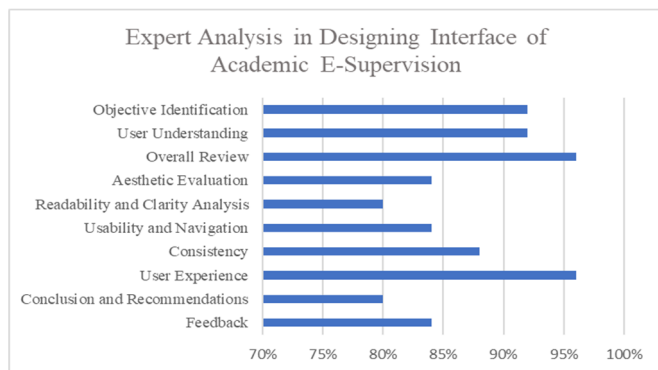


Fig. 8 Expert Validation Test Results of Designing Interface

These results indicate that the academic e-supervision system interface received positive expert ratings overall. The aspects that received the highest ratings were Overall Review and User Experience, with an average of 96%.

IV. CONCLUSIONS

Several highly positive conclusions can be drawn based on the results of the user interface design analysis by experts. Firstly, there is potential to enhance the clarity of supervision objectives for users. While users already understand the system well, there is a significant opportunity to improve navigation for an enhanced user experience. Furthermore, the interface has substantial room for improvement, especially regarding layout and aesthetics. This can be viewed as a positive opportunity to bring about significant enhancements. Additionally, there is a chance to enhance text readability and clarity, including text size and contrast, which is a positive aspect. Although interface consistency is already reasonably good, there is still room for improvement, which can be seen as a positive opportunity. The conclusions and recommendations from the experts are highly beneficial, offering constructive improvement suggestions, particularly regarding navigation and aesthetics. By implementing these recommendations, the academic e-supervision system interface is expected to meet user needs and enhance their experience significantly.

Furthermore, the quantitative analysis results indicate that this interface received a highly positive rating from experts, with an average overall rating of 88%. What's particularly encouraging is that the aspects that received the highest ratings are the Overall Review and User Experience, with an average of 96%. Although the Readability and Clarity Analysis aspect received a slightly lower rating, with an average of 80%, this can still be considered a positive achievement. While some areas require improvement, the overall interface is already quite good and has the potential for further enhancement by evaluating the improvement suggestions from the experts. This indicates that the Academic E-Supervision user interface has significant potential to provide a better user experience and enhance academic supervision effectiveness.

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