

## Developing an Online Educational Measurement and Evaluation System with a Focus on Authentic Assessment

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### ABSTRACT

This research aimed to investigate and develop an online system for educational measurement and evaluation with a focus on authentic assessment. The research process consisted of four main stages: (1) analyzing the current state and carrying out qualitative interviews on authentic assessment, (2) developing an online measurement and evaluation program and assessing its quality, (3) implementing the program in real-world situations, and (4) evaluating its effectiveness. The research findings indicate that most teachers predominantly rely on standardized testing as the primary tool for assessing student performance, and the scoring of student work lacks well-defined assessment criteria. The developed program is designed for use by administrators, students, and teachers and is compatible with Windows XP and Windows 10 operating systems. The evaluation of the program's effectiveness validates its applicability in terms of usability, practicality of implementation, alignment with the educational context, and accuracy of assessment results. Additionally, teachers using the program expressed satisfaction with its data processing capabilities, indicating its practical applicability in teaching and learning environments.

**Key words:** Online Educational Measurement, Authentic Assessment, Evaluation System, Educational Technology

## INTRODUCTION

### Background and Significance of the Problem

The outbreak of Coronavirus Disease 2019 (COVID-19) has had a severe and widespread impact on education systems worldwide, forcing educational institutions to suspend traditional in-person learning and rapidly adapt to new learning models (Mulyani, 2020). This situation has accelerated a major transformation in the education sector, particularly the widespread adoption of digital technology and online learning to ensure the continuity of education even during crises. At the onset of the pandemic, educational institutions worldwide swiftly adapted to this unprecedented situation by implementing various forms of distance learning. These included blended learning, which integrates online learning with face-to-face instruction (Sajid et al., 2016); live teaching through online platforms (Mian & Khan, 2020); flipped classrooms, where students engage with course materials independently before attending class; and the use of video conferencing technology to simulate traditional classroom environments as closely as possible (Chick et al., 2020). This rapid transition has not only impacted teaching methods but has also significantly affected the processes of educational measurement and assessment. Traditional assessment systems that rely on in-class examinations and paper-based tests

have proven ineffective in the context of online learning. As a result, educational institutions must reform their measurement and evaluation approaches to align with the new learning environment.

In Thailand, the Office of the Basic Education Commission (OBEC) (2021) has recognized the importance of this transition and has established guidelines for classroom assessment and evaluation that are aligned with pandemic-era educational challenges. These guidelines emphasize the use of diverse and integrated assessment methods to promote a holistic and equitable assessment approach to student learning. This approach aligns with the concept of Authentic Assessment, which incorporates diverse assessment methods to collect data that best reflect students' abilities and development in real-life contexts (Karunanayaka & Naidu, 2021). Authentic assessment offers several advantages over traditional assessment methods, particularly in the context of online learning. Mazur (2015) highlighted that traditional assessments, which rely heavily on midterm and final exams, often fail to measure what students have truly learned and may not accurately reflect their actual skills and competencies. Additionally, the COVID-19 pandemic has led to a growing trend in online learning, which is expected to continue even after the pandemic subsides. McDonald (2020) predicted that an increasing number of students would enroll

in online courses due to the adaptability and accessibility that online learning provides. Therefore, developing an effective assessment system for online education is essential in addressing this trend. Several research studies have demonstrated the potential of online education in fostering student learning and active participation, as well as improving access to work and authentic learning assessments. Hwang et al. (2014) found that integrating mobile technology into flipped classroom instruction significantly enhances student learning outcomes and engagement.

Therefore, it is essential to develop an online educational measurement and evaluation program that effectively supports authentic assessment. Such a program should be flexible, adaptable to various learning contexts, and capable of integrating diverse assessment tools, such as project-based assessments, presentations, digital portfolios, and self-assessments. This will ensure that the evaluation process genuinely supports student learning and development.

### Research Objective

- To research and develop an online system for educational measurement and evaluation with a focus on authentic assessment.

### METHOD

This study focuses on the development of an online educational measurement and evaluation system with an emphasis on authentic assessment. The researchers divided the research process into four phases, as illustrated in Figure 1.

The study was conducted in four stages as discussed in the sections below.

#### Phase 1

The first phase involved analyzing the current state of educational measurement and evaluation with a focus on authentic assessment among educational personnel under the Buriram Secondary Educational Service Area Office. This phase included a review of documents, theories, and related research on authentic assessment, methods for developing assessment tools, and the current state and conceptual framework of authentic assessment. Data collection was conducted through a survey of 355 teachers working

in secondary schools. The research instrument used was a 35-item questionnaire assessing the current state and needs of teachers and educational personnel regarding authentic assessment. The collected data were analyzed using frequency, percentage, and standard deviation, and the results were presented in tables accompanied by descriptive explanations.

#### Phase 2

The second phase focused on developing an online educational measurement and evaluation program with an emphasis on authentic assessment. This phase involved studying concepts related to educational measurement, evaluation, and authentic assessment, as well as teacher competencies. The findings from Phase 1 were incorporated into the program development process. The program design was based on synthesized theoretical concepts, and a draft version of the program was created. Subsequently, the program underwent a quality assessment conducted by 20 experts in program development, instructional management, and educational measurement and evaluation. The experts reviewed the program for accuracy and suitability before it was implemented in the trial phase, as illustrated in Figure 2.

The researchers have designed the Online Educational Measurement and Evaluation System with a Focus on Authentic Assessment, as illustrated in Figure 3.

#### Phase 3

The third phase involved implementing and examining the effectiveness of the Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment. The trial was conducted with 100 teachers from Lahan Sai Ratchadaphisek School, under the Buriram Secondary Educational Service Area Office. This phase included a two-day training session to introduce teachers to the program, followed by its application in classroom settings. Teachers who participated in the training used the program to facilitate learning activities and conduct online measurement and evaluation with a focus on authentic assessment. Data collection methods included pre- and post-program self-assessment questionnaires to evaluate teachers' knowledge and understanding, unstructured interviews to gather qualitative insights, and observation forms to monitor program

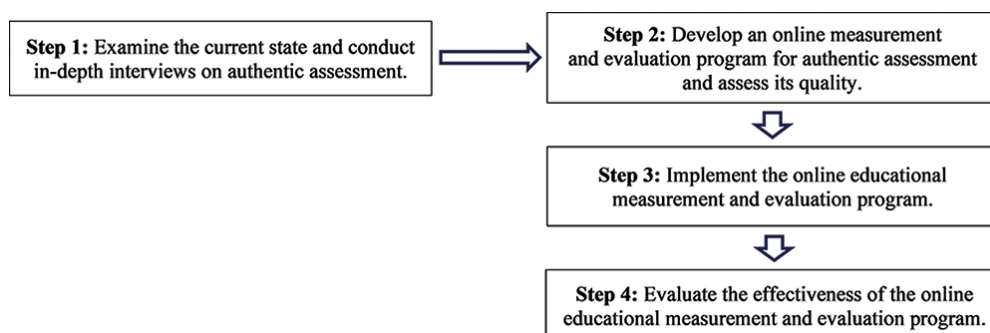
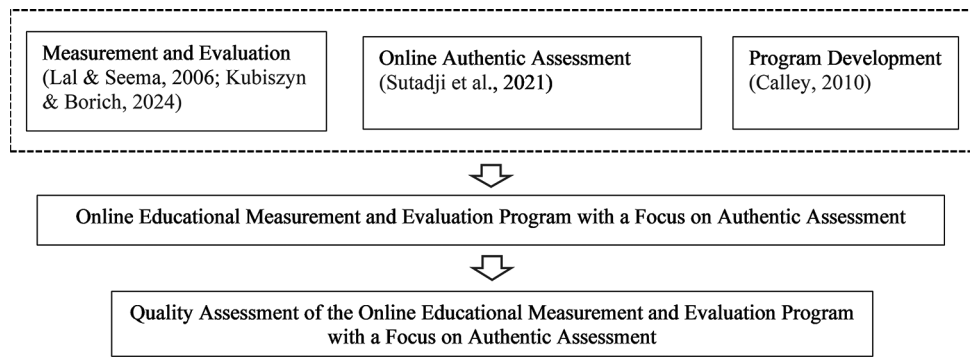
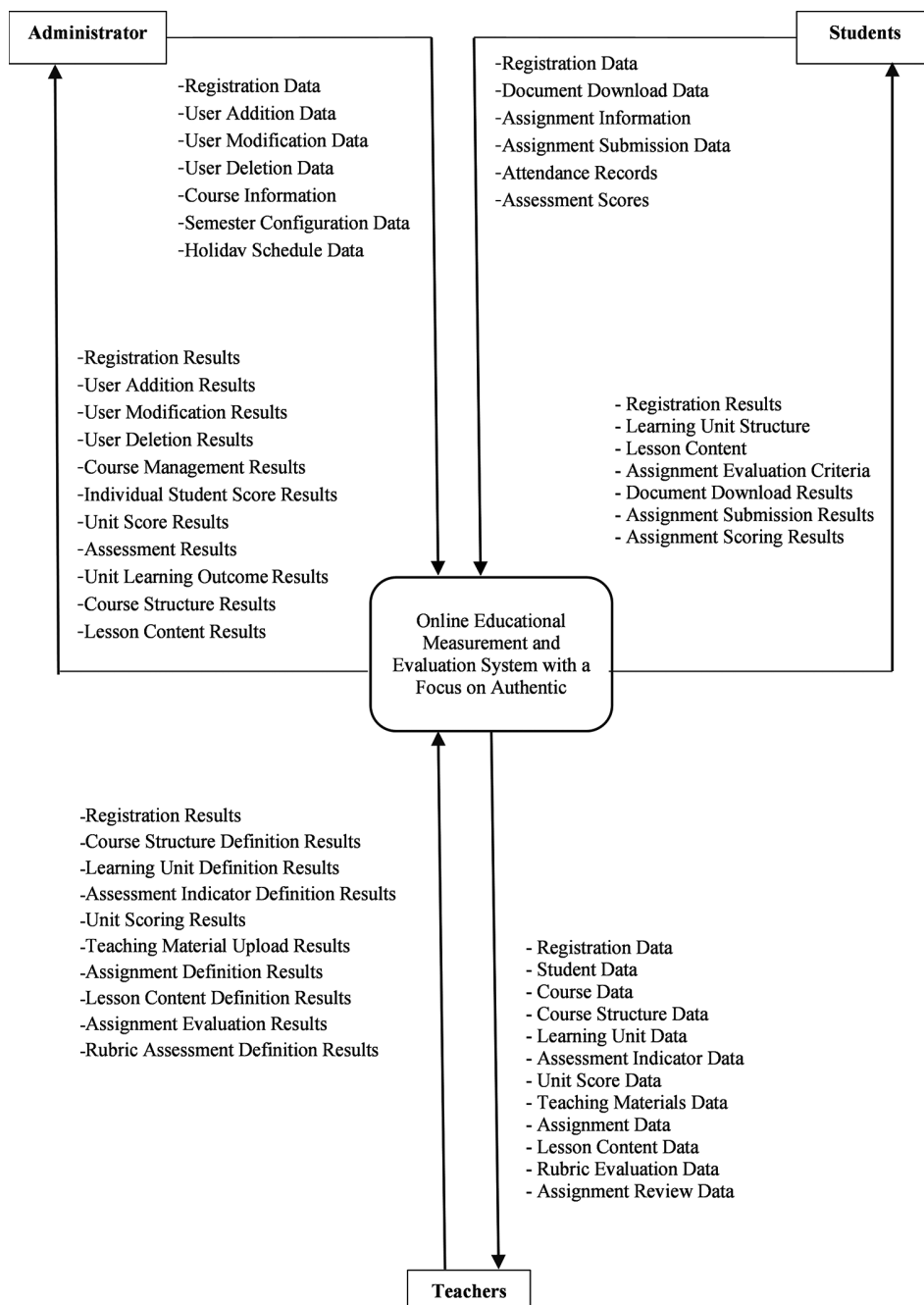


Figure 1. Research stages



**Figure 2.** The development process of the online educational measurement and evaluation program with a focus on authentic assessment



**Figure 3.** Online educational measurement and evaluation system with a focus on authentic assessment

implementation. Quantitative data, such as demographic information, were analyzed using descriptive statistics, including frequency distribution, percentage, mean, and standard deviation. Additionally, qualitative data from interviews were analyzed using content analysis to derive meaningful conclusions.

#### Phase 4

The fourth phase involved evaluating the program based on two key aspects. First, it was assessed according to four evaluation criteria: utility standard, which measured the usefulness of the program; feasibility standard, which evaluated the practicality of implementation; propriety standard, which assessed the suitability of the program; and accuracy standard, which determined the reliability and correctness of assessments conducted through the program. Second, teacher satisfaction with the program was measured using descriptive statistics, specifically mean and standard deviation. The mean values were then compared against predefined criteria to determine the overall effectiveness and usability of the program.

## RESULTS

This section presents the findings on authentic educational measurement and evaluation, the development and implementation of the online program, and its effectiveness. The results are categorized into four key areas: (1) the current state of authentic assessment practices, (2) the development process of the online program, (3) its implementation among teachers, and (4) its effectiveness based on expert reviews and teacher feedback.

### Results on the Current State of Educational Measurement and Evaluation with a Focus on Authentic Assessment among Educational Personnel

The study on the current state of educational measurement and evaluation with a focus on authentic assessment

among educational personnel under the Buriram Secondary Educational Service Area Office found that, overall, the implementation was at a high level ( $M = 3.59$ ,  $SD = 0.66$ ). When analyzed by specific aspects, the concepts and principles of authentic assessment were rated at a high level ( $M = 3.40$ ,  $SD = 0.61$ ), and the methods used by teachers for authentic student assessment were also at a high level ( $M = 3.52$ ,  $SD = 0.63$ ). Additionally, the study revealed that teachers still predominantly use test-based assessments as the primary method for evaluating students. Furthermore, student performance scoring lacks clear assessment criteria, highlighting the need for more structured evaluation guidelines.

### Development of the Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment

In the second phase, the Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment was developed as follows:

The findings from the program development process indicated that the program was highly efficient. The researcher also created a user manual for the program, which is compatible with Windows XP and Windows 10, as illustrated in Figure 4.

#### Login process

- Visit the website: <https://etr.bru.ac.th>
- Select the user type
- Enter your username and password (National ID number)

#### Administrator role

For first-time use, the administrator must log in with administrator privileges by clicking the user profile located in the top right corner of the screen. This will display the username

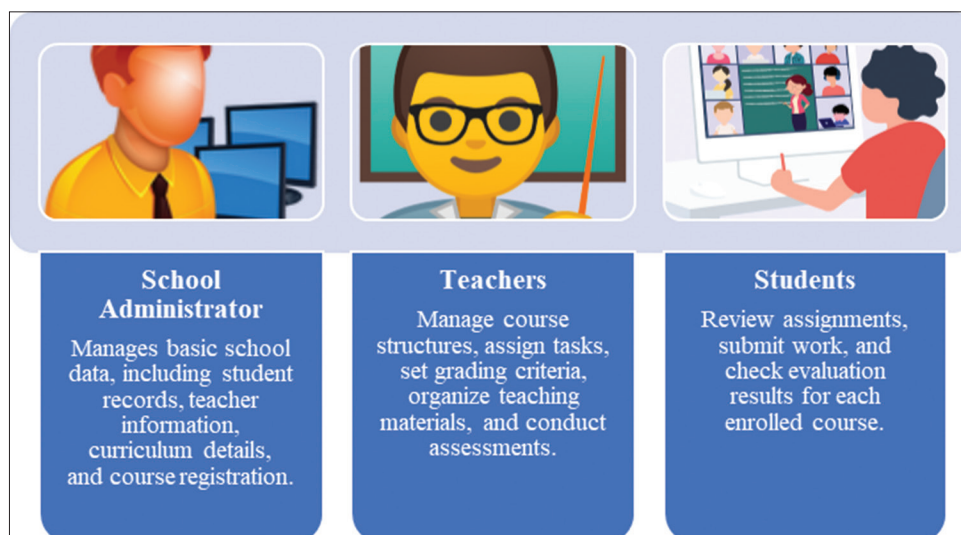


Figure 4. System user roles

and various menu options. Then, select Role → School Admin from the menu (Figure 5).

**Advising teacher/subject teacher role**

To access the system as a teacher, click on the user profile located in the top right corner of the screen. This will display the username and various menu options. Then, select Role → Advising Teacher/Subject Teacher from the menu (Figure 6).

**Student role**

To access the system as a student, log in to <https://myschool.smis32.com> and select “Student” as the user type. Students must use their National ID number as their username and their Student ID number as their password. Once logged in, the system will display a list of all registered courses. To check assignments, submit work, and review self-assessment results for each enrolled subject, students should click on the desired course name (Figure 7).

After developing the program, the researchers had 20 experts assess its suitability. The overall evaluation results indicated a high level of suitability ( $M = 4.13$ ). When analyzed by specific criteria, the program was found to be most beneficial for secondary school students, achieving the highest average score (Figure 8).

**Results of Implementing the Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment**

The Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment was tested with 100 teachers from Lahan Sai Ratchadaphisek School. The findings revealed that before using the program, teachers had low proficiency in operating the system. However, after training and practical application, their proficiency significantly improved to a high level (Figure 9).

Additionally, observations and interviews indicated that participants were highly motivated to enhance their skills and integrate the program into their teaching practices to improve student learning. Following the training, participants were asked to evaluate the program’s effectiveness (Figure 10).

**Evaluation Results of the Online Educational Measurement and Evaluation Program with a Focus on Authentic Assessment**

After 100 teachers completed training on using the program and implemented it in their classrooms, they were asked to evaluate its effectiveness. The results indicated that the usefulness aspect received the highest average score ( $M = 4.27$ ) as shown in Figure 11.

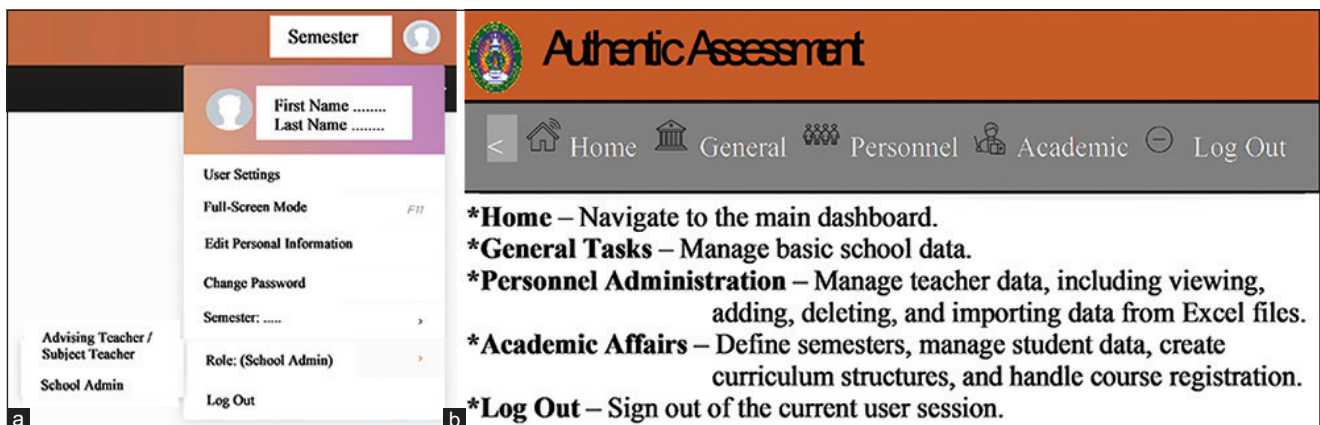


Figure 5. Administrator role (a) and administrator role menu (b)

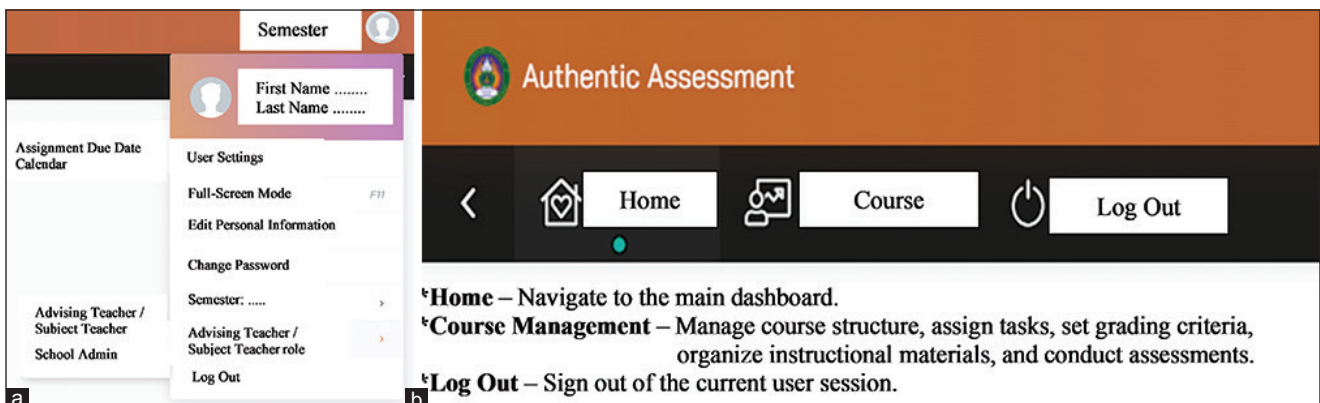


Figure 6. Advising teacher/subject teacher: role (a) and menu (b)

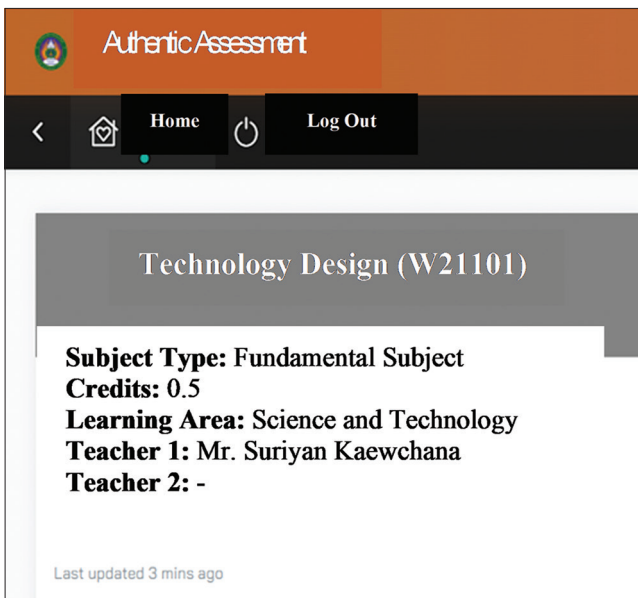


Figure 7. Screen display of student-registered courses

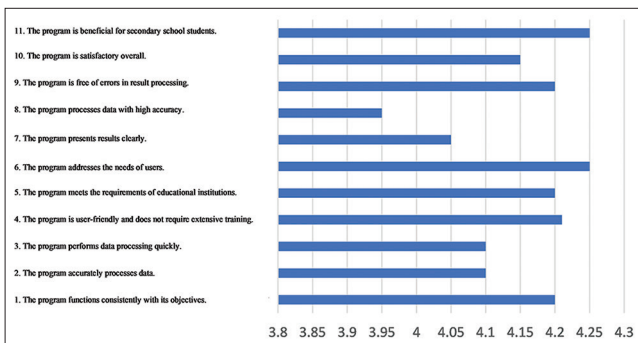


Figure 8. Evaluation results of the program by experts

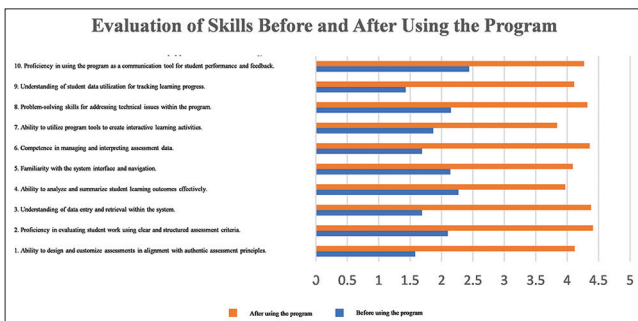


Figure 9. Pre- and post-program skill evaluation

**DISCUSSION**

The discussion of the research findings on the development of an online educational measurement and evaluation program with a focus on authentic assessment can be categorized into key aspects as follows:

**Current State of Educational Measurement and Evaluation**

The research findings indicate that most teachers still rely on tests as the primary tool for assessing student performance.

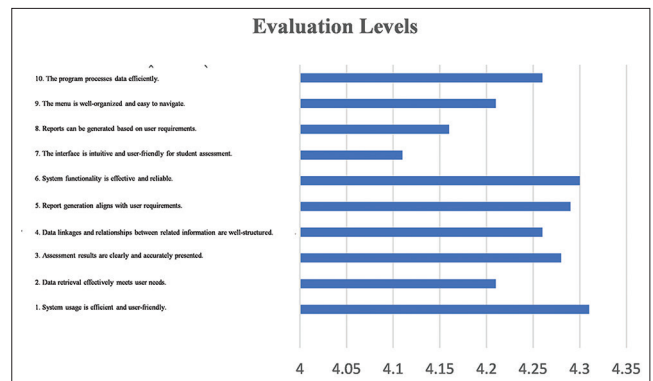


Figure 10. Evaluation of the program’s effectiveness

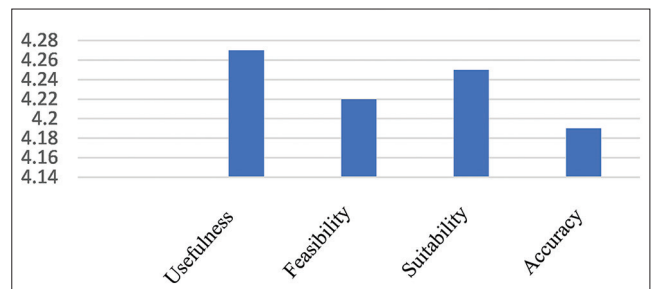


Figure 11. Evaluation of program usage

This aligns with the study by Smith et al. (2022), which found that traditional assessment methods may not fully reflect students’ true abilities, particularly in an era where critical thinking, problem-solving, and creativity skills are increasingly important. Moreover, the absence of clear evaluation criteria in student performance scoring may result in inconsistencies and reduced reliability in assessments. Johnson and Brown (2023) emphasized the importance of implementing clear and systematic assessment criteria to enhance the accuracy and credibility of evaluation processes.

**Development of the Measurement and Evaluation Program**

The developed program is distinguished by its emphasis on authentic assessment through an online system. This aligns with the concept proposed by Lee (2021), who suggests that authentic assessment provides a clearer view of students’ progress compared to relying solely on tests. The system is structured into distinct modules for administrators, students, and teachers, reflecting a user-centered design approach. This design aligns with the principles of online learning system development outlined by García-Peñalvo and Corell (2024), which emphasize creating systems that cater to the diverse needs of users.

**Effectiveness of the Program**

The research findings indicate that the program is effective, particularly in terms of usability, feasibility, suitability, and accuracy. These results align with the educational software quality assessment criteria established by Wang et al. (2024). However, Mishra and Koehler (2023) suggest that future research should include long-term performance testing in more diverse contexts to validate the program’s reliability.

Regarding user satisfaction, teachers expressed a high level of satisfaction with the program's data processing capabilities, which is a crucial factor in the acceptance and adoption of educational technology, as outlined in Davis's (1989) Technology Acceptance Model. However, Liu and Cheng (2022) propose that further studies on student satisfaction should be conducted to provide a more comprehensive perspective.

The program's compatibility with both Windows XP and Windows 10 demonstrates its flexibility, a key factor in the adoption of technology in education, as suggested by Chen and Huang (2023). The ability to function across multiple operating systems reduces barriers to implementation and increases accessibility to modern measurement and evaluation technologies, particularly for educational institutions with limited resources. These findings reflect a broader shift in educational assessment trends, transitioning from traditional test-based evaluations to online authentic assessment methods. This shift aligns with Thompson's (2024) prediction that digital assessment will play a crucial role in the future of education. Bates (2022) further emphasizes that digital assessment enables detailed and continuous data collection and analysis of students' learning progress.

Although the program has been evaluated as effective, its widespread implementation may pose challenges, such as preparing teachers and students for technology integration. Kim et al. (2023) stress the importance of training and technical support in the successful adoption of educational technology. Additionally, Fullan and Quinn (2024) highlight that gaining support and acceptance from parents and communities is another crucial factor in ensuring its effective implementation.

While this study does not explicitly measure the direct impact of the program on student learning outcomes, Zimmerman and Schunk (2021) suggest that online authentic assessment systems can positively influence various aspects of learning, such as increasing motivation and developing higher-order thinking skills. Brown and Green (2024) recommend conducting further research on the impact of such systems on student learning to gain a deeper understanding of their overall effectiveness.

### Future Development Opportunities

This research presents opportunities for further development in several areas, such as enhancing in-depth data analysis functions, integrating the system with other learning management systems, and expanding its compatibility with mobile devices. These advancements align with trends in educational technology development predicted by Park et al. (2025). Siemens (2022) further suggests that developing systems to support connectivist learning will be another crucial step in advancing educational technology.

Wilson and Moore (2023) emphasize the importance of considering long-term system sustainability, particularly regarding maintenance, system updates, and future technological adaptation. Additionally, Anderson and Dron (2023) highlight that designing flexible and adaptive systems will enable better responsiveness to technological and educational paradigm shifts in the future.

In summary, the development of an online educational measurement and evaluation system with a focus on authentic assessment demonstrates significant progress in integrating technology into education. However, challenges and opportunities for further advancements remain, requiring collaboration among all stakeholders to ensure effective implementation. Such efforts will contribute to enhancing the quality of education and equipping students with the skills needed to navigate the challenges of the 21<sup>st</sup> century.

## RECOMMENDATIONS

### Recommendations for Implementation

- Educational institutions should provide training sessions to ensure that teachers understand and can effectively use the program. Additionally, they should consider improving technological infrastructure to support the program's implementation.
- A detailed and user-friendly manual should be developed to assist users at all levels.
- Teachers should be encouraged to develop skills in creating clear and context-appropriate assessment criteria. Furthermore, continuous monitoring and evaluation of the program's usage should be conducted to facilitate ongoing development and improvement.

### Recommendations for Future Research

- Examine the longitudinal effects of using the program on students' academic achievement.
- Develop the program to support additional operating systems and mobile devices.
- Assess the viability of integrating the program with other online learning management systems.
- Compare the effectiveness of assessments conducted using the program versus traditional assessment methods.
- Explore strategies for enhancing teachers' authentic assessment skills through the use of the program.

## ACKNOWLEDGEMENTS

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