

Transformation of Technology-Based PAI Learning Assessment in the Digital Era

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Abstract: This study aims to analyze the transformation of technology-based Islamic Religious Education (PAI) learning assessment in the digital era in the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University. The focus of the research includes the concept and implementation of technology-based assessment, the use of digital technology in the measurement of cognitive, affective, and psychomotor aspects, as well as supporting and inhibiting factors for its application. The research uses a qualitative approach with a descriptive method. Data was obtained through observations, in-depth interviews, and documentation of lecturers, students, and academics involved in the implementation of technology-based assessments. Data analysis is carried out through data reduction, data presentation, and conclusion drawing by triangulating sources and techniques to ensure data validity. The results of the study show that the transformation of technology-based PAI assessment has changed the learning evaluation paradigm from conventional assessment to a more flexible, comprehensive, and competency-oriented assessment in the 21st century. The implementation of assessments is carried out through Learning Management System (LMS), Computer Based Test (CBT), online quizzes, digital portfolios, spiritual reflection, and multimedia projects, as well as learning and religious practice videos that are able to integrate cognitive, affective, and psychomotor aspects. The successful implementation is supported by digital infrastructure, technological literacy, distance education flexibility, and institutional policies. However, there are still obstacles in the form of limited internet access, digital literacy gaps, challenges in measuring affective and spiritual aspects, and academic integrity issues. Therefore, it is necessary to strengthen infrastructure, improve digital competence, and develop authentic assessments that remain based on Islamic values.

Keywords: Technology-Based Assessment, Islamic Religious Education, Digital Transformation, Learning Management System.

Introduction

The development of digital technology has brought major changes in the world of education, including in the assessment system or assessment of Islamic Religious Education (PAI) learning on campus (Qolbi, 2025). Digital transformation not only changes the method of delivering learning materials, but also affects the way lecturers evaluate student learning outcomes (Assegaf et al., 2026). So far, PAI learning assessments still tend to be oriented to cognitive aspects through conventional written tests, so they have not been able to comprehensively measure the affective, spiritual, and religious dimensions of students. On the other hand, the digital era demands a more flexible, authentic, interactive, and technology-based assessment system to answer the learning needs of the 21st century. This condition shows that the transformation of technology-based PAI learning assessment is an urgent need so that the learning evaluation process can run more effectively, adaptively, and relevant to the times without eliminating spiritual values and Islamic character.

Various previous studies have examined the use of technology in learning assessment. The first research shows that the implementation of the Learning Management System (LMS) is able to increase the effectiveness of the learning evaluation process through a faster, more transparent, and well-documented assessment system (Rohmah et al., 2026). The second study found that the application of digital assessment can increase students' motivation to learn because the evaluation process becomes more interesting, interactive, and easily accessible through digital devices (Wati et al., 2026). The third study explains that the use of technology-based learning applications, such as Google Form, Quizizz, and Kahoot, makes it easier for educators to measure students' cognitive abilities in real time (Afiatun et al., 2024). In addition, the study emphasizes that the digitization of assessments can strengthen the culture of independent learning and increase student involvement in the evaluation process.

Meanwhile, the fourth study highlights the importance of authentic assessments in PAI learning to measure students' spiritual, social, and religious practice competencies as a whole (Kusnadi et al., 2018). The study stated that PAI assessment is not enough to use only written tests, but it is necessary to utilize digital media to document students' worship activities, religious projects, and spiritual reflections. The fifth research shows that the integration of technology in Islamic education is able to create a learning system that is more innovative and responsive to the challenges of the Society 5.0 era (Nadliroh & Ashari, 2024). However, most of the previous

research still focused on the technical aspects of the use of digital media in learning assessment in general and has not specifically discussed the transformation of technology-based PAI assessments that still maintain the dimensions of Islamic values, spirituality, and student character formation.

Based on previous research studies, there is a research gap that shows that the study of technology-based assessment in PAI learning is still limited to the use of digital applications as an evaluation tool, while the discussion of the transformation of the PAI assessment paradigm in the digital era has not been studied in depth. In addition, previous research has tended to focus on the effectiveness of technology in cognitive assessment, while the integration of affective, spiritual, and Islamic character aspects in the digital assessment system is still not optimal. Therefore, research is needed that is able to comprehensively examine the transformation of PAI learning assessments, starting from the concept, implementation, challenges, to its implications on the quality of learning and the formation of students' character.

The novelty of this research lies in the effort to integrate digital technology with the principles of Islamic Religious Education assessment holistically. This research not only discusses the concept and implementation of technology-based Islamic Religious Education (PAI) learning assessment transformation in the digital era, but also offers a new perspective on the form of using digital technology in the PAI learning assessment process to measure students' cognitive, affective, and psychomotor aspects. In addition, this study presents supporting and inhibiting factors in the implementation of technology-based PAI learning assessments in the digital era. Thus, this research is expected to be able to make a theoretical and practical contribution to the development of technology-based PAI assessment models in the digital era.

This research has an important impact on the development of Islamic education in the future. Theoretically, this research can enrich the study of the transformation of technology-based PAI learning assessment and become an academic reference in the development of a modern Islamic education evaluation system. Practically, the results of this research can be a reference for teachers, lecturers, educational institutions, and policy makers in designing a digital assessment system that is more effective, innovative, and oriented towards the formation of students' Islamic character. In addition, this research is also expected to be able to encourage the creation of a PAI learning culture that is more adaptive, humanistic, and relevant to the challenges of the digital era and the needs of today's generation.

Method

This study uses a qualitative approach with a descriptive method to examine the transformation of technology-based Islamic Religious Education (PAI) learning assessment in the digital era in the Islamic Religious Education Study Program, Open University. The descriptive qualitative approach was chosen because this study aims to understand in depth the phenomenon of the application of technology-based assessment in the PAI learning process, both from the aspects of concept, implementation, and its implications on the quality of learning. Through this approach, the researcher can describe the empirical reality in a systematic, factual, and contextual manner regarding the use of digital technology in the PAI learning assessment system in an open and distance higher education environment. In addition, the qualitative approach allows researchers to gain a comprehensive understanding of the experiences, perceptions, and strategies used by lecturers and students in the implementation of technology-based assessments.

The data sources in this study consist of primary data and secondary data. Primary data was obtained directly from research informants, namely lecturers of the Islamic Religious Education Study Program at the Open University, students, and academics involved in the technology-based learning assessment process. Informants were selected using purposive sampling techniques by considering their involvement and experience in the use of digital technology in the learning evaluation process. Meanwhile, secondary data was obtained through various supporting documents, such as scientific journals, books, academic policies, learning modules, digital assessment guides, and various previous research results that are relevant to the transformation of technology-based PAI learning assessments. The use of primary and secondary data is carried out to strengthen the validity of the research and provide a more complete picture of the phenomenon being studied.

The data collection techniques in this study were carried out through observation, interviews, and documentation. Observations were made to see firsthand the implementation of technology-based learning assessments in the PAI learning process, including the use of the Learning Management System (LMS), digital evaluation applications, and other online learning media. Interviews were conducted in depth with lecturers and students to obtain information about their experiences, perceptions, challenges, and effectiveness of the implementation of technology-based assessments. In addition, documentation techniques are used to collect various supporting documents, such as assessment instruments, learning evaluation results, academic policies, and archives on the use of digital platforms in PAI learning. The three techniques are used in an integrated manner to obtain valid, accurate, and in-depth data related to the focus of the research.

The data analysis technique in this study uses an interactive analysis model which includes data reduction, data presentation, and conclusion drawn. Data reduction is carried out by selecting, focusing, and simplifying data

that is relevant to the research objectives. Furthermore, the data is presented in the form of a descriptive description to make it easier for researchers to understand the patterns, relationships, and meanings of the data obtained. The last stage is the continuous drawing of conclusions and data verification during the research process to ensure the validity of the research findings. The data validity test was carried out through source triangulation and triangulation techniques to increase the validity and credibility of the research results. With this analysis technique, this research is expected to be able to produce objective, systematic, and in-depth findings regarding the transformation of technology-based PAI learning assessment in the digital era.

Results and Discussion

1. Concept and Implementation of Technology-Based Islamic Religious Education (PAI) Learning Assessment Transformation in the Digital Era in the Islamic Religious Education Study Program (PAI) Faculty of Teacher Training and Education (FKIP) Open University (UT)

The transformation of technology-based Islamic Religious Education (PAI) learning assessment in the digital era in the Islamic Religious Education Study Program of the Open University is a form of adaptation of the learning evaluation system to the development of information and communication technology in open and distance higher education. Based on the results of the research, assessment transformation is not only understood as a change in assessment media from conventional to digital, but also as a paradigm change in evaluating student learning outcomes in a more comprehensive, flexible, effective, and oriented manner towards 21st century competency development. In this context, PAI learning assessments are no longer just assessing students' cognitive abilities through written exams, but also integrating affective, spiritual, social, and religious practice skills through the use of digital technology.

The concept of technology-based PAI learning assessment transformation in the Islamic Religious Education Study Program of the Open University is based on the principle of flexible learning which is the main characteristic of distance education. The assessment system is designed to allow students to follow the learning evaluation process online through various digital platforms that are integrated with the Learning Management System (LMS). Based on the results of an interview with the Head of the Islamic Religious Education Study Program at the Open University, Muhammad Sulaiman, technology-based assessments are seen as able to increase the efficiency, transparency, and accountability of the learning evaluation process. In addition, the use of digital technology also provides opportunities for lecturers to develop more varied and authentic assessment instruments in accordance with the characteristics of Islamic Religious Education courses. UT has accommodated very well, namely having a special unit of testing centers that every year takes care of the implementation of exams. The assessment at UT is divided into two, namely the first tutorial-based learning assessment is in UT elearning and the learning assessment at the end of the tutorial carried out by the center.

The results of the study show that the implementation of technology-based assessment in the Islamic Religious Education Study Program of the Open University is carried out through several forms of digital assessment, such as elearning in which there are assignments and quizzes from here moodle-based applications developed by UT, Teams, online quizzes, project-based assignments, virtual discussions, digital portfolios, and religious reflection based on digital media. The use of LMS is the main center of assessment implementation because the platform allows lecturers to manage learning materials, assign assignments, monitor student activities, and conduct systematic evaluations in 8 sessions during one semester consisting of discussions and assignments. Students can access assessment instruments anytime and anywhere according to a predetermined schedule, so that the learning process becomes more flexible and adaptive to the needs of students who have diverse backgrounds and geographical conditions.

In its implementation, lecturers not only use multiple-choice-based assessments, but also develop authentic assessments that emphasize students' ability to internalize Islamic values into daily life. For example, students are given the task of making videos of learning practices, worship, digital da'wah projects, spiritual reflection through electronic journals, and online presentations related to contemporary issues in Islamic Religious Education. The form of assessment shows that digital transformation in PAI learning does not eliminate the spiritual dimension and Islamic character, but rather expands the evaluation space to be more contextual and relevant to student life in the digital era.

The results of the study also show that the implementation of technology-based assessments has a positive impact on increasing student participation and learning motivation. Students feel more interested in participating in the evaluation process because the use of digital media is considered more interactive, practical, and easily accessible anywhere and anytime. In addition, the digital assessment system allows students to get feedback quickly and transparently, so they can find out learning outcomes and make improvements independently. This condition is in line with the principle of student-centered learning which places students as active subjects in the learning process.

From the lecturer side, technology-based assessment transformation helps the learning evaluation

management process to be more effective and efficient. Lecturers can utilize various digital features to compile assessment instruments, make automatic corrections, store evaluation data, and monitor student learning progress in real time. In addition, the use of digital technology also encourages lecturers to be more creative and innovative in developing assessment models that are in accordance with the characteristics of the current digital generation. Thus, the transformation of technology-based assessments not only has an impact on students, but also improves the pedagogic competence and digital literacy of lecturers in PAI learning.

However, this study found several challenges in the implementation of technology-based assessment in the Islamic Religious Education Study Program, Open University. One of the main challenges is the limited digital literacy of some students and lecturers in using learning platforms optimally. Not all students have adequate technological skills, especially students in areas with limited internet access. In addition, technical obstacles such as unstable internet networks, unsupported digital devices, and system disruptions on learning platforms are also obstacles in the implementation of online assessments, especially when in 2025 there will be flash floods in the Sumatra area that cut off internet access.

The results of the study show that the transformation of technology-based Islamic Religious Education (PAI) learning assessment in the Islamic Religious Education Study Program of the Open University is a form of learning evaluation innovation that is not only oriented towards digitizing assessment instruments, but also on changing the assessment paradigm that is more authentic, flexible, and student-centered. This transformation is in line with the development of 21st century higher education which requires an evaluation system capable of measuring the cognitive, affective, psychomotor, and character competencies of students in an integrated manner. These findings are reinforced by research stating that "e-Assessment and digital platforms improve efficiency, accessibility, and enable a more comprehensive evaluation of students' cognitive, affective, and psychomotor development" (Syarif et al., 2024).

The implementation of technology-based assessment in the PAI FKIP Study Program at the Open University is realized through the use of the Learning Management System (LMS) which integrates various forms of digital assessment, such as Computer Based Test (CBT), online quizzes, virtual discussions, project assignments, and digital portfolios. This model shows that learning evaluation is no longer limited to measuring learning outcomes through written tests, but is geared towards the development of students' critical, collaborative, communicative, and reflective thinking skills. The findings are in line with research Nurohmah & Ma'rifah, 2025 which explains that "The transition from paper-based assessments to digital assessments allows the evaluation process to be more flexible, effective, and in accordance with modern learning needs".

From a student perspective, the implementation of technology-based assessments has a positive impact on motivation and learning participation. The digital system allows students to get feedback quickly, transparently, and continuously so that they can self-evaluate their learning achievements. These findings support the concept of student-centered learning that places students as active subjects in the learning process. Study Rahman, 2025 shows that "authentic and formative assessments enhance student engagement and reflective learning in Islamic education".

On the other hand, technology-based assessment transformation also provides benefits for lecturers in managing learning evaluations. Lecturers can take advantage of digital features to compile more varied assessment instruments, make automatic corrections, store evaluation data, and monitor student progress in real time. This finding is in line with the research of Mistiawati et al. (Mistiawati et al., 2025) which states that "The competence of lecturers in integrating digital technology with assessment is an important factor in increasing the effectiveness of Islamic Religious Education learning evaluation in the digitalization era".

Overall, the transformation of technology-based PAI learning assessment at the Open University shows a change in the evaluation paradigm that is more modern, flexible, and adaptive to technological developments. The digital assessment system is able to increase the effectiveness of learning while providing space for the development of students' intellectual, spiritual, and social competencies in a balanced manner. However, successful implementation requires adequate digital infrastructure support, increased technological literacy, and the development of an authentic assessment model that remains grounded in Islamic values and a humanistic approach (Sriyanta, 2022).

In addition, another challenge found is how to validly measure the affective and spiritual aspects of students through a digital system. Assessment of religious attitudes, morals, and internalization of Islamic values requires a more in-depth approach and it is not enough to use only online test instruments. Therefore, lecturers need to develop an authentic assessment model that is able to integrate observation, self-reflection, socio-religious projects, and documentation of students' spiritual activities through digital media. This shows that the transformation of technology-based PAI learning assessment requires a balance between the use of technology and a humanistic approach in Islamic education.

Based on the findings of the research, the transformation of technology-based PAI learning assessment in the digital era in the Islamic Religious Education Study Program of the Open University reflects a change in the learning evaluation paradigm that is more modern, flexible, and adaptive to the times. Technology is no longer seen as just a learning tool, but has become an integral part of the Islamic educational evaluation system. The

implementation of digital assessments is able to create a more effective, interactive, and transparent learning process, while providing space for the development of students' spiritual, intellectual, and social competencies in a balanced manner.

Thus, the transformation of technology-based PAI learning assessment needs to continue to be developed through improving the quality of digital infrastructure, technology literacy training for lecturers and students, and the development of authentic assessment models that are in accordance with the characteristics of Islamic Religious Education. This step is important so that the digital assessment system is not only oriented towards technological efficiency, but also maintains spiritual, moral, and humanistic values as the core of Islamic education in the digital era.

2. The Form of Utilization of Digital Technology in the PAI Learning Assessment Process to Measure Cognitive, Affective, and Psychomotor Aspects of Students in the Islamic Religious Education Study Program (PAI) of the Faculty of Teacher Training and Education (FKIP) of the Open University (UT)

The results of the study show that the use of digital technology in the learning assessment of Islamic Religious Education (PAI) in the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University has developed significantly in response to the demands of education in the digital era. Digital technology not only functions as a means of assessment administration, but also as an evaluation instrument that is able to measure student learning outcomes comprehensively in cognitive, affective, and psychomotor aspects. In open and distance education systems, the use of technology is a key need to support a flexible, effective, and integrated evaluation process through a Learning Management System (LMS).

In the cognitive aspect, technology-based assessments are carried out through Computer Based Test (CBT), online quizzes, online exams, virtual discussion forums, and various forms of digital assignments. The use of applications such as Moodle, Google Form, Quizizz, and LMS at the Open University allows lecturers to evaluate more efficiently through automatic correction, data storage of learning outcomes, and providing quick feedback. In addition, digital technology supports the development of questions based on Higher Order Thinking Skills (HOTS) that encourages students to think critically, analytically, and reflective on various contemporary Islamic issues. Through article analysis tasks, case studies, and online discussions, students not only master the material conceptually, but are also able to relate Islamic values to the social realities that develop in society.

In the affective aspect, digital technology is used to assess the development of attitudes, character, spirituality, and internalization of Islamic values. The assessment was carried out through digital reflection journals, observation of online learning activities, participation in religious discussion forums, and involvement in various Islamic-based virtual activities. One form of innovation found is the use of e-reflection or spiritual reflection journals that allow students to write down religious experiences, understanding Islamic values, and their implementation in daily life. In addition, students are also given digital-based social project tasks such as da'wah campaigns on social media and the creation of Islamic educational content. This activity makes assessment not only function as an evaluation tool, but also as a means of character formation and strengthening Islamic values. However, the study found that the measurement of affective aspects through digital media still has limitations in assessing the honesty, sincerity, and depth of internalization of spiritual values, requiring a combination with humanistic approaches and interpersonal communication.

In the psychomotor aspect, digital technology is used to evaluate students' religious practice skills through learning videos, virtual presentations, multimedia projects, and digital portfolios. Students are asked to document various practical activities such as Qur'an recitation, prayers, sermons, lectures, PAI learning practices, and basic teaching skills in the form of videos which are then assessed by lecturers based on certain indicators. In addition, digital portfolios are an important medium for documenting the development of student competencies, including the results of their work, Islamic learning media, digital educational content, and field practice reports. This assessment model not only assesses religious practice skills, but also develops students' creativity, digital literacy, communication skills, and 21st century competencies.

Overall, the study shows that the use of digital technology in PAI learning assessments at Open University has succeeded in integrating the assessment of cognitive, affective, and psychomotor aspects more comprehensively. Technology provides convenience, flexibility, transparency, and effectiveness in the learning evaluation process. Although there are still challenges related to the measurement of affective aspects and the limitations of technological infrastructure, the implementation of digital assessments proves that Islamic education is able to adapt to technological developments without neglecting spiritual, moral, and Islamic values as the main foundation of Islamic Religious Education learning.

The results of the study show that the use of digital technology in the assessment of Islamic Religious Education (PAI) learning in the Islamic Religious Education Study Program of the Open University has undergone a significant transformation in line with the development of digital education. These findings show that technology no longer functions only as an assessment administrative tool, but has become a strategic instrument to measure learning outcomes holistically in cognitive, affective, and psychomotor aspects. In the cognitive aspect, the use

of Computer Based Test (CBT), online quizzes, virtual discussion forums, and LMS-based assignments shows a paradigm shift from outcome-oriented assessments to assessments that support the learning process. The use of Moodle, Google Form, and various digital platforms allows lecturers to provide feedback quickly and accurately.

In the affective aspect, the study found that digital reflection journals, online religious discussions, and social media-based da'wah projects are important instruments in assessing the development of spirituality and student character. These findings show that technology can be used to expand the space for internalizing Islamic values. However, the results of the study also show that the measurement of affective aspects through digital media still faces limitations. Religious attitudes, sincerity, and internalization of spiritual values are difficult to measure only through digitally documented activities. These findings are in line with research Ujiyanti & Hanif, 2025 which emphasizes that affective evaluation in Islamic Religious Education requires measurable indicators as well as an in-depth observational approach in order to be able to describe the development of students' character more authentically. Therefore, digital assessments need to be combined with a humanistic approach through guidance, mentoring, and interpersonal communication between lecturers and students.

In the psychomotor aspect, the use of worship practice videos, virtual presentations, and digital portfolios shows that technology is able to bridge the limitations of distance learning. Students can document their religious practice skills, teaching skills, and creativity in developing Islamic learning media. The digital portfolio is authentic evidence of the continuous development of student competencies. These findings support research Mistiawati et al., 2025 which states that *"Teachers' competence in carrying out assessments integrating digital technology with Islamic values is a determining factor in the effectiveness of learning evaluation."*

Overall, the results of the study show that technology-based assessments in the Islamic Religious Education Study Program, Open University have succeeded in integrating cognitive, affective, and psychomotor assessments more comprehensively. Technology provides flexibility, transparency, and efficiency in the evaluation process, while supporting the development of 21st century competencies. However, the successful implementation of digital assessments still requires strengthening digital literacy, improving lecturer competence, and developing an authentic assessment model that is able to maintain a balance between technological advances and Islamic spiritual values.

3. Supporting and Inhibiting Factors in the Implementation of Technology-Based PAI Learning Assessment in the Digital Era in the Islamic Religious Education Study Program (PAI) Faculty of Teacher Training and Education (FKIP) Open University (UT)

The results of the study show that the application of technology-based Islamic Religious Education (PAI) learning assessments in the digital era in the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University is influenced by various interrelated supporting and inhibiting factors. In the context of open and distance higher education, the use of digital technology is an important element in supporting an effective, flexible, and efficient learning evaluation process. The transformation of technology-based assessment does not only depend on the availability of digital platforms, but is also influenced by the readiness of human resources, institutional support, technological infrastructure, and academic culture that develops in the online learning environment. Based on the results of observations, interviews, and documentation, this study found that the success of the implementation of technology-based assessment in the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University is determined by the institution's ability to integrate technology with pedagogical needs and Islamic educational values.

This is in line with the research of Syarif, Huda, and Hermina which states that *"e-assessment and online platforms enhance evaluation efficiency and accessibility, while big data analysis provides in-depth insights into students' cognitive, affective, and psychomotor development"*. The findings show that digital technology is able to expand the scope of learning evaluation, but its success still depends on the readiness of adequate support systems (Syarif et al., 2024).

One of the main supporting factors in the implementation of technology-based assessment is the availability of technology support readiness, namely UT has a digital technology directorate that backs up technological capabilities, namely having learning center services, there is the development of exam materials and the development of teaching materials. Learning Management System (LMS) which is integrated into the Open University learning system. LMS is a center for academic activities that facilitates lecturers and students in carrying out online learning and evaluation processes. Through this platform, lecturers can compile assessment instruments, assign assignments, conduct online exams, monitor student activities, and store evaluation results data systematically. Students also get convenience in accessing learning materials and taking assessments without limited space and time. The existence of an LMS shows that digital infrastructure support is the main foundation in the implementation of technology-based PAI learning assessments.

One of the main supporting factors found in this study is the existence of a Learning Management System (LMS) that is integrated into the Open University learning system. The LMS functions as a center for academic activities that allows lecturers to manage assignments, exams, learning monitoring, and systematic storage of

evaluation data. This finding is in line with the research of Adiyono, Fitri, and Sanam which explains that *"LMS-based assessment enhances transparency, accountability, and efficiency in measuring student performance within Islamic higher education"*. The existence of an LMS not only increases the effectiveness of evaluations, but also supports the implementation of more flexible assessments according to the characteristics of open and distance education (Adiyono et al., 2025).

In addition to digital system support, another supporting factor is the increase in technology literacy of lecturers and students. The results of the study show that most of the lecturers of the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University already have basic skills in operating various digital learning and evaluation applications, such as Teams, Google Form, Zoom Meeting, Google Meet and interactive quiz applications. This ability helps lecturers develop assessment models that are more creative, interactive, and in accordance with the needs of 21st century learning. On the other hand, students are also starting to get used to using digital technology in the learning process because the current educational environment demands mastery of digital literacy as part of academic competence. This condition makes it easier to adapt to technology-based assessment systems.

Another supporting factor is the increase in digital literacy of lecturers and students. The ability to use various applications such as Microsoft Teams, Zoom Meeting, Google Form, and other digital evaluation platforms allows for the development of more creative and interactive assessment models. These findings are supported by research Mistiawati et al., 2025 which affirms that *"teachers' competence in carrying out assessments integrating digital technology with Islamic values is a determining factor in the effectiveness of learning evaluation"*. Thus, the digital competence of lecturers is a strategic factor in creating assessments that are not only technically effective, but also relevant to PAI's learning objectives.

The next supporting factor is the flexibility of the open and distance education system which allows assessments to be carried out more adaptively. In the Open University system, students come from various regions with diverse backgrounds, so technology-based assessments provide solutions in creating an evaluation process that can be widely accessed. Students can take exams, collect assignments, and get learning feedback without having to be physically present on campus. This provides time and cost efficiency, both for students and lecturers. In addition, the use of digital technology also supports the implementation of authentic assessments through learning videos, digital portfolios, multimedia projects, and online-based spiritual reflections that are relevant to the characteristics of PAI learning.

The results of the study also show that institutional policy support is an important factor in the successful implementation of technology-based assessment. The Open University provides support through the provision of digital platforms, learning technology training, the development of online evaluation systems, and academic policies that encourage digital transformation in learning. The training provided to lecturers helps improve digital pedagogic competence so that they are better prepared to face changes in the learning system and evaluation in the digital era. The support of these institutions shows a commitment to building a more innovative and modern technology-based learning culture.

Although it has various supporting factors, this study found a number of inhibiting factors in the implementation of technology-based PAI learning assessments. One of the main obstacles is the limited access to the internet and technological infrastructure in some areas where students live. As a distance education institution that reaches students from various regions of Indonesia, the Open University faces the challenge of inequality of access to technology. Not all students have a stable internet network, adequate digital devices, or financial ability to support online learning optimally. This condition often causes students to have difficulties when taking online exams, uploading assignments, or accessing learning platforms. This condition causes some students to have difficulty taking online exams, uploading assignments, and accessing the LMS optimally. These findings are in line with research Nurohmah & Ma'rifah, 2025 which states that *"limited technological proficiency, inadequate training, and insufficient infrastructure hinder broader implementation of digital assessment in Islamic education"*. Inequality of access to technology is a real challenge in the implementation of digital assessments in the distance education system that covers a wide geographical area.

Another obstacle is that there are still differences in the level of digital literacy among lecturers and students. Although most of them have been able to use basic technology, some lecturers and students still have difficulty in making the most of digital features. Some lecturers still tend to use technology-based assessments only as a substitute for conventional tests without developing innovative and authentic assessment models. In addition, students who are less familiar with digital technology need a longer adaptation time in following the online evaluation system. This condition shows that technology-based assessment transformation requires continuous strengthening of digital competencies.

This study also found that measuring affective and spiritual aspects in PAI learning is a challenge in technology-based assessment. Assessment of religious attitudes, morals, and internalization of Islamic values is not easy to do only through digital platforms. Lecturers have difficulty in ensuring the authenticity of student attitudes and behaviors because learning interactions are carried out virtually. Online assessments tend to be more effective in measuring cognitive aspects, while affective and spiritual assessments require a more in-depth

approach to direct observation, interpersonal communication, and coaching. Therefore, lecturers need to develop an authentic assessment strategy that is able to integrate technology with a humanistic approach in Islamic education.

In addition, the issue of academic integrity is also an inhibiting factor in the implementation of technology-based assessments. The results of the study show that there are concerns related to the potential for plagiarism, academic cheating, and dishonesty of students when taking online exams. The limitation of direct supervision makes lecturers have to look for an alternative evaluation system that emphasizes more on analytical assignments, collaborative projects, and process-based assessments so that students are more responsible for their learning outcomes. In this context, the use of digital technology needs to be balanced with strengthening ethical values, honesty, and academic responsibility as part of Islamic character education. Research Sundowo et al., 2024 affirms that *"The digital era poses ongoing challenges in preserving academic ethics and preventing academic dishonesty"*. Therefore, the development of digital assessments in PAI learning needs to be accompanied by strengthening the values of honesty, trust, responsibility, and academic ethics as an integral part of Islamic character education.

Based on the results of the study, the supporting and inhibiting factors in the implementation of technology-based PAI learning assessment show that digital transformation in Islamic education is a complex and multidimensional process. The success of the implementation of technology-based assessments is not only determined by the sophistication of the digital system, but also influenced by the readiness of human resources, institutional support, academic culture, and the ability to maintain spiritual values in the learning process. Therefore, a strategy is needed to strengthen technological infrastructure, increase digital literacy, develop authentic assessments, and develop Islamic character so that the implementation of technology-based PAI learning assessments can run optimally, humanistly, and sustainably in the digital era.

Conclusion

Based on the results of the research and discussion, it can be concluded that the transformation of technology-based Islamic Religious Education (PAI) learning assessment in the Islamic Religious Education Study Program, Faculty of Teacher Training and Education, Open University has resulted in a more modern, flexible, and oriented learning evaluation paradigm that is more modern, flexible, and oriented towards holistic student competency development. The use of digital technology through Learning Management System (LMS), Computer Based Test (CBT), online quizzes, digital portfolios, webinar spiritual reflections, and multimedia-based projects allows the implementation of assessments that are able to integrate cognitive, affective, and psychomotor aspects more comprehensively. The implementation of digital assessments has been proven to increase the effectiveness, transparency, accessibility, participation, and motivation of student learning, while encouraging the improvement of lecturers' pedagogic competence and digital literacy. The success of its implementation is supported by the availability of digital infrastructure, the technological competence of lecturers and students, the flexibility of the distance education system, and institutional policy support. However, there are still various challenges, such as limited internet access, digital literacy gaps, difficulties in measuring affective and spiritual aspects authentically, and potential academic integrity issues. Therefore, the development of technology-based PAI assessments needs to be accompanied by strengthening infrastructure, improving digital competence, developing authentic assessment models, and strengthening spiritual values, ethics, and Islamic character so that the learning evaluation process remains humane, meaningful, and sustainable in the digital era.

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