

Research Title

“Integrating Artificial Intelligence into Smart Assessment Systems”

Opportunities and Possibilities for Its Use in Schools in the Kingdom of Saudi Arabia

Name: Hissah Al Otaibi

ID: 252001788

Abstract:

This research aims to explore current artificial intelligence tools used in the education sector and how they can be employed in Saudi Arabian schools to conduct student assessments in a smart, flexible, and fast manner, providing immediate feedback that helps teachers identify and address students' weaknesses and support and enrich their strengths. The paper will focus on an in-depth study of relevant previous academic literature and focus on the key aspects of the educational process, namely teachers, students, and training them to use these tools to improve the quality of education. The study will discuss suggestions for developing these tools to produce results that are in line with the needs of schools and students in particular. It will also address the advantages and disadvantages of smart assessment and the The best tools used in electronic assessments for the 2024-2025 academic year will be reviewed,

and their application in some schools. Statistics will be compiled from the results, and interviews and surveys will be conducted with students and teachers, which will then be combined to arrive at the best results.

Chapter 1:

Introduction:

Artificial intelligence is defined as a task performed by a machine or program that would normally require human intelligence (Harkut and Kasat, 2019). Learning is how to use facts and knowledge. Artificial intelligence encompasses many processes and tools such as machine learning, natural language processing, computer vision, robotics, and others. Thus, achieving artificial intelligence by simulating human intelligence and creating a system that can learn independently is one of the goals of artificial intelligence (Ghosh and Thirugnanam, 2021).

The authors mentioned that artificial intelligence can be used in important matters or to perform critical tasks. Our current era is witnessing tremendous development in artificial intelligence and its uses, and it has been applied in various sectors. Education is considered the cornerstone of the development of societies and the foundation for creating an educated and developed generation, and artificial intelligence plays a major role in enhancing the quality and efficiency of education and learning. Artificial intelligence can change the traditional way of learning for students and teaching for teachers. It also helps teachers understand student patterns and tailor education to their needs and abilities. Artificial intelligence can be applied in several important areas, such as personalized education, where it analyzes and understands the learner and shows the appropriate teaching style suitable for them. The student's level is then determined based on the previous data. Artificial intelligence technologies can also be used to create smart teaching systems that help fill temporary teacher shortages in schools. One of the most important applications of these technologies, which we will focus on in this study, is automatic correction and assessment

, where methods and approaches have been applied in some studies for formative and summative assessment in educational centers (Aldriye et al., 2019) This gives teachers the ability to use artificial intelligence tools to correct assignments, short tests, and final exams, as well as to conduct continuous assessment with the highest efficiency and in the shortest time, thereby relieving teachers of the burden of routine correction and checking and saving their energy, which gives them more time to focus on supporting students and addressing areas of shortcomings and weaknesses, which is the focus of the Ministry of Education in the Kingdom of Saudi Arabia. Artificial intelligence also plays a role in virtual classrooms and distance learning in cases where students are unable to attend school in emergencies, as well as reducing teacher assignments and the hassle of traveling between schools. Artificial intelligence can analyze data and insights for schools to understand the overall direction and level of students and help them achieve institutional excellence and evaluate educational data, including student achievements, attendance, and learning outcomes, to help teachers and administrators make decisions that benefit the school. One of the most important applications of artificial intelligence in our modern era is natural language processing (NLP), which is a branch of artificial intelligence that deals with natural language processing and computer interpretation. (Sodhar et al., 2020).

It helps students learn languages and develop reading and writing skills by providing them with immediate feedback on spelling mistakes and vocabulary usage. These

tools enhance communication between teachers and students or between the system and students through voice recognition and chat. One of the latest learning methods is adaptive learning, and artificial intelligence greatly helps this type of learning (GGligorea et al., 2023). A smart hybrid space that enables learning can change the level of difficulty of learning and questions according to the student's abilities and achievements, providing continuous support and motivation for students. There are predictive analyses of the likelihood of a student's success or failure, which can be detected early on, making it easier for teachers to support these students to ensure they do not drop out of school.

All these technologies create higher quality, more productive educational processes that are suitable for learners of different ages and abilities. However, we must ensure that these tools are ethical in their application and use to support teachers rather than replace them. The following image illustrates the role that artificial intelligence should play when applied to the learning process.



Figure 1. AI tasks in the education process, (<https://studycorgi.com/blog/can-ai-change-the-way-we-study-in-the-near-future/>, 2023)

Research Problem

This research belongs to the field of educational technologies and their development, focusing on the integration of artificial intelligence into intelligent assessment systems. In this research, we focus on the educational environment of middle and high schools in Saudi Arabia, where educational institutions face increasing challenges in improving the quality of assessments and keeping pace with the digital transformation of educational processes. This challenge falls within a broader context that includes the development of effective and personalized assessment tools that reflect individual differences among learners and provide immediate feedback that helps teachers address each student's weaknesses, as well as supporting the requirements of the Kingdom's 2030 Vision for smart education. Hence, the research highlights the field of AI-supported smart educational assessment and explores the possibilities of transforming traditional practices into more adaptive, effective, and equitable systems.

With the rapid development of artificial intelligence technologies, student assessments remain traditional, relying on fixed paper tests or manual assessments that are unable to keep pace with the modern requirements of adaptive learning and immediate feedback. there is a lack of AI-based practical models that provide a more accurate and comprehensive assessment of students' educational performance within flexible interactive environments. In recent years, artificial intelligence has proven its effectiveness in supporting the educational process through personalization and predictive analysis technologies. According to a recent study, “artificial intelligence will be able to understand the characteristics of each student: learning style, preferences, as well as the specifics of knowledge acquisition, and as a result, it will be able to provide educational materials and a learning experience appropriate for each student” (Zhuk & Zhuk, 2023, p. 7).

This possibility reflects the role of artificial intelligence in providing personalized education that accommodates individual differences, thereby contributing to improving educational outcomes and enhancing student achievement.

Research Objectives

1. To review recent academic literature and identify the latest tools and techniques in artificial intelligence when applied to education.
2. To analyze existing data on the benefits and drawbacks associated with the use of these AI-based educational systems—such as adaptive learning, personalized education, cheating detection, and educational efficiency assessment.
3. To propose a practical AI-based framework for assessing student performance: the system includes automatic question generation, automatic grading, and a detailed report on student performance.
4. To support adaptive evaluation through artificial intelligence: Questions are adjusted according to the student's level, allowing for performance improvement through interactive analytics and intelligent distribution of educational content.
5. To employ performance analytics to display detailed data on each student's strengths and weaknesses, enabling teachers to intervene in a targeted manner and achieve more personalized education.

Scope of research:

The test will initially be implemented in middle and high schools for girls, then it will be generalized to boys' schools and applied to three schools in different locations. The tests will be held during this year at different times and not close to each other.

Chapter 2

Research Papers

First Paper:

Impact of E-Assessment at Middle School Students Learning -An Empirical study at USA Middle School Students

This study analyzes the impact of electronic assessment on the learning process in US middle schools and how it has contributed to improving their performance and its role in motivating students. The study used an empirical research method by comparing the performance of students who were assessed electronically with students who were assessed traditionally. After the data was collected, statistical analysis was used to compare the two groups. The electronic assessments proved successful and superior in terms of student performance and increased participation. The study also noted that the group that used electronic assessment had higher attention and concentration than the traditional group. The study also pointed out the difficulty of implementing electronic assessment in some schools due to their inability to fully access technology.

Critical analysis of the study:

Strengths

- Use of the experimental method, which is suitable for comparing the two groups and clarifying the relationship between the type of assessment and the results.
- The diversity of data collection sources to support a comprehensive view of the impact of electronic assessment on students from all aspects
- The success of the results, as the study showed a positive impact on students who used electronic assessment

Weaknesses

- Difficulty in accessing technology for all schools, as the gap affects the effective implementation of electronic assessment, and the study did not address this problem in depth
- The results cannot be generalized because the study only included some schools in the United States

Evaluation of methodology

The experimental methodology is appropriate for studying the impact of using electronic assessment on students, but the students' personal opinions about their

experience with electronic assessment were not taken into account, and the group on which it was applied was also insufficient and not diverse.

Evaluation of data sources

The main source was questionnaires, which are considered a strong source, but they can be influenced by students' biases and preferences. It would have been better to interview students and teachers in person in addition to the questionnaires to gain a deeper understanding of the challenges and opportunities of using electronic assessment.

Second paper:

The integration of electronic assessments for middle and high school students

The study aimed to explore the possibility of integrating digital assessments into secondary education and focused on enhancing student engagement and interaction. It also provided students with options to choose their learning method by offering flexible assessments that took into account student needs, such as distance learning. The study used several tools from Google Doc and HyperDoc

to deliver assignments and track student progress. It also diversified the ways of presenting information, such as graphs or charts, and provided education through video games. It did not restrict students with strict deadlines for submission, which contributed to reducing stress and promoting self-responsibility, leading to improved performance and participation.

Critical analysis of the study:

Strengths

- Enhanced student participation by providing them with options and making them more responsible.
- Flexibility in assessment and consideration of students' different circumstances, which contributed to reducing stress and increasing educational effectiveness.
- Use of technology and modern tools, which made assessment more effective and realistic.

Weaknesses

- Limited resources, with some students facing difficulty in accessing digital tools
- Difficulty in assessing creative work, which requires more time and effort from teachers

- Total reliance on technology may cause problems in the event of a technical glitch or malfunction or a loss of connection

Evaluation of methodology

The study is based on practical experience and direct application in classrooms, providing a realistic view of the impact and effectiveness of digital assessments.

Evaluation of data sources

The data is based on the personal experiences of a teacher in a specific educational environment, which may affect the generalizability of the results.

Paper 3:

Application of artificial intelligence in academic assessment: A review of current trends and future directions

This paper reviewed the trends and current status of the use of artificial intelligence in assessment, discussed future technologies used in electronic assessments, and explored the potential of artificial intelligence and its role in improving student assessment. A comprehensive analytical study of AI-supported assessment tools was used, and interviews and surveys were conducted with experts and teachers to assess the benefits and challenges facing these systems. One of the most important results of this study was the increase in assessment efficiency due to the speed and accuracy of AI, as well as the provision of personalized education for each student based on their performance and providing immediate feedback. The most prominent challenges were the resistance of some teachers to change, their need for training, and privacy and security issues.

Critical analysis of the study:

Strengths

- Improvement in educational performance after improving data accuracy with the help of artificial intelligence.
- Enhanced self-learning AI-powered systems can tailor education based on student needs

Weaknesses

- AI systems require robust infrastructure and technical capabilities that may not be available in some schools
- Bias and privacy

Evaluation of methodology

The study relied on a comprehensive and in-depth analysis of available data on AI applications in education, which is a balanced and comprehensive methodology.

Data credibility

A variety of sources were used, such as previous studies, interviews, and evaluations of AI assessment tools.

Paper 4

“The Application of Artificial Intelligence in Education: The Current State and Trends”

The aim of this research paper is to review artificial intelligence technologies and tools recently used in education. It analyzes the current state of AI use across all sectors, with a focus on education, and discusses future trends in its use in education. Among the most important findings of the study are the increasing use of AI in education and the focus on personalized education, automatic assessment, and immediate feedback.

Critical analysis of the study:

Strengths

- Providing a comprehensive overview of AI applications.
- Identifying challenges and future trends.
- Providing guidance and training for teachers and educational institutions.

Weaknesses

- Lack of specific case studies illustrating the actual application of the tools.
- No in-depth analysis of the challenges of artificial intelligence applications

Evaluation of methodology

Review of literature and analysis of the current situation provided an overview, but there was a lack of practical details

Data credibility

Based on reliable academic sources, which reinforced the credibility of the study's results

Paper 5:

The Role of Artificial Intelligence in Educational Assessment

The study explores the role of artificial intelligence in improving the effectiveness and efficiency of educational assessments. It discusses the challenges and opportunities associated with the application of artificial intelligence in educational assessments. It reviewed the literature and analyzed previous studies on the application of artificial intelligence in educational assessments. It gathered the opinions of teachers and students on the effectiveness of AI-supported assessments. Among the most notable results were the development of personalization tailored to the needs of each student using AI tools, time savings, the provision of immediate feedback, and professional training for teachers on the use of AI tools.

Critical analysis of the study:

Strengths

- The research covers a wide range of AI-supported applications and tools.
- It provides actionable suggestions for improving AI applications.

Weaknesses

- Lack of empirical studies that assess the actual status of tools used in classrooms
- Technical and logistical challenges to implementing AI tools

Evaluation of methodology

The study relies on a review of the literature and qualitative analysis, which provided a general understanding but lacks some practical details.

Data credibility

Based on reliable academic sources.

Paper Six

Transforming Student Evaluation with Adaptive Intelligence and Performance Analytics

Aims to identify how to transform student evaluation with artificial intelligence and adaptive and predictive performance analytics, and seeks to develop it. The study used quantitative and qualitative analytical research methods, and the researchers used predictive analytics techniques to enable the prediction of student performance based on previous data and interviews with teachers and students who used smart systems in assessment. The study showed an improvement in assessment and accuracy by

customizing questions according to each student's needs and providing immediate feedback. The researchers faced challenges related to technical infrastructure.

Critical analysis of the study:

Strengths

- The research paper benefited greatly from modern technologies such as artificial intelligence and predictive analytics.
- Supporting data: The research relied on a diverse set of data that included interviews and interactive test data, which enhanced the credibility of the results.
- Adaptive analysis shows innovation in the field of education.

Weaknesses

- Reliance on digital data: While digital data is important, there is a possibility that the results may not be representative of all students who may face technological challenges or may not be comfortable using digital tools.
- Technical challenges The focus should have been on developing solutions to technical challenges that users may face and weaknesses in the infrastructure of some schools.
- The study did not take into account the geographical location of students or cultural diversity.

Evaluation of methodology

The methodology is fairly comprehensive.

Data credibility

The research relied on reliable data sources, including interviews with teachers and students, as well as data from AI-supported digital tests. However, technical challenges in data collection may affect the validity of the results, especially when using technologies that may not be compatible in all educational environments.

Connections:

- Research has shown the efficiency, accuracy, and flexibility of smart assessment compared to traditional assessment.
- Students interact with content and improve their performance when using electronic assessments.
- Most studies were conducted on a specific group of students, region, or several schools and were not fully generalized to other groups.
- •The need to provide training and practical applications for teachers and educational institutions.

- There are challenges related to the technical infrastructure of educational institutions.
- There are technological gaps in some schools, which may prevent them from implementing electronic assessment effectively and fully.

Chapter Three:

Research Methodology:

This study uses quantitative and qualitative analytical research methods. Previous data will be analyzed, as well as data extracted from interactive tests supported by artificial intelligence and interviews with teachers and students who have used smart systems in assessment. Data will be collected through:

- Interviews with teachers and students.
- Digital tests supported by artificial intelligence.
- Predictive analysis of academic performance.

Research philosophy:

This research will follow a pragmatic philosophy, as it aims to understand and experience the potential effects of AI technologies in assessment in the context of schools by applying several tests to assess students using AI tools and comparing them with the results of traditional assessment.

Research Design:

- Sample: Three different schools that use AI technologies in assessment will be selected, ensuring diversity in terms of size and location.

Tools used:

- AI-supported assessment tools
- Interview tools: Questions will be prepared for interviews with teachers and administrators to open up discussion about their experiences.
- Student questionnaires: These will include closed and open-ended questions to gather students' opinions on the impact of AI.
- Observation tools: Observations will be recorded during classes on how AI-based assessments are implemented.

Research Limitations:

- Some schools may not grant permission to use their data, which may affect the sample size.
- Participants' personal opinions may be influenced by their individual experiences with AI, which may limit generalizability.
- A lack of data on AI technologies in some schools may lead to challenges in collecting sufficient information.

Expected results:

- Analysis of the grades of students from the traditional and AI-supported groups may show that smart assessment gives better results than the traditional group because questions are tailored to the student's ability and needs.
- Gathering the opinions of students and teachers. Interviews may reveal the acceptance or resistance of teachers and students to this type of assessment.
- The efficiency of smart assessment compared to traditional assessment, as it contributes to the efficiency and accuracy of assessment.
- Challenges of using artificial intelligence: Some schools may face difficulties in implementing this type of assessment due to weak technical infrastructure, and it may also be met with resistance from some teachers and students.

Gantt chart:

Stage	Tasks	Time frame
Planning and preparation	Precisely define the research topic Define objectives and hypotheses Determine the appropriate methodology (qualitative or quantitative). Gather preliminary information about artificial intelligence in education. - Review previous literature and studies	Two weeks
Design research tools	-Designing tests - Designing questionnaires and interviews. -Identifying target schools or groups - Sending questionnaires to students and teachers. -Identifying schools to contact and collect data from	4 weeks
Collect data	-Conduct interviews with teachers and administrators. -Collect questionnaires and analyze preliminary data	1 Week

Data analysis	-Analyze data using appropriate analysis tools -Process and analyze qualitative and quantitative data -Write research results based on analysis. - Extract key patterns and preliminary recommendations	1 Week
Writing results	-Analyze data using appropriate analysis tools. - Processing and analyzing qualitative and quantitative data	1 Week
Discussion and interpretation	- Discussing and interpreting the results. - Linking the results to previous studies. -Making recommendations	1 Week
Final report	-Writing the final report. -Review recommendations and conclusion - Ensure report formatting	1 Week
Review and submission	-Review final report with academic supervisor. -Make final revisions . - Submit research by deadline	1 Week

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