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# The Role of Artificial Intelligence in Personalizing Learning for Each Student

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**ABSTRACT**

Artificial Intelligence (AI) has become one of the major technological innovations in modern education. This article explores the role of AI in personalizing each student's learning. Individual learning is a learning method that adapts each student's learning experience to their needs, abilities and interests. AI enables this personalization of learning to be more efficient and productive. AI plays an important role in personalizing each student's learning. With the ability to analyze data, deliver personalized content, provide better feedback, and predict student progress, AI creates a more adaptive and effective learning environment. However, it should be remembered that the role of the teacher as a learning facilitator is still very important in the use of AI, because human interaction is still an important factor in an effective learning process. The method used in this research is a quantitative method. Researchers conducted a survey using a Google Form which consisted of 15 sentences related to the search title. The study found that applying artificial intelligence (AI) to personalize each student's learning produces significant tracking effects in educational settings. Overall, the use of AI in personalized learning has a significant positive impact on education. However, this requires careful oversight and regulation to ensure that this technology is used properly and provides maximum benefit to all students. The limitation of this research is that the researcher only conducted research in schools, and the researcher did not conduct research directly in schools, but distributed a survey link on a Google form which contained statements about the role of artificial intelligence (AI) in individualization. learning of each student.

***Keywords:*** *Artificial, Each Student, Personalizing*

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## INTRODUCTION

Education is one of the main pillars of societal growth and personal development (Esteva et al., 2019). As technology advances, changes in learning methods become

increasingly important to effectively fulfil the needs and potential of each student (Ismail Fawaz et al., 2019). As the digital revolution and technological advancements continue, changes in learning approaches are becoming more profound and significant. Education is no longer confined to a classical environment where a teacher imparts knowledge to students in a uniform manner (Liu et al., 2020). Instead, we are in an era where technologies such as AI have changed the way we view and design learning. The importance of personalising learning cannot be overlooked. Every student is a unique individual with different needs, interests and levels of understanding (Zhang et al., 2020). As such, providing learning experiences that suit each student's individual characteristics is key to their success. AI is not just a tool in achieving this, but also the foundation that shapes the future of education.

Artificial intelligence (AI) has been one of the key innovations bringing radical changes in education (Barredo Arrieta et al., 2020). This article will discuss the important role of AI in personalising each student's learning. In the past, education was often perceived as a single process, where curriculum, teaching methods, and length of study often did not take into account individual differences between students (Q. Yang et al., 2019). However, we have seen this paradigm shift thanks to the rise of AI (Miller, 2019). In personalised learning, education is no longer seen as a one-size-fits-all process (Vamathevan et al., 2019). But as an attempt to tailor the learning experience to the unique needs and abilities of each student (Tang et al., 2020). Artificial intelligence (AI) enables personalised learning by collecting and analysing in-depth student data. This includes understanding students' learning styles, comprehension levels, interests, and even psychological aspects.

Based on this data, AI can design customised learning plans for each student, provide the right materials, and support their development as effectively as possible (Baltrusaitis et al., 2019). In other words, AI opens the door to more focused and effective learning (Abdollahzadeh et al., 2021). This article will also explore various aspects of AI's role in personalised learning, including its ability to customise curriculum, provide detailed feedback, predict student progress, and its positive impact on student achievement (Lei et al., 2020). However, it is also necessary to address some of the challenges and ethical considerations when using AI in education. Therefore, the debate on the role of AI in personalised learning is not only relevant to education, but has far-reaching implications for a more inclusive and effective future of global education.

## Review of literature

### 1. Artificial Intelligence (AI)

Artificial intelligence (AI) is a branch of computer science that focuses on developing computer systems capable of performing tasks that would normally require human intelligence (Duan et al., 2019). The ultimate goal of AI is to create machines or computer programmes that can process information, learn from experience, and make data-driven decisions in a way that mimics human thinking skills (Bi et al., 2019). AI uses data processing techniques to analyse, understand, and make decisions based on information provided to it. This includes word processing, image recognition, speech processing, and statistical data analysis (Vaishya et al., 2020). AI has grown rapidly in

recent years thanks to advances in computing, big data, and algorithms (Dwivedi et al., 2021). While there are still some challenges to overcome, such as ethics, privacy, and bias, AI continues to be an integral part of the modern world and has the potential to change the way we do things, work, live, and learn.

AI has opened the door for major innovations in various aspects of human life (Liu et al., 2020). In the field of education, AI can be used in personalised learning to provide a tailored learning experience for each student (Mei et al., 2020). AI is also used in various fields of science, including astronomy (analysing data from telescopes), biology (genome processing), and physics (simulation). It is important to remember that advances in AI also raise ethical and security concerns (Davenport et al., 2020). It is worth thinking about how these technologies can affect employment, data privacy and social justice, and how we can ensure ethical and safe use of AI in Apps. Overall, AI is a very dynamic field and will continue to play an important role in shaping various aspects of our lives in the future.

**1. Personalised Learning**

Personalised Learning or Individualised learning is an educational approach designed to meet the needs, interests, and level of understanding of each student (Bera et al., 2019). It is a concept that emphasises that there is no one learning method that works for all students so the learning process must be adapted to the characteristics of each individual (Ting et al., 2019). Personalisation of learning allows programmes to be tailored to individual needs (Jamshidi et al., 2020). Students who understand the material faster may be given additional or more challenging material, while students who need extra help may receive additional support. Personalisation gives students more control over their learning (Attia et al., 2019). This can include giving them a wider choice of study topics or giving them the ability to set their own pace of learning.

Personalised systems often involve continuous monitoring of a student's progress (Ardakani et al., 2020). This may involve collecting data on how students answer questions, complete tasks, or demonstrate their understanding of concepts (Oh et al., 2020). Based on the data, feedback can be given to students to help them improve their understanding (Lalmuanawma et al., 2020). Technology, particularly artificial intelligence (AI), has become a powerful tool for personalising learning. AI can quickly and accurately analyse individual student data, design personalised learning plans, and make recommendations based on students' learning progress (Stetco et al., 2019). Personalised learning aims to improve the quality of education by making learning more relevant, meaningful and effective for each individual. It recognises that each student is unique and that education should accommodate these differences to maximise each individual's potential.

There are several previous research opinions regarding research on the Role of Artificial Intelligence (AI) in Personalising Learning for Each Student. Firstly (Nagendran et al., 2020), with the research title Effective Artificial Intelligence (Ai) in Learning and Teaching and obtaining research results This tool can be used individually or in groups depending on the user's goals, so that AI technology can help the world of education effectively and efficiently. Secondly (Disemadi, 2021), with the research title Urgency of Special Regulations and Utilisation of Artificial Intelligence

in Realising Personal Data Protection in Indonesia and obtained research results This suggests that the Indonesian government must immediately form and approve special legal instruments governing personal data protection. Alternatively, one of the efforts that can be maximised in protecting personal data is by utilising the potential of AI. The use of AI in personal data protection will reduce the occurrence of human error so that personal data protection is more secure. Third (Harmon et al., 2020), with the research title The Role of Artificial Intelligence (AI) Information Technology at the Al-Kahfi Foundation and obtained research results that artificial intelligence can help the teaching and learning process more innovative and effective in the future.

Research conducted by previous researchers is different from current research. Meanwhile, the study conducted by the researcher is entitled The Role of Artificial Intelligence (AI) in Personalising Learning for Each Student. The researcher found that by utilising the role of artificial intelligence in the education process will create individualised learning or personalised learning. In addition, artificial intelligence also has a major impact on the way students and teachers view and experience education. However, a number of challenges must be overcome when implementing personalised learning with AI, including student data privacy issues, ethical use of data, and privacy gaps. Therefore, it is important for educational institutions to develop appropriate guidelines and policies and ensure that the application of AI in education provides maximum benefits to students.

## RESEARCH METHODOLOGY

A research needs to follow the applicable rules or regulations so that the resulting search results can be considered valid. Research methods are basically scientific ways to collect data with specific purposes and uses (Zou et al., 2020). The scientific method means research activities that are based on scientific properties that are rational, systematic, and empirical. Research on the Role of Artificial Intelligence (AI) in Personalising Learning for Each Student requires a careful and structured research method to understand its impact in depth (Liang et al., 2019). Research methods are a series of steps or approaches that researchers use to design, collect data, analyse data, and draw conclusions in order to answer research questions or achieve research results, specific research objectives (Yu et al., 2020). The appropriate research method is chosen based on the type of research, the purpose of the research, the data required and the resources available. In this study, researchers used quantitative research methods to collect, analyse and interpret data. Quantitative research is a scientific method for measuring, determining cause-and-effect relationships, and testing hypotheses using numerical or measurable data.

This research uses quantitative research methods. Quantitative methods are known as traditional methods, because this method has been used for a long time as a tradition as a research method (Nusinow et al., 2020). This method is also called the posivsk method because it is based on the philosophy of positivism. This method is like the scientific/scientific method because it fulfils scientific principles, concrete/empirical, objective, measurable, rational and systematic. This method is also called the discovery method, because with this method one can discover and Many new sciences and

technologies are developed (F. Yang et al., 2020). This method is called quantitative method because the research data is numerical and the analysis is in the form of statistics. Quantitative research method is a research method based on the philosophy of positivism, used to examine the state of a natural object, (as opposed to experience) where research is an important tool sample data sources are made deliberately and snowball, collection techniques with three angles (associative, inductive / qualitative and data analysis) qualitative research results stress the importance of generalisation.

## RESULT AND DISCUSSION

AI (Artificial Intelligence) technology is progressing rapidly year by year. Its presence with new features, functions and appearance is increasingly affecting many aspects of human life, including education. Artificial intelligence is starting to play a role in learning activities in schools and universities. Artificial intelligence is becoming an important part of the growth and development of educational technology. This has clear implications for people's working lives in the future. When it comes to educational technology, it must be said that it has not been applied thoroughly in learning. In this era of increasingly fierce competition, there are still educational institutions that have not implemented technology in teaching and learning activities. At this time, schools will benefit from the emergence of technology that supports the work of teachers and students. Schools can use applications or media that can automate tasks such as providing feedback, selecting appropriate learning materials, or customising the curriculum to student needs.

Education is one of the fields where artificial intelligence (AI) has made significant contributions and has a huge impact on various aspects of learning. One of the main applications of AI in education is personalised learning. Personalised learning is an approach where the learning experience is tailored to the needs and abilities of each student. AI can collect and analyse data on each student in real time. This data includes information on individual abilities, learning styles, interests, and needs. With this information, AI systems can understand students' strengths and weaknesses and plan learning accordingly. AI enables the development of adaptive learning platforms. This means that learning materials can be customised according to the student's level of understanding and skills. The AI system will identify areas that require improvement and provide additional materials or exercises accordingly.

Artificial intelligence (AI) also plays a role in assessing learning or learning evaluation. Where AI can do the assessment automatically. AI can be used to automate the grading and review process. This allows teachers to save time in assessing student work and provide faster feedback to students. Meanwhile, in language learning, AI can be used to provide speaking, listening, and writing exercises that are appropriate to the students' language level. It can also help in translating and understanding foreign languages. AI also helps analyse large amounts of data in education to identify trends, potential problems, and patterns that humans might miss. This helps to make better decisions in designing educational programmes.

AI does not only help with the learning process in schools, but it can also help with school administration. AI can help schools in administrative management, such as

lesson planning, asset management, and financial management. This allows teachers and school staff to focus more on the teaching and learning process. It can also help schools analyse student data and make predictions. AI can analyse large amounts of data in education to identify trends, potential problems and patterns that humans might miss. This helps to make better decisions in designing educational programmes. AI can be used for online learning, such as e-learning and distance learning. Distance learning is in dire need of AI in its implementation. This is because AI has played an important role in facilitating distance education and online learning platforms. This includes virtual assistants to support students in online learning and personalised online learning tools.

In the world of education, it seems that there is no denying the huge impact of the role of artificial intelligence. With AI, students can carry out learning anywhere and anytime. In addition, AI also expands students' access space. AI can be used to make learning materials more accessible to students with special needs, such as students with disabilities. This creates comprehensiveness in education. AI can also be used to monitor students' emotional and behavioural development. This helps schools identify psychological or behavioural issues that require additional intervention. In addition, AI can also play a role in guiding and encouraging students. AI can provide students with advice and information on career paths and training opportunities. This helps them make informed decisions about their careers. As AI technology continues to evolve, education will continue to undergo significant transformation. However, it is important to remember that AI does not replace teachers. Instead, AI can be used as a powerful tool to help teachers help students reach their full learning potential.

Figure 1. The role of AI in the learning process

Based on the picture above, it can be concluded that AI plays a big role in the education process. Especially in personalising learning for each student. How can AI not allow online learning so that students must learn individually or personally. This personalised learning is a system that allows students to proactively transform their intellectual abilities into learning skills through thoughts, emotions and actions that help them achieve their goals. This personalised learning allows for more tangible and far-

reaching academic benefits. Because if children only get learning at school, it is certainly not enough to explore and train students' skills with teacher support alone. However, when children use informal digital learning apps, such as YouTube, Instagram or TikTok apps, they may have too much freedom, leading to ineffective learning. It can be said that schools still favour formal education technologies such as e-books and animated videos.

The advent of artificial intelligence (AI) in learning brings many benefits but also poses some challenges that need to be addressed. AI will also raise issues related to data completeness and security. AI collects and analyses student data. The challenge here is to keep students' personal data safe and protected from privacy breaches. Data storage, usage, and access policies must be managed very carefully, so AI can also affect data quality. AI will only work if data is fed into it. If the initial data is inaccurate or misleading, then the results generated by the AI system may also be inaccurate. Therefore, it is important to ensure the integrity and quality of the data used by AI. AI also creates unequal access, as not all students or educational institutions have equal access to AI technology. This creates an access and learning gap, which can exacerbate the existing educational achievement gap.

AI also creates a dependency of students and teachers with technology that can take away the human aspect of education. Teachers still play an important role in guiding and motivating students, and excessive use of AI may reduce this engagement. The use of AI in assessment and decision-making may raise ethical questions. For example, biased algorithms may result in unfair or discriminatory decisions. Some are concerned that the use of AI in education will replace some of the jobs of teachers or administrative staff. This raises questions about the economic and social impacts of education automation. To address these challenges, it is important for stakeholders, including governments, schools, educational institutions and technology developers, to jointly develop guidelines, regulations and best methods to ensure that the use of AI in education provides maximum benefits while protecting privacy and minimising negative impacts and risks.

Researchers collected data on students' perspectives and responses to the Role of Artificial Intelligence (AI) in Personalizing Learning for Each Student by distributing questionnaire links to students. The purpose of distributing this questionnaire is to obtain results and to find out whether the role of artificial intelligence (AI) is able to support the personalization of learning for each student. The questionnaire or questionnaire given by researchers to students contains 15 statements covering the Role of Artificial Intelligence (AI) in Personalizing Learning for Each Student. The questionnaire was made using google form. In addition, researchers also need to pay attention to the aspect of relevance to the statements given, also related to the accuracy of the statement with the research title. The response of students who filled out the questionnaire was very positive towards the Role of Artificial Intelligence (AI) in Personalizing Learning for Each Student. The data that researchers get then researchers summarize in one table, as below:

| NO | Statement | SS | S | RR | TS | STS |
|---|---|---|---|---|---|---|
| 1 | AI can identify each student's individual learning needs based on data analysis, such as learning style, comprehension speed, and skill level. | 60% | 40% | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | With AI, the learning curriculum can be automatically customised to each student's ability | 33,3 % | 50% | 16,7 % | | |
| 3 | AI helps create a more dynamic learning experience, offering additional practice when needed and more challenging material for brighter students | 40% | 60% | | | |
| 4 | The AI system allows students to select learning materials that match their interests and career goals | 66.7 % | 33.3 % | | | |
| 5 | AI can provide feedback immediately after a task or exam is completed, allowing students to identify and address their mistakes quickly | 55% | 45% | | | |
| 6 | Teachers can use AI to monitor student progress more accurately and provide specialised support in areas where needed | 50% | 50% | | | |
| 7 | AI can design customised lesson plans for students with special needs, such as students with disabilitie | 60% | 40% | | | |
| 8 | The use of AI in language teaching allows students to practice speaking and listening in their target language more effectively | 50% | 50% | | | |
| 9 | AI can assist students in solving problems and developing problem-solving skills by providing appropriate challenges | 50% | 50% | | | |
| 10 | Analysis of students' emotions by AI can help in identifying emotional problems or stress, enabling timely intervention | 30% | 50% % | 20% | | |
| 11 | AI can also be used to make recommendations for additional literature and resources that match the reading level and interests of students | 55% | 45 % | | | |
| 12 | Teachers can use AI data to plan collaborative projects that match students' skills and interests | 60% | 40% | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | AI can provide access to online learning content customised to the curriculum and students' level of understanding | 55% | 45% | | | |
| 14 | AI systems can monitor student absenteeism and provide early warnings to schools and parents if there are issues that need to be addressed | 50% | 50% | | | |
| 15 | The use of AI in teaching helps reduce teachers' workload in grading assignments, allowing them to focus more on direct interaction with students | 33,3 % | 50% | 16,7 % | | |

**Table 1. Table of questionnaire filling by students**

Description:
SS = Strongly Agree
S = Agree
RR = Undecided
TS = Disagree
STS = Strongly Disagree

The table above is a table of assessment results from a questionnaire given to students. Responses or responses given by students are needed to provide an assessment of the Role of Artificial Intelligence (AI) in Personalising Learning for Each Student whether it is optimal or not. In the statement there are 5 assessment categories, namely Strongly Agree (SS), Agree (S), Undecided (RR), Disagree (TS), Strongly Disagree (STS). Based on this table, the first highest assessment result is 66.7% with a very agree assessment category. While the second assessment is 60% with a very agree assessment category. The role of Artificial Intelligence (AI) in personalising learning for each student greatly facilitates teachers and students in the learning process. Although there are still some negative effects in its implementation. The use of AI in personalised learning provides great potential to improve educational outcomes and meet the unique needs of each student, creating a more effective and inclusive learning experience.

Next, the researcher will describe the results of filling out the questionnaire. For the first statement, AI can identify the individual learning needs of each student based on data analysis, such as learning style, speed of understanding, and skill level, 60% strongly agreed and 40% agreed. For the second statement, With AI, the learning curriculum can be automatically adapted to each student's ability, the response was strongly agreed by 33.3%, agreed by 50%, and undecided by 16.7%. For the third statement, AI helps create a more dynamic learning experience, offering additional practice when needed and more challenging material for brighter students obtained responses with strongly agree 40% and agree 60%. For the fourth statement, the AI system allows students to select learning materials that match their interests and career goals obtained responses with 66.7% strongly agreeing and 33.3% agreeing. For the

fifth statement, AI can provide feedback immediately after an assignment or exam is completed, enabling students to identify and address their mistakes quickly obtained responses with strongly agree 55% and agree 45% categories.

Furthermore, for the sixth statement, Teachers can use AI to monitor student progress more accurately and provide specialised support in areas needed, the responses were strongly agreed 50% and agreed 50%. For the seventh statement, AI can design customised lesson plans for students with special needs, such as students with disabilities obtained responses with strongly agree 60% and agree 40% categories. For the eighth statement, the use of AI in language teaching allows students to practice speaking and listening in their target language more effectively, the responses were strongly agreed 50% and agreed 50%. For the ninth statement, AI can help students solve problems and develop problem-solving skills by providing appropriate challenges, the responses were strongly agreed 50% and agreed 50%. For the tenth statement, Analysing students' emotions by AI can help in identifying emotional problems or stress, enabling timely interventions obtained responses with a strongly agree category of 30% and an agree category of 50% and a doubtful category of 20%.

Furthermore, for the eleventh statement, AI can also be used to make recommendations for additional literature and resources that are appropriate to the reading level and interests of students obtained responses with a strongly agree category of 55% and an agree category of 45%. For the twelfth statement, Teachers can use AI data to plan collaborative projects that match students' skills and interests obtained responses with a strongly agree category of 60% and agree category of 40%. For the thirteenth statement, AI can provide access to online learning content tailored to the curriculum and students' level of understanding obtained responses with 55% strongly agreeing and 45% agreeing. For the fourteenth statement, AI system can monitor student absenteeism and provide early warning to schools and parents if there is a problem that needs to be addressed obtained responses with strongly agree 50% and agree 50% categories. For the fifteenth statement, The use of AI in teaching helps reduce teachers' workload in grading assignments, so that they can focus more on direct interaction with students obtained responses with a strongly agree category of 33.3% and an agree category of 50% and a doubtful category of 16.7%.

## CONCLUSION

Based on the results and discussion above, it can be concluded that Artificial Intelligence (AI) plays an important role in personalising each student's learning. Through sophisticated data analysis and adaptability, AI makes education more effective and personalised. It opens up learning opportunities that are tailored to each student's abilities, needs and interests, thus creating a more comprehensive and rich educational experience. With AI, teachers can provide feedback faster, design more adaptive programmes and provide support faster. While challenges and ethical considerations remain, AI's role in personalising learning is a positive step towards improving the quality of education and helping every student reach their full potential. In other words, AI helps close the education gap by providing a more comprehensive approach, tailoring learning to individual abilities, and providing fairer opportunities for all students. While

there are still challenges around data privacy, education staff training, and rapid technological advancements, the potential of AI to transform education and provide a richer and more effective experience for students cannot be ignored. With continuous development and ethical reflection, AI has great potential to transform the future of education to be smarter, adaptive, and more tailored to the needs of each student.

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