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Principles of Science and Technology in Islamic Education Curriculum Development

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Abstrak: Pengembangan kurikulum Pendidikan Agama Islam (PAI) bertujuan untuk menciptakan pendidikan yang relevan dengan kebutuhan zaman. Mengintegrasikan asas ilmu pengetahuan dan teknologi dalam pengembangan kurikulum PAI memungkinkan pembelajaran agama yang lebih kontekstual, dinamis, dan relevan, tanpa mengabaikan nilai-nilai moral dan spiritual. Penelitian ini bertujuan untuk mengetahui asas IPTEK dalam pengembangan kurikulum pendidikan agama Islam. Penelitian ini menggunakan jenis kepustakaan *(library Reseach*). Teknik Pengumpulan data yang dilakukan yaitu dengan membaca artikel publikasi ilmiah dan buku terbitan yang berkaitan dengan topik yang dibahas. Analisis data dalam penelitian ini menggunakan analisis deduktif. Hasil penelitian ini menjelaskan bahwa Asas Ilmu Pengetahuan dan Teknologi (IPTEK) dalam pengembangan kurikulum Pendidikan Agama Islam memiliki peran penting untuk memastikan relevansi materi pendidikan dengan perkembangan zaman. Mengintegrasian asas IPTEK dalam kurikulum PAI bertujuan menciptakan generasi yang mampu beradaptasi dengan tantangan global melalui penguasaan teknologi dan ilmu pengetahuan. Asas IPTEK dalam pengembangan kurikulum PAI juga harus diarahkan untuk membangun generasi yang beriman, bertakwa, dan berdaya saing global. Namun, mereka juga mengingatkan pentingnya menjaga keseimbangan antara kemajuan teknologi dan penanaman nilai-nilai moral Islam. Dengan

pendekatan ini, kurikulum PAI dapat menciptakan individu yang tidak hanya cerdas secara intelektual, tetapi juga berintegritas dalam menjalankan perannya di tengah masyarakat modern

Keywords:
Science, Technology, curriculum, education

Abstract: The development of Islamic Religious Education (PAI) curriculum aims to create education that is relevant to the needs of the times. Integrating the principles of science and technology in the development of PAI curriculum allows for more contextual, dynamic, and relevant religious learning, without neglecting moral and spiritual values. This study aims to determine the principle of science and technology in the development of Islamic religious education curriculum. This research uses the type of literature (library research). The data collection technique is done by reading scientific publication articles and published books related to the topic discussed. Data analysis in this research uses deductive analysis. The results of this study explain that the principle of Science and Technology (Science and Technology) in the development of the Islamic Religious Education curriculum has an important role to ensure the relevance of educational materials to the times. Integrating the principles of science and technology in the Islamic Education curriculum aims to create a generation that is able to adapt to global challenges through mastery of technology and science. The principle of science and technology in the development of PAI curriculum should also be directed to build a generation that is faithful, pious, and globally competitive. However, they also reminded the importance of maintaining a balance between technological progress and the cultivation of Islamic moral values. With this approach, PAI curriculum can create individuals who are not only intellectually intelligent, but also have integrity in carrying out their roles in modern society

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INTRODUCTION

The development of technology in education provides many benefits for educators in the learning process. Learning can be easy with the technology that is developing today. The use of technology in Indonesia today, especially mobile phones and the internet, reaches 87.13% of those who use social network media. This shows that information technology has become a part of Indonesian people's lives. This also has a big impact on many people who use information technology, either directly or indirectly (Ramadhan, 2022).

The principle of science and technology in the development of the 21st century education curriculum must be able to accommodate this major change by integrating technology in the learning process. By utilising technology, students can access information quickly and easily through various digital platforms, such as the internet, learning applications, and hardware and software that support teaching. Technology enables more flexible and dynamic learning, providing a learning experience that is more immersive, engaging, and suited to the needs of today's students (Ariani, 2019).

Islamic religious education has an important role in shaping students' character, morals, and spirituality. In a world that continues to develop with the rapid advancement of science and technology (science and technology), the development of Islamic education curriculum must be able to adapt to these changes. The integration of science and technology in curriculum development is expected to improve the quality of learning, not only in the context of teaching religion but also in developing 21st century skills, such as critical thinking, creativity, and problem-solving ability. Therefore, the development of science and technology-based PAI curriculum becomes very important to answer the challenges of an increasingly complex era and requires a deep understanding of religion that is in line with technological advances (Fathurrahman, 2018).

The integration of science and technology in PAI does not only concern technical aspects such as the use of digital technology in learning but also contains critical and reflective values that should exist in PAI. With an approach based on science and technology, the PAI curriculum can facilitate students learning religion more applicable, interactive, and relevant to global social and cultural developments. Science and technology can enrich Islamic learning materials by providing various sources of information that can be accessed through the internet, as well as using digital devices to support the learning process, so that students can learn in a more interesting and effective way (Musfiroh, 2020).

In addition, science- and technology-based Islamic education should reflect efforts to create a generation that not only masters religious knowledge but also has the ability to adapt and develop in a digital and connected world. An educational process that integrates science and technology will open up opportunities for students to better understand the application of science in daily life while maintaining relevant religious values. The use of technology in Islamic religious education also provides opportunities for more innovative and adaptive teaching, which is able to answer the needs of modern society that is more open to change (Hasanah & Arifin, 2019).

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Sariduddin (2016) explains that the development of science and technology has direct implications for curriculum development, which includes goals, materials, methods, and evaluation. Technology has an important role in developing PAI materials that are relevant to the conditions and needs of students. PAI learning must always be contextualised with the real life of students so that its existence is always present and becomes the needs of students (Saridudin, 2016). Nirmayanti et al. (2024) explained that technology utilizes technological advances in the learning process. This will enable teachers to understand the various technologies that can be applied in learning, as well as design effective and efficient learning activities (Nirmayanthi et al., 2024).

Qolbi and Hamami (2021) explain that science and technology are a foundation of thinking based on scientific discoveries that have gone through a scientific process to produce products that make it easier for humans to meet their needs. Science and technology is dynamic and continues to develop over time, making a major contribution in various aspects of human life, including as a foundation in the education curriculum. Technology, as a result of science and technology, aims to create efficient and effective conditions and help humans meet their needs (Qolbi & Hamami, 2021). Putri et al. (2024) explained that science and technology influence the education curriculum. Science and technology play a crucial role in human development. The main purpose of science and technology in the development of PAI curriculum is to create a situation that is effective, efficient, and in accordance with human behaviour patterns. Advances in science and technology reflect the progress of human civilisatio (Putri et al., 2024). Didiyanto (2017) explained that science and technology as the foundation of PAI curriculum development is expected to be able to follow the development of science and technology and art in accordance with the value system, humanity, and culture of the nation (Didiyanto, 2017).

Science and technology-based PAI curriculum can improve students' ability to apply religious values in a world that is increasingly influenced by technology. In addition, research on the principles of science and technology is also needed to prepare students to compete at the global level with the ability to think critically and adapt to the development of science and technology (Rachmawati, 2017). Technology-based education will give birth to a generation that is innovative and ready to face future challenges. Therefore, this research is important to ensure that the PAI curriculum can meet the demands of the times without neglecting essential religious values (Widiastuti, 2019).

This research is to examine in depth the principles of science and technology (science and technology) in the development of Islamic education curriculum. This research also explains how the application of science and technology principles can support innovation in learning, enrich teaching materials, and create more relevant and effective methods in teaching Islamic values in the modern era. Thus, it is hoped that this research can make a real contribution to the development of education that is oriented towards technological progress without overriding spiritual and moral values.

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METHODS

This research uses the type of literature study *(library research)*. The data collection technique is by reading scientific publications and published books related to the principles of science and technology and the development of Islamic religious education curriculum. The analysis in this study uses deductive analysis which consists of: 1) Finding various references related to the principles of science and technology and Islamic religious education curriculum; 2) Understanding the references that have been found; 3) Determining whether the reference is in accordance with the research study; 4) Connecting several references that have been found; and 5) Drawing conclusions from the data collected**.**

RESULTS AND DISCUSSION

PAI Curriculum

The curriculum is a fundamental guideline in the learning process (Suparman, 2020) and a very important tool for the success of an education (Basire & Rasak, 2024). The curriculum is a very important part of the education system because it serves as a tool to achieve educational goals and serves as a guideline for the learning process for all types and levels of education. Therefore, curriculum development is needed to ensure that the curriculum used always meets the needs (Sutarto et al., 2024). The definition of curriculum, according to Majid cited by Hasan (2013), is that PAI curriculum is a plan or design that includes various components related to the implementation of PAI. This curriculum is designed to provide a deep understanding of the teachings of Islam to students, as well as develop character and morals in accordance with the principles of Islam (Hasan, 2013). The curriculum is limited to the knowledge presented by teachers or other educational institutions in the form of subjects or books by previous scholars that are studied for a long time by students at each stage of their education (Afif, 2023).

According to Mr. Beauchamp, cited by Yunus and Muzakir (2023), *"A curriculum is a written document that may contain many ingredients, but basically it is a plan for the education of pupils during their enrolment in a given school."* Beauchamp emphasises that the curriculum is an educational or teaching plan. The implementation of the plan is included in teaching (Yunus & Mudzakir, 2023). According to modern views, the curriculum is more than just a lesson plan or field of study. The curriculum, in the modern view, is all that actually happens in the educational process at school. This view stems from something actual, real, that is, what actually happens at school in the learning process. In education, activities carried out by students can provide learning experiences, such as gardening, sports, scouting, and socialising, in addition to studying the field of study. All of these are useful learning experiences. The modern view argues that all learning experiences are the curriculum (Sya'bani, 2018).

The curriculum used affects the success and failure of education and the ability of students to absorb lessons. As an educational program provided by schools, it covers various aspects that can influence the development and formation of students' characters, align with the goals of education, and play a role in improving their quality of life. The

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application of this curriculum is not limited to the school but also extends outside the school environment. The Islamic education curriculum is a guide for teachers in guiding students towards the main objectives of Islamic education by developing various knowledge and skills. In this case, the process of Islamic education should not be carried out haphazardly. Instead, it must refer to the conception of a perfect human being (insan kamil), whose plans have been systematically arranged in the Islamic education curriculum (Saputra et al., 2021).

The curriculum that learners undergo has three important roles that greatly affect their development and achievement. These roles are conservative, critical, and creative. The conservative role of the curriculum is responsible for incorporating information about values in society. In addition, this role is concerned with the culture of the school that will be transferred to the culture of the community, so that the school not only learns about the cultural heritage of the community but also learns about it. The critical role is to teach how to think. It helps students become people who can think critically and use evidence to make decisions, as well as understand and face intellectual challenges. Students acquire critical, analytical, and independent thinking skills that are essential for dealing with a variety of situations and problems that arise in everyday life. In the science curriculum, students create their own research, create research questions, and analyse data (Aslan & Wahyudin, 2020). Conservative role The curriculum plays a role in carrying out various creative and constructive activities, which means creating and compiling something new according to the needs of society in the future. Thus, the curriculum creates new lessons, experiences, ways of thinking, skills and abilities that benefit society as a whole and help everyone develop what they currently have (Maftuhah & Suharsono, 2024).

Learning and curriculum must be in a context of mutual influence. The document prepared by the school that describes the structure of the subject matter must be implemented in the teacher's teaching, both in the classroom and outside the classroom, using the various educational resources available. There are several levels of curricular decision-making, with the instructional level being very important and very close to the students. In this situation, teachers use a transactional approach to consider the needs of students and the aspirations of the community at school (Abdurrahmansyah, 2021).

The PAI curriculum is a set of plans and arrangements about the objectives, content, materials, and ways of learning as a reference for organising PAI learning activities in order to achieve its learning objectives. The PAI curriculum is a set of Islamic studies that include the Qur'an, hadith, akidah akhlak, fiqh, and the history of Islamic culture (Widodo, 2023). The Islamic education curriculum involves planning, implementation, evaluation, and revision to ensure that the curriculum is relevant, effective, and appropriate to the needs of learners and the times (Basire & Rasak, 2024). The Islamic religious education curriculum also includes learning materials based on PAI. These materials begin with structured activities, knowledge, habits, and experiences provided to students to achieve PAI objectives. These tools can be in the form of Islamic

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religious education materials, structured activities and programs in the learning process, and learning practices (Qolbi & Hamami, 2021).

The PAI curriculum is also integrated with other fields of study in the school curriculum. As the implementer of the Islamic religious education curriculum, every religious teacher is expected to learn the curriculum as well as possible so that they can use it with interactive and communicative teaching techniques with attention to student activities. In addition, religious teachers must act as mentors, supervise the environment, and provide the means for children to learn on their own (Widodo, 2023).

Principles of Science and Technology in Education Curriculum

Etymologically in Indonesian, the word 'principle', which in English is translated as '*principle*' (Echols & Shadily, 2003), is defined as 'basis', 'foundation'. Science is defined as an understanding or awareness of knowledge with the ability to search, investigate, and analyse hypotheses. It also refers to knowledge acquired through various means of learning and experience. The term'science' refers to a type of knowledge that has been proven accurate (Camelia, 2020). Knowledge is defined as information that is known and realised by someone. There are two ways to gain knowledge, namely through personal experience and through teaching from others. However, knowledge cannot be considered science unless it has been validated. Knowledge about human origins comes from information that is unsystematic, inaccurate, and not based on a clear theory. With the development of culture, people began to make theories about many things based on what was available (Arifin, 2017).

Horton B. and Chester L. H., in Mulyani and Nurhaliza (2021), explain that science is an attempt to find knowledge that is acceptable and reliable and systematically tested with regular steps and based on certain principles and procedures. One of the main objectives of science is to research, discover, and expand human understanding of various aspects of human natural reality. These aspects are limited to producing formulations that can be understood easily. by limiting how broad the thoughts and beliefs he gains from his experiences are (Mulyani & Haliza, 2021). Technology, according to Roger, quoted by Ahmad Suryadi, is a design or design for action aids that reduce uncertainty in causal relationships in achieving a desired result (Suryadi, 2020). Technology is essentially the implementation of science and has an important role in every human life (Daryono et al., 2021).

In essence, technology is the implementation of science and plays an important role in human life. Technology comes from human thinking through scientific processes to achieve ideal goals and can also be interpreted as a means for humans to fulfil their needs. The goal is to create a situation where human behaviour patterns function properly, efficiently, and synergistically (Camelia, 2020). In line with the development of science and technology, various tools and media have emerged related to information and communication. Before the existence of information media using software and hardware, humans used paper media to disseminate knowledge, news, or messages. Libraries, newspapers, and postal services were very important in this regard for people who

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wanted to communicate remotely. Computers, radio, television, and other telephones are examples of the rapid development of science and technology (Sitika et al., 2023).

Over time, the use of science and technology continues to grow, which impacts the formation of the curriculum. Given that the curriculum is a tool to achieve dynamic educational goals, the curriculum must always be developed and refined to keep pace with the development of science and technology (Saifudin, 2021). Education will participate in the use of modern technology that will support the continuity of education. The development of science and technology can support education, which aims to develop the potential of students to become people who are devoted to God, have good character, and are intelligent in science. For example, the learning process using audio-visual media will facilitate the delivery of material and can increase students' enthusiasm for learning (Susi & Yasir, 2021).

Over the years, educators and learners have become accustomed to the past perspective on education. However, a wave of reform is currently reshaping Indonesians' thinking. Actually, this change is caused by the need to change the direction and pattern of educational goals as well as the methods to achieve them. Thus, education is seen as a process of teaching someone to 'live' anywhere and anytime, not just preparing children for the future. Therefore, building mental capabilities that enable one to learn is an important goal of education. The goal of education is learning itself, not merely learning outcomes. In the process of education, important human characteristics should be instilled. They should be considered when creating a 'living' human resource learning design, which means that truly excellent people are those who are able to compete in an era of global chaos (Uno & Lamatenggo, 2016).

Educational development is highly dependent on the curriculum that will be implemented. The curriculum is not only a concept on paper, but the curriculum is attached to the educator and also prepares a variety of action options based on the educator's ideas and other changes that are considered important in the teaching and learning process. Educational curriculum development is a learning plan to bring students towards the desired changes and measure how much these changes occur in students (Camelia, 2020).

Education is closely related to social life because education is one of the social aspects. Education is not limited to formal education but also non-formal education. The development of science and technology can affect education both directly and indirectly. The direct influence of the development of science and technology is to provide content or material to be delivered in education. The indirect influence of science and technology is to cause the development of society, and the development of society raises new problems that demand solutions with new knowledge, abilities, skills developed in education. Therefore, the curriculum should be able to accommodate and anticipate the pace of development of science and technology so that students can keep up and, at the same time, develop science and technology for the benefit and survival of mankind. The advancement of science and technology brings humans to a time that is different from the

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previous period, even a time that has never been imagined in the past. The emergence of technological results, such as the results of transportation technology, which not only allows humans to explore the world (Saridudin, 2016).

The implications of science and technology in curriculum development should aim to improve students' thinking skills so that they can create new technologies that are more in line with the times and the needs of Indonesian society. Curriculum development should improve students' ability to identify and revitalise technologies that have long been used by Indonesian society. The development of science and technology also has implications for curriculum development, which includes the development of educational content or materials, the use of learning strategies and media, and the use of evaluation systems Indirectly requires the world of education to be able to equip students to have the ability to solve problems faced as an influence of the development of science and technology. In addition, the development of science and technology is also used to solve educational problems (Maftuhah & Suharsono, 2024).

However, in everyday life, we must be aware of the fact that technology not only brings benefits but can also have a negative impact. Currently, many students use technology facilities not in accordance with expectations, which can have a negative impact, such as the use of e-learning, which can cause the diversion of teachers' functions, which causes them to be eliminated because it allows pupils to learn individually. Students use the internet for bad things such as pornography and online games. Criminal acts on the internet can also occur in the field of education, such as theft of important documents or assets about the education system that are actually kept secret, causing apathy in everyone, whether students or students, as well as educators, teachers, or lecturers. The excessive existence of cyberspace becomes an addiction for students or students. This can happen when students are less sceptical and critical of new things (Jamun, 2018).

In addition, science and technology have a very positive impact if used properly in education. Schools must be able to support and anticipate the development of science and technology, both those faced today and future challenges. Teaching materials or materials should be the result of contemporary developments in science and technology, both related to the results of obtaining information, or how to obtain this information and utilise it for society. Curriculum developers pay attention to the needs of society, industry, lifestyle, and employment and interpret individual needs within the framework of the interests of science and technology so that the curriculum is in accordance with the development of science and technology. The utilisation, development, and mastery of science and technology will have implications for the development of human resources (Camelia, 2020).

Principles of Science and Technology (Science and Technology) in Islamic Religious Education Curriculum Development (PAI)

A principle is something that is fundamentally linked to the idea of purpose and the primary laws that govern action. You can draw a parallel between low-rise buildings

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such as houses and high-rise buildings such as buildings. A foundation must be established before constructing a complete building. This is done to ensure that the building is resistant to environmental hazards such as strong winds and earthquakes and can also be used properly. By referring to this example, one can gain an understanding of the importance of principle, foundation, or basis. Every curriculum must have a foundation that serves as the foundation for the curriculum. The basic function, or foundation, provides the direction of the goals to be achieved and serves as the foundation for the curriculum (Jarni & Sugiran, 2023).

The principle of something very important that is related to thinking about the purpose and basic laws of action (Qolbi & Hamami, 2021). Educational curriculum (manhaj al-dirasah), in the dictionary of tarbiyah, is a collection of strategies and materials used by educational institutions as guidelines for achieving educational goals. Islamic religious education (PAI) is a form of education that combines various Islamic religious practices. Government Regulation of the Republic of Indonesia No. 55/2007 on Religious Affairs and Religious Education stipulates that Islamic religious education consists of Qur'an, Hadith, Aqidah/Akhlak, Fiqh, and SKI. This is the final definition used in various laws, curricula, and other contexts (Putra, 2023).

According to Nana Syaodih Sukmadinata, quoted by Jarni and Sugiran, the principle of science and technology, the curriculum, and the principles that emphasise the importance of developing scientific knowledge and the use of technology in the educational process. With the development of the times and the increasingly complex needs of society, a curriculum based on the principles of science and technology aims to prepare students to face global challenges related to science, technology, and innovation. The socio-cultural foundation of the curriculum refers to the elements embedded in education to help learners understand, appreciate, and practice relevant social and cultural values in their society (Jarni & Sugiran, 2023).

One of the efforts is to develop the Pal curriculum with the principles of science and technology (IPTEK) to obtain new curriculum results through the burden of planning curriculum preparation from the results of assessments conducted over a certain time (Saputra et al., 2021). In developing the PAI curriculum in Islamic education institutions, a strong foundation or principle is needed. If the development process is random and does not have a strong foundation, the resulting educational output will not be reflected in quality. Humans are strongly influenced by technology.

Progress in science and technology is one way to measure the progress of human civilisation. Many aspects of life utilise technology. The goal is to create a condition in which human behaviour patterns function properly, efficiently, and synergistically. Technology is not always physical, such as computers, TV, and radio, but also non-physical, such as evaluation systems, learning procedures, and teaching techniques, and so on. The use of this technology in education has a major impact on the process and outcomes of education. Advances in science and technology, especially in the fields of transportation and communication, have the ability to create a new order in human life;

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the curriculum should be future-oriented and anticipate the pace of this development so that students can keep rapidity with and develop science and technology simultaneously (Taman & Arbain, 2020).

The technological basis for developing educational programs stems from an analysis of the competencies required to complete specific tasks. PAI learning uses technological principles to analyse learning problems, plan, manage, implement, and assess them. This technological method inevitably has some limitations. The first is that it is limited to pre-designed products. Therefore, technology cannot always be used in Islamic education learning. However, if the learning objective of Islamic religious education is simply to acquire material knowledge and the ability to apply religious teachings, the technological approach may be viable because the process and product can be planned in advance (Hasan, 2013). Their knowledge, skills, attitudes, aspirations, interests, enthusiasm, habits, and even life patterns will be influenced by advances in science and technology (Didiyanto, 2017).

Advances in information and communication technology can provide an approach to learning Islam that is not only centred on the teacher's approach but also gives students the opportunity to dialogue with technology. Students are given the opportunity to search for information taught through various sources, such as the internet, web, e-books, Facebook, email, and SMS, among others. So, students feel that learning religion is an important need, and the teacher's lessons are not boring. By using technological values, learning Islamic religious education is expected to help develop character education. Character education includes trust, honesty, intelligence, resilience, responsibility, caring, democracy, politeness, discipline, love of knowledge, curiosity, self-confidence, respect for diversity, adherence to social rules, and a healthy lifestyle. PAI teachers must also be proficient in technology to ensure that religious teachings are always relevant to learners' daily lives. PAI teachers must also be able to relate religious teachings to learners' daily lives so that PAI materials are always relevant to their daily lives (Saridudin, 2016).

Science and technology is a principle for the development of Islamic religious education curriculum in the preparation of PAI curriculum that can be standardised in all educational institutions both at the basic and higher levels. The application can be in the form of creating scientific works at each level according to their abilities, learning strategies and methods utilising new technologies that are developing, learning media using digitalisation, and standardization of the use of technology in every educational institution in this country(Putri et al., 2024).

In this context, Islamic religious education must be able to become a filter that filters out negative values from advances in science and technology and the modern world that can mislead the younger generation. To achieve this goal, Islamic religious education needs to integrate the values of the Qur'an and the Prophet's Sunnah in every aspect of life, including economics, social, and education, so that children and adolescents can utilise science and technology and the times wisely and responsibly. The implementation of Islamic education that is relevant and contextual in the face of social and technological changes is very important. Not only does it emphasise aspects of knowledge but also the

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formation of morals and character in accordance with Islamic teachings. Thus, the younger generation can develop into individuals who are not only intelligent but also have moral and spiritual resilience in facing an increasingly complex and challenging world (Afif, 2023).

CONCLUSIONS

The Islamic religious education curriculum is a learning process carried out by students through a number of activities that have been planned to perfect the main material of the previous material in accordance with the principles of Islamic teachings. The principle of Science and Technology (Science and Technology) in the development of Islamic Religious Education curriculum has an important role to ensure the relevance of educational materials to the times. The integration of the principle of science and technology in the Islamic education curriculum aims to create a generation that is able to adapt to global challenges through mastery of technology and science. The principle of science and technology in the development of PAI curriculum should also be directed to build a generation that is faithful, pious, and globally competitive. However, they also reminded us of the importance of maintaining a balance between technological progress and the cultivation of Islamic moral values. With this approach, PAI curriculum can create individuals who are not only intellectually intelligent but also have integrity in carrying out their roles in modern society. Science and technology, a principle for the development of Islamic religious education curriculum, can also be standardised in all educational institutions by maximising the development of science and technology at both the basic and higher levels.

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