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Development Model of AI (Artificial Intelligence) - Based Learning Media in Madrasah Ibtidaiyah

Hurril Bariroh[a,1*], Ashari[b,2]

[a]UIN Sunan Ampel Surabaya

[b]UIN Ar-Raniry Banda Aceh

[1] rillhurril@gmail.com* ; [2] asharipad17@gmail.com

*corresponding author

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Abstract

Integrating Artificial Intelligence (AI) into learning media must be aligned with the learning component to function optimally in teaching and learning activities. The study analyzes urgency, selection criteria, and procedures for developing AI-based learning media. This study employs a qualitative approach using a library research method. Data were collected through a systematic review of books, journal articles, and other credible academic sources relevant to the research topic. The research instrument in this research is documentation, which involves identifying, selecting, and interpreting relevant written materials. Data analysis used content analysis techniques to identify patterns, themes, and key concepts related to the research focus. The results of this study show that the importance of AI-based learning media in Madrasah Ibtidaiyah can be reviewed from an independent curriculum perspective and a technology perspective. AI-based learning media criteria can be seen from the extent to which they are compatible with learning system components, such as learning objectives, learning materials, learning media, teachers, and educators. Procedures include analyzing the conditions and needs of learning components, formulating AI-based learning media designs, and implementing such designs. The implications of this research suggest that when developed systematically, AI-based learning media can enhance effectiveness.

INTRODUCTION

In many educational settings, conventional methods still dominate the learning process, relying heavily on verbal explanations and passive student participation. This often leads to low student engagement, limited material retention, and a lack of meaningful understanding, especially in abstract or complex topics. Learning media is an important factor in improving the quality of learning. Technological developments in education encourage the need for efficiency and effectiveness in learning. One of the steps to achieve optimal effectiveness and efficiency is to actively reduce or even eliminate the dominance of verbal learning systems through the use of learning media (Shoffa, 2021). Learning media brings various important benefits in education, such as facilitating understanding of material with a visual and concrete approach, increasing information retention through images, videos, and other visual elements, and increasing student involvement through engaging and interactive media. In addition, learning media can also arouse students' interest in learning, save time with quick explanations, and facilitate independent learning outside the classroom environment (Shoffan Shoffa, 2021). In this digital education era, Artificial Intelligence (AI) is one of the technologies with great potential to transform various aspects of education. AI technology can provide innovative solutions for personalized learning, where each student can receive material tailored to the student's individual needs and abilities (Lukman Hakim, 2022).

AI also plays an important role in providing adaptive and interactive learning resources, allowing students to learn more interestingly and effectively. At the primary level, such as in madrasah ibtidaiyah, AI has great potential to increase student engagement in the learning process. The technology can be used to develop better teaching methods, combining subject matter with interactive activities that encourage active student participation. With AI, students' learning experience can be enriched through visual aids and simulations that allow them to understand complex concepts more easily. AI can also assist teachers in identifying the specific needs of each student, providing additional support in areas where students may have difficulty, and ensuring that no student is left behind. Thus, AI modernizes teaching methods and creates a more inclusive and efficient learning environment. At the primary level, such as madrasah ibtidaiyah, AI can help increase student engagement, improve teaching methods, and enrich the learning experience.

Madrasah ibtidaiyah, as a basic education institution that integrates general education with Islamic religious education, faces various challenges in improving the quality of education. These challenges include limited resources regarding competent teaching staff and adequate educational facilities and infrastructure. Technology integration, particularly AI, can help overcome challenges by providing practical tools for teachers and students. Past research has shown that using AI in education can improve student learning outcomes. For example, intelligent tutoring systems can provide personalized guidance and feedback to students based on analysis of their learning data. Research conducted by Kulik and Fletcher (2016) found that the use of intelligent tutors can significantly improve students' academic performance compared to traditional methods (Kulik & Fletcher, 2016).

Madrasah ibtidaiyah focuses on teaching the general curriculum, character education, and Islamic values. Therefore, the learning media developed should be able to integrate religious and general content in a balanced manner. AI is expected to play a role in creating learning materials that are contextual and relevant to the needs of students in madrasah. The application of AI in madrasah ibtidaiyah offers various opportunities, such as: AI can tailor learning materials to students' individual needs, considering differences in abilities and learning styles. AI can be used

for teacher training and professional development, providing access to the latest educational resources and effective teaching strategies. AI can automate administrative tasks, allowing teachers to focus more on teaching.

Every student has different learning styles, interests, and learning needs. However, in a large classroom environment, it is difficult for teachers to provide personalized learning for each student. This can result in some students not receiving the support they need to reach their full learning potential. Madrasah ibtidaiyah also often experiences limitations in terms of infrastructure, which further hinders the implementation of individualized learning strategies. Based on the findings of this study, it is expected that the integration of AI-based learning media can serve as a strategic solution to address these challenges. Adaptive technologies have the potential to provide personalized learning pathways that accommodate students' diverse needs without requiring excessive teacher intervention. Therefore, it is recommended that educational institutions, especially madrasah ibtidaiyah, begin to explore the adoption of AI-based learning tools that are contextually appropriate and accessible. In addition, policymakers and education stakeholders are encouraged to support the development of digital infrastructure and training for educators to ensure the effective use of such technology in the learning process.

METHODS

This study employs a qualitative approach using a literature review (library research) method (Amir Hamzah, 2020). The research is carried out systematically to collect, examine, and analyze various scientific sources relevant to AI-based learning media. This literature study aims to build a comprehensive understanding of theoretical foundations and empirical findings related to the development and implementation of AI in educational settings, particularly in madrasah ibtidaiyah.

The subject of this research is academic literature published from 2018 to 2024, focusing on the use of AI technology in education. The selected literature includes peer-reviewed journal articles, books, research reports, and conference proceedings that specifically discuss the urgency of AI-based learning media, criteria for adaptive learning media, and procedures for selecting appropriate AI-based educational tools. The selection of literature was based on relevance, publication credibility, and its contribution to the development of the study.

The research instrument used is a document analysis guide developed by the researcher to ensure systematic and objective data extraction. This guide includes criteria for selecting sources, thematic coding categories, and content evaluation checklists. This instrument categorizes data from the documents according to key themes such as AI integration in education, pedagogical impact, technological challenges, and best practices in media development.

Data collection in this study uses exploratory techniques by analyzing scientific documents and written sources that align with the research objectives. The document analysis technique is applied by reading, reviewing, and extracting information from written materials, which are then classified based on thematic relevance. The data analysis technique used is content analysis, involving in-depth interpretation to discover patterns, themes, and categories relevant to the formulation of the study's focus. The collected data is then interpreted and aligned with the research problems previously formulated (Adlini et al., 2022). The analysis results are the basis for organizing a proposed development model for AI-based learning media in madrasah ibtidaiyah, grounded in empirical findings from previous studies.

RESULTS AND DISCUSSION

RESULTS

The urgency of AI-based learning media in madrasah ibtidaiyah is increasingly recognized in light of current curriculum demands and rapid technological development. In accordance with the principles of the Merdeka Belajar (Independent Learning) curriculum, learning is expected to be more student-centered, adaptive, and responsive to individual learning differences. AI-based learning media is essential because it delivers personalized learning experiences in real-time, adjusting to students' unique abilities, progress, and preferences. This aligns with the view of Holmes et al. (2019), who argue that AI in education can significantly increase the efficiency and effectiveness of the learning process by automating differentiation and offering tailored content dynamically. Therefore, integrating AI technology is not merely a technological advancement, but also a pedagogical necessity in addressing the diverse learning needs that traditional classroom methods often cannot accommodate.

In designing effective AI-based learning media, several criteria must be fulfilled to ensure that the media support pedagogical objectives. First, the media must align with learning goals, content, and competencies outlined in the curriculum, while also considering the roles of teachers and students in the learning process. Furthermore, key selection criteria include interactivity, adaptability, content quality, accessibility, engagement, ease of use, data security, and the availability of real-time feedback mechanisms. As Chen et al. (2020) emphasized, adaptability and interactivity are two core features of AI-powered learning environments that significantly influence learner motivation and achievement. AI media should present content and facilitate meaningful learner interaction, allow for progress tracking, and adapt in real-time based on learners' behavior and performance.

Regarding the development process, AI-based learning media ideally follow the ADDIE model, comprising Analysis, Design, Development, Implementation, and Evaluation, allowing for systematic and iterative development. This model is widely used in instructional design due to its structured yet flexible approach to media development. In the analysis stage, a needs assessment is conducted to identify specific learning challenges; the design stage involves planning learning experiences and media structure; the development stage focuses on content creation and technical integration; implementation involves applying the media in a real or simulated environment; and the final evaluation stage assesses the effectiveness of the media. Additionally, models such as SAM (Successive Approximation Model), Dick and Carey, ASSURE, and 4C/ID provide alternative frameworks that emphasize rapid prototyping, feedback loops, and learner-centered design. Research by Branch (2009) and Molenda (2015) supports the use of such models in ensuring instructional quality and learner engagement. By adopting these frameworks, AI-based learning media can be developed to meet evolving educational demands and ensure that technological integration remains aligned with instructional goals.

In conclusion, through the synthesis of existing literature, it becomes clear that AI-based learning media present both an opportunity and a necessity in the context of madrasah ibtidaiyah. Its implementation, however, requires careful planning, alignment with pedagogical principles, and continuous evaluation to ensure that it truly enhances the learning experience in meaningful and measurable ways.

1. **Urgency of AI-based learning media**
   a. AI-based learning media is important because it can fulfill learning needs based on its relevance to the independent curriculum and technological perspectives.

b. AI-based learning media is essential because it can customize learning experiences in real-time based on students' needs and abilities. This is expected to increase the effectiveness and efficiency of learning.

2. Criteria of AI-based learning media

a. AI-based learning media must follow learning objectives, learning materials, learning media, teachers, and educators.
b. The selection criteria for AI-based learning media include relevance to the curriculum, interactivity and adaptability, content quality, flexibility of access, student engagement, ease of use, security and privacy, and evaluation and feedback features to support an effective learning process

3. Development procedure of AI-based learning media

a. The AI-based learning media development procedure follows the ADDIE model, which consists of five stages: Analysis (learning needs analysis), Design (learning media design), Development (content and technology development), Implementation (implementation in a real environment), and Evaluation (effectiveness evaluation).
b. Other models such as SAM, Dick and Carey, ASSURE, and 4C/ID are also used to ensure an iterative development process, responsive to feedback, focused on instructional objectives, and attentive to learners' needs and characteristics to produce effective and efficient learning media.

By adopting these principles, AI-based learning media can be designed and developed to meet dynamic and individualized learning needs, utilizing AI technology to create a more effective and engaging learning experience.

DISCUSSION

1. The Urgency of AI-Based Learning Media

The urgency of artificial intelligence (AI)-based learning includes analyzing the needs and abilities of each individual, thus enabling curriculum development tailored to the student's learning pace and style. This helps students to learn more effectively and according to their abilities. AI also supports Collaborative Learning, providing tools and platforms that facilitate student interaction, increasing their active engagement in problem-solving and collaborative learning. AI supports the development of cognitive skills such as problem-solving, critical thinking, logic, and strategy through various creative and contextualized learning methods. AI assists teachers in planning and managing learning by providing suggestions to improve the quality of learning and ensuring that the program matches students' needs. This makes learning more effective and efficient. The utilization of AI in learning not only improves the quality of education but also prepares students to face challenges in the ever-evolving digital era (Mukti, 2023).

a) Learning Media in the Independent Curriculum Perspective

Development research includes analyzing the needs and evaluating the products' effectiveness, so that these products can function properly and benefit the wider community (Sugiyono, 2022). Learning media are tools used to demonstrate specific facts, concepts, principles, or procedures to make them appear more real and concrete. These tools are designed to provide a more concrete experience, motivate, and increase the absorption and memory of

students in the learning process. Learning media can lead to a positive attitude of students towards the material being studied, and students tend to respond better when using learning media. The teaching and learning process becomes more interesting if using media that is in accordance with the characteristics of students, so that they are motivated to love the science being studied. The use of learning media in accordance with the characteristics of learners is an important aspect that educators must know to achieve learning objectives. Educators can present learning materials effectively and efficiently if they utilize the media appropriately and adequately (Nursamsu & Kusnafizal, 2017).

Learning media is a tool for educators to deliver learning materials. One of the roles of learning media is to increase students' creativity and attention in learning. With media, students will be more motivated to learn, encouraged to write, speak, and imagine more actively. Thus, learning media can make the teaching and learning process more effective and efficient, and help establish a good relationship between teachers and students (Aji Silmi & Hamid, 2023).

The Merdeka Curriculum is a new approach in the Indonesian education system that emphasizes student independence, creativity, and flexibility in the learning process. Learning media is crucial in supporting effective teaching and learning within this framework. The curriculum encourages the integration of digital technology, such as e-books, educational applications, online learning platforms, and interactive videos, to create engaging and dynamic classroom experiences (Zahwa & Syafi'i, 2022). Learning media are also expected to be interactive and innovative, delivering information and fostering active student participation through simulations, educational games, and interactive tools that make learning more enjoyable and meaningful (Latif et al., 2021).

In addition, the Merdeka Curriculum highlights the importance of contextual and relevant media that connect subject matter with students' real-life experiences, for instance, through videos or stories related to their immediate environment (Muhartini et al., 2023). A multisensory approach is also promoted by utilizing diverse media, such as visual, auditory, and kinesthetic, in order to cater to different learning styles and make the process more comprehensive (Hildayah, 2019). Furthermore, learning media are designed to foster collaboration and participation, supported by online platforms that facilitate discussion, group projects, and the sharing of resources.

Equally important, flexibility and adaptability are key in selecting and using media, enabling teachers to adjust materials and methods according to students' needs, interests, and learning pace. Finally, the Merdeka Curriculum strongly promotes project-based learning, where students use various media such as digital presentations, video documentation, and online journals to design, implement, and reflect on their projects. Altogether, these aspects demonstrate that learning media within the Merdeka Curriculum are positioned not merely as teaching aids but as essential components for fostering creativity, independence, and collaborative learning.

In the Merdeka Curriculum, the teacher is a facilitator who supports and guides students in an active and creative learning process. The goal of creating an enjoyable, challenging, and meaningful learning environment for students can be achieved by utilizing the appropriate learning media.

b) Learning Media in the Perspective of Technology

Technology has significantly transformed learning media, influencing teaching methods, content delivery, teacher-student interaction, and overall education management. One significant implication is the diversification of learning media, where multimedia elements such as videos,

animations, and interactive simulations make complex concepts easier to understand. At the same time, e-books and other digital resources provide flexible alternatives to traditional textbooks. These innovations expand learning opportunities and create more engaging experiences for students.

Technology facilitates distance and online learning through platforms such as Zoom, Google Classroom, and Microsoft Teams, enabling education to reach students in remote areas and those with mobility challenges. In addition, MOOCs offered by universities worldwide provide broader access to high-quality education regardless of geographical boundaries. Additionally, technology supports personalized and differentiated learning through adaptive systems that adjust instructional content based on student needs and real-time assessment tools that provide immediate feedback on learning progress.

The use of technology in education also contributes to the development of digital literacy and other practical skills, preparing students for the demands of the modern workforce. Teachers, too, benefit from technological advances through tools like Learning Management Systems (LMS), which help manage instructional materials, monitor student performance, and streamline classroom administration. Learning analytics further enhances this process by providing insights into teaching effectiveness and student learning patterns. Technology has reshaped the teacher's role, shifting from sole knowledge providers to facilitators and mentors guiding students in their learning journey. Moreover, teachers can continue professional development through online courses and digital networks, ensuring they remain adaptable in an ever-changing educational landscape.

Overall, technology has brought significant changes to the use of learning media, improving the effectiveness, accessibility, and personalization of education. However, it is also important to consider the challenges that may arise, such as technology access inequality and the need for new skill development for both students and teachers.

2. Criteria for Selecting AI-Based Learning Media

When selecting learning media, teachers need to carefully consider several criteria to ensure that the chosen media can effectively support the achievement of learning outcomes (Miftah & Nur Rokhman, 2022). The first aspect concerns alignment with learning objectives, as the media should directly contribute to attaining instructional goals and be consistent with the curriculum content being studied. Equally important is the relevance and appropriateness of the material presented, so that the messages conveyed through the media are accurate, precise, and suitable for the subject matter. Practical considerations, such as media availability in schools, cost-effectiveness, and durability, are also crucial since they determine the sustainability and efficiency of media use in the long term. In addition, flexibility is an essential characteristic, allowing the same media to be adapted to various learning contexts and student needs.

With the growing adoption of AI-based learning media, additional criteria must be considered. AI-powered platforms must ensure curriculum relevance, presenting verified and high-quality content that aligns with national standards. Interactivity and adaptability are also essential, as AI should be able to respond to individual student needs and provide a more personalized learning experience. Furthermore, accessibility across different devices and contexts allows for flexible use inside and outside the classroom.

AI-based media should foster engagement through interactive features, challenges, and timely feedback to maximize student motivation. Usability is another critical factor, since intuitive and user-friendly interfaces help teachers and students focus on learning rather than

technical difficulties. At the same time, security and privacy issues cannot be overlooked, as personal data must be protected against misuse or unauthorized access.

Finally, AI-based learning media should include robust evaluation and feedback mechanisms, enabling teachers to monitor progress and tailor instruction according to student performance. By considering these interrelated criteria, schools and educational institutions can select learning media, both conventional and AI-based, that not only align with curriculum requirements but also create meaningful, engaging, and secure learning experiences for students.

3. Procedure for Selecting AI-Based Learning Media

The development of AI-based learning media utilizes various models that serve as guidelines to ensure that the media created is effective, efficient, and aligned with learning needs. Below are some of the commonly used models:

a) ADDIE Model

ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation. This model is one of the most well-known in developing learning media. The procedure for developing learning media based on the ADDIE model is as follows (Basu, 2021):

The **Analysis** stage involves identifying the learning needs, analyzing problems, and analyzing the characteristics of learners.

1) Theoretical Review: Searching for literature reviews related to the topic to obtain theoretical foundations (Rudi Hari Rayanto, 2020).
2) Identifying Learning Needs: Determining the learning needs based on existing problems or performance gaps. This involves analyzing the needs of the organization and the learners.
3) Audience Analysis (Learners): Understanding the characteristics of the learners, such as their background, prior knowledge, learning preferences, and motivation.
4) Setting Learning Objectives: Formulating specific and measurable learning objectives based on the analysis results.

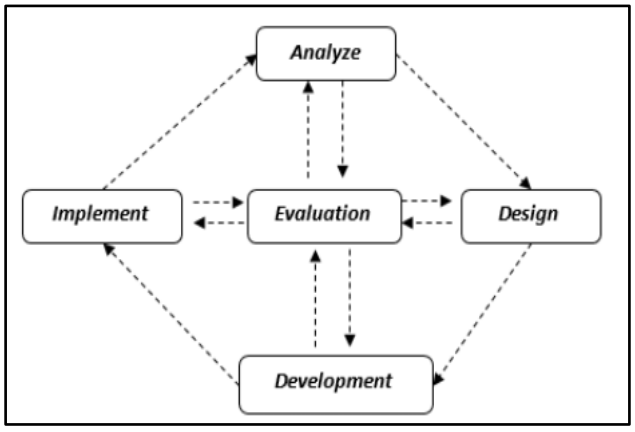

Figure 1. Model ADDIE

Development Using the ADDIE Model includes the stages of Analysis, Design, Development, Implementation, and Evaluation (Safitri & Aziz, 2022). In the analysis stage, an initial analysis is conducted to identify potential problems, the needs of learners, and the curriculum analysis. The second stage is the design phase, where the multimedia learning design to be developed is planned in the form of storyboards and flowcharts. Next, in the development stage, the multimedia that has been designed is validated by experts and implemented. However,

before implementation, the multimedia will be revised based on the suggestions and comments of the validators. A limited trial is conducted during the implementation stage using a one-group pretest-posttest research design. The final stage is evaluation, where formative and summative evaluations are conducted. Formative evaluation takes place at each development stage because revisions may be needed. Meanwhile, summative evaluation occurs at the final stage, aiming to assess the feasibility of the developed multimedia during the implementation stage (Hidayat & Nizar, 2021).

In the **design** stage, the planning and structuring of learning media are carried out, beginning with the formulation of clear and measurable learning objectives based on the results of the needs analysis (Cahyadi, 2019). Once the objectives are established, teachers select and organize relevant content that aligns with the curriculum and the intended outcomes. This is followed by determining appropriate learning strategies, including the choice of instructional methods, media formats, and learning activities that best support student engagement. Assessment tools are also designed at this stage, ensuring that the chosen techniques, such as quizzes, projects, or performance evaluations, can measure the extent to which objectives have been achieved. To visualize and refine the design, storyboarding and prototyping are often used to provide an initial framework of the learning media before full development.

The **development** stage involves producing the learning materials according to the established design. This includes creating textual, visual, and audiovisual content and programming or integrating the media into e-learning platforms supported by AI technology. At this stage, the media undergoes initial testing to identify potential weaknesses, followed by revisions based on user feedback to enhance its quality and usability.

Once development is complete, the **implementation** stage begins. Learning media are distributed and made accessible to students through online platforms or offline channels. Teachers or facilitators receive training to ensure they can use the media effectively, and student usage is closely monitored to provide necessary guidance and support during the learning process.

Finally, an **evaluation** is carried out to determine the effectiveness of the media and the development process. Formative evaluation occurs throughout the design and development phases, gathering feedback for continuous improvement, while summative evaluation is conducted after implementation to assess the program's overall success. This includes measuring the achievement of learning objectives and evaluating the impact of the media on student performance.

According to experts such as Dick, Carey, and Carey (2009) and Reiser and Dempsey (2017), the use of the ADDIE model helps ensure that the instructional design process is systematic and structured, and that the resulting learning media is effective in achieving learning objectives. This flexible model can be adapted to various learning contexts and technologies, including AI-based learning (Basu, 2021).

b) SAM Model (Successive Approximation Model)

The Successive Approximation Model (SAM) is a more iterative and flexible development model than ADDIE. It is particularly suitable for projects requiring quick adaptation, including those involving AI-based learning media (Iskandar et al., 2022). Unlike linear models, SAM emphasizes continuous refinement through short design, development, and testing cycles. The process begins with the **Preparation Phase**, during which initial planning, literature review, curriculum analysis, and needs identification are conducted to ensure the project addresses relevant problems. At this stage, information is also gathered from lecturers and other

stakeholders, often through Focus Group Discussions (FGD), to strengthen the contextual basis of the design.

The **Iterative Design Phase** involves developing concept maps, designing the structure of the learning media, and creating prototypes such as storyboards or preliminary layouts. These prototypes are then reviewed by experts in learning design, software engineering, and graphic design, who provide feedback that leads to immediate revisions. By integrating expert review early in the process, this phase ensures that the resulting media are both pedagogically sound and technically feasible.

Next, the **Iterative Development Phase** takes place in short cycles, allowing the team to refine the product continuously. In this phase, content is produced and integrated into the chosen format, such as pocket guidebooks or tutorial videos, and tested for practicality, usability, and effectiveness. Teachers from the relevant subject areas are often involved in experimental trials, providing valuable insights into whether the media are engaging, user-friendly, and aligned with learning objectives. Whenever necessary, revisions are promptly made to improve the prototype.

The **Implementation Phase** follows, in which the developed learning media are applied in actual classroom settings. For example, trial implementations may be conducted across different courses within the Department of Mechanical Engineering to examine how well the media support learning activities. Finally, the **Evaluation Phase** is carried out formatively and summatively, assessing the design, development, and implementation stages. Evaluation determines the extent to which the media achieve their intended outcomes and identifies areas for improvement, ensuring that the final product is both practical and sustainable for long-term use (Jung, Kim, Lee, 2019).

c) Dick and Carey Model

The Dick and Carey model is considered one of the more detailed approaches to instructional design and is widely applied in the development of complex learning media, including those integrating AI technology (Munthe, 2021). The model begins with identifying instructional goals, the foundation for the design process. Once the goals are established, an instructional analysis is conducted to determine the knowledge and skills learners need to achieve those goals. This is complemented by an analysis of learner characteristics and the learning context, ensuring that the design is tailored to the needs and conditions of the target audience.

Based on these analyses, specific and measurable performance objectives are written to articulate what learners are expected to achieve clearly. Assessment instruments are then developed to measure the extent to which these objectives are met, ensuring validity and reliability in the evaluation process. At the same time, instructional strategies are designed to outline the methods, techniques, and media that will best facilitate learning. This stage is closely linked to developing and selecting instructional materials, which may include written resources, multimedia, or other supporting tools.

Formative evaluation is carried out throughout the development process to gather feedback, allowing for continuous refinement of materials and strategies. Any weaknesses identified during this stage lead to revisions that strengthen the instructional design. Finally, after implementation, a summative evaluation is conducted to assess the program's overall effectiveness and determine the degree to which learning goals have been achieved.

Through these interrelated steps, the Dick and Carey model ensures that the instructional design process is systematic, comprehensive, and oriented toward producing effective and efficient learning programs.

d) ASSURE Model

The ASSURE model is an instructional design framework developed by Heinich, Molenda, Russell, and Smaldino, and has been widely applied to ensure that learning processes are designed and implemented effectively and systematically (Lei, 2023). The model begins with analyzing learner characteristics, including their general background, prior knowledge, learning styles, and psychological factors. This step is crucial for understanding learners' needs and abilities so that instructional activities can be tailored appropriately.

Once learners are analyzed, clear and specific learning objectives are formulated, often using the ABCD model (Audience, Behavior, Condition, Degree) to articulate expected outcomes. These objectives then guide the selection of appropriate methods, media, and instructional materials. At this stage, teachers determine which strategies, media formats, and learning resources will best support the intended outcomes. The selected materials are subsequently prepared and utilized in the learning process, which also involves arranging the learning environment and ensuring that learners are ready to participate actively.

Learner participation is a central principle of the ASSURE model, as students are encouraged to participate in instructional activities rather than passively receive information. Finally, evaluation and revision complete the process by measuring the extent to which learners have achieved the objectives and assessing the overall effectiveness of the instruction. Based on the evaluation results, necessary revisions are made to improve the quality of future instruction.

Through these interrelated components, the ASSURE model provides educators with a systematic yet flexible approach to instructional design, ensuring that learning is both learner-centered and outcome-oriented (Pérez-Castán et al., 2022).

e) 4C/ID Model (Four Component Instructional Design)

The 4C/ID (Four Component Instructional Design) model is designed to develop complex learning and is used in contexts requiring skill-based learning and profound knowledge, including AI-based learning(Garcia et al., 2023). This model has four components that work synergistically to create compelling and profound learning experiences.

1) Learning Tasks: Designing Realistic and Relevant Learning Tasks

This component involves designing learning tasks that reflect real-world situations and are relevant to the learning objectives. These tasks are designed to cover the full spectrum of skills and knowledge required by learners. In the context of AI-based learning, these tasks could involve simulations, case studies, or projects that require the application of AI technology to solve real-world problems. The goal of these learning tasks is to provide learners with the opportunity to apply their knowledge and skills in authentic and meaningful situations.

2) Supportive Information: Providing Supporting Information to Help in Task Understanding

Supportive information is additional information that helps learners understand and complete the learning tasks. This information includes theories, models, principles, and examples relevant to the tasks undertaken. In an AI learning environment, supportive information can include tutorials, technical documentation, or other learning resources that help learners understand the AI concepts needed to complete the tasks. This information is provided before or during the task execution to help learners develop a deep understanding.

3) Just-in-Time Information: Providing Information Exactly When Needed to Complete the Task

Just-in-time information is provided when learners need it to complete the learning tasks. This information is often specific and contextual, delivered precisely when needed to support task execution. In AI-based learning, just-in-time information can include technical instructions, problem-solving tips, or real-time feedback from the AI system as learners work on a particular task. The purpose of just-in-time information is to provide timely assistance that helps learners overcome obstacles and complete tasks more effectively.

4) Part-Task Practice: Practicing Subtasks to Strengthen Specific Skills

Part-task practice involves focused practice on specific parts of the learning task to strengthen the particular skills required for more complex tasks. These practices are designed to help learners master key components of the main task through repetition and targeted practice. In the context of AI, part-task practice could involve coding exercises, data modeling, or using specific algorithms that are part of a larger learning task. This practice helps learners develop specific skills step by step before applying them to more complex and integrated tasks (Jeroen J. G. van Merriënboer, 2019).

Using the 4C/ID Model, learning media development is expected to be systematic and thorough, ensuring that each component of the learning process is designed to support effective and sustained learning. This model is particularly suitable for AI-based learning, where deep skills and knowledge are crucial for learners' success.

Using these models in developing AI-based learning media ensures that the development process is systematic and that the produced media enhances the learning experience effectively. The ADDIE Model provides a comprehensive framework for systematically designing, developing, and evaluating learning media. The SAM Model (Successive Approximation Model) emphasizes continuous iteration and refinement through prototypes and quick evaluations, accelerating development and enhancing responsiveness to feedback. The Dick and Carey Model, with its focus on instructional goals, needs analysis, and both formative and summative evaluations, ensures that the learning media are produced based on clearly identified needs and thoroughly assessed for effectiveness. The ASSURE Model helps educators design and implement effective learning, considering the learners' needs and characteristics. The 4C/ID Model, with its four components of realistic learning tasks, supportive information, just-in-time information, and part-task practice, ensures that every learning process is designed to develop deep skills and knowledge.

By integrating these approaches, the development of AI-based learning media becomes more structured, adaptive, and focused on enhancing learner engagement and outcomes, resulting in a more interactive and practical learning experience.

CONCLUSION

Integration of AI in Learning Media in Madrasah Ibtidaiyah

Integrating AI in learning media can potentially enhance the quality of education in Madrasah Ibtidaiyah. AI technology can create a more personalized and interactive learning experience, enabling students to learn in more engaging and effective ways. The use of learning media in the teaching and learning process aligns with the Merdeka Curriculum and technological perspectives (Ashshiddiqi, 2024).

This research shows that AI-based learning media provide a potential solution by creating more adaptive, engaging, and student-centered learning experiences. When developed systematically through instructional design models such as ADDIE, SAM, Dick and Carey, ASSURE, or 4C/ID, AI-based media can enhance learning outcomes, improve efficiency, and strengthen the role of teachers as facilitators.

However, this study has limitations, particularly because it relies on a literature review and has not yet been validated through empirical classroom implementation. As such, the findings serve as a conceptual foundation rather than a tested practical application.

Therefore, future research is recommended to conduct empirical studies on using AI-based learning media in real classroom settings. This would allow for testing its effectiveness, identifying potential challenges in implementation, and refining development procedures. Furthermore, collaboration between educators, technology experts, and policymakers will be essential to ensure that AI integration supports pedagogical goals and the vision of the Merdeka Curriculum.

Recommendations

1. **Improving Infrastructure**: Improving the technological infrastructure in Madrasah Ibtidaiyah is recommended to implement AI-based learning media optimally.
2. **Teacher Training**: Teachers must undergo intensive training on using AI technology. This includes technical and pedagogical training to ensure teachers can effectively utilize this technology.
3. **Curriculum Adjustment**: The curriculum should integrate AI-based learning media. This adjustment must consider students' needs and abilities and accommodate more interactive and adaptive learning methods.
4. **Further Research**: Further research is recommended to evaluate the long-term effectiveness of using AI in education. This research could cover various aspects, such as the impact on student learning outcomes, motivation, and long-term engagement.
5. **Collaboration with Technology Developers**: Schools and educational institutions should collaborate with technology developers to create AI solutions that are more tailored to educational needs. Such collaborations can help develop more innovative and effective learning media.
6. **Raising Awareness**: Efforts should be made to raise awareness about the benefits and potential of AI in education among parents, students, and other stakeholders. This is essential to support this technology's broader and more effective adoption.

By implementing these recommendations, the use of AI in education is expected to be more optimal and provide maximum benefits for improving the quality of education in Madrasah Ibtidaiyah.

REFERENCES

Adlini, M. N., Dinda, A. H., Yulinda, S., Chotimah, O., & Merliyana, S. J. (2022). Metode Penelitian Kualitatif Studi Pustaka. *Edumaspul: Jurnal Pendidikan*, *6*(1), 974–980. https://doi.org/10.33487/edumaspul.v6i1.3394

Aji Silmi, T., & Hamid, A. (2023). Urgensi Penggunaan Media Pembelajaran Berbasis Teknologi. *Inspiratif Pendidikan*, *12*(1), 69–77. https://doi.org/10.24252/ip.v12i1.37347

Amir Hamzah. (2020). *Metode Penelitian Kepustakaan (Library Research*. Literasi Nusantara Abadi.

Ashshiddiqi, M. H. (2024). Pemanfaatan AI dalam Era Kurikulum Merdeka: Perspektif Siswa dan Guru Sekolah Menengah. *JDPP*, *12*(1).

Basu, R. (2021). Instructional Design Models: Benefits and Challenges. *UGC Approved*, *41*(1), 31–36. https://www.researchgate.net/publication/352771683_Instructional_Design_Models_Benefits_and_Challenges

Branch, R. M. (2009). *Instructional design: The ADDIE approach*. Springer. https://doi.org/10.1007/978-0-387-09506-6

Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. *Halaqa: Islamic Education Journal*, *3*(1), 35–42. https://doi.org/10.21070/halaqa.v3i1.2124

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8*, 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

Chen, X., Xie, H., Zou, D., & Hwang, G.-J. (2020). Application and theory gaps during the rise of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence*, *1*, 100002. https://doi.org/10.1016/j.caeai.2020.100002

Garcia, C., Argelagós, E., & Privado, J. (2023). Information skills instruction in Higher Education students using the 4C/ID model. *9th International Conference on Higher Education Advances (HEAd'23)*, 137–144. https://doi.org/10.4995/HEAd23.2023.16149

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation and Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Hildayah, D. (2019). Penggunaan Media Visual, Auditif, dan Kinestik untuk Meningkatkan Hasil Belajar Siswa. *Prosiding Seminar Nasional Pendidikan FKIP*, *2*(1), 137–146.

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Center for Curriculum Redesign.

Iskandar, H., Koto, I., Yulanto, D., & Marlan, M. (2022). *Instructional Design of Successive Approximations Model (SAM) for Project-Based Learning Media Development*. https://doi.org/10.4108/eai.11-10-2022.2325511

Jeroen J. G. van Merriënboer. (2019). *The Four-Component Instructional Design Model: An Overview of Its Main Design Principles*. School of Health Professions Education.

Jung, K., Lee, & S. (2019). Advanced Instructional Design for Successive E-Learning: Based on the Successive Approximation Model (SAM). *International Jl. on E-Learning*, *2*(18), 191–204. https://www.researchgate.net/publication/331829482_Advanced_Instructional_Design_for_Successive_E-Learning_Based_on_the_Successive_Approximation_Model_SAM

Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of Intelligent Tutoring Systems. *Review of Educational Research*, *86*(1), 42–78. https://doi.org/10.3102/0034654315581420

Latif, A., Rohmiyanti, W., Syafira, I., Wahiddatul, S., & Haryanto, A. D. (2021). Penggunaan Media Pembelajaran berbasis Game Edukasi sebagai Upaya Meningkatkan Minat Belajar Siswa Sekolah Dasar. *SEMAI: Seminar …*, 809–825.

Lei, G. (2023). Influence of the ASSURE model in enhancing educational technology. *Interactive Learning Environments*, 1–17. https://doi.org/10.1080/10494820.2023.2172047

Lukman Hakim. (2022). *Peranan Kecerdasan Buatan (Artificial Intelligence) dalam Pendidikan*. Ppg.Kemendikbud.Go.Id. https://ppg.kemdikbud.go.id/news/peranan-kecerdasan-buatan-artificial-intelligence-dalam-pendidikan

Miftah, M., & Nur Rokhman. (2022). Kriteria pemilihan dan prinsip pemanfaatan media pembelajaran berbasis TIK sesuai kebutuhan peserta didik. *Educenter : Jurnal Ilmiah Pendidikan*, *1*(9), 641–649. https://doi.org/10.55904/educenter.v1i9.92

Molenda, M. (2015). In search of the elusive ADDIE model. *Performance Improvement, 54*(2), 40–42.
https://doi.org/10.1002/pfi.21461

Muhartini, A. M., & Abu Bakar. (2023). Pembelajaran Kontekstual dan Pembelajaran Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, *1*(1), 66–77.

Mukti, F. . (2023). Transformasi Pendidikan di Sekolah Dasar: Pemanfaatan Media Peembelajaran Berbasis Kecerdasan Buatan dalam Era Digital. *Dirasatul Ibtidaiyah*, *3*(2), 229–240.

Munthe, M. Z. (2021). Model Pembelajaran Dick and Carey Serta. *Model Pembelajaran Dick and Carey Serta Implementasinya Dalam Pembelajaran Pai*, 1–9.

Nursamsu, & Kusnafizal, T. (2017). Pemanfaatan Media Pembelajaran ICT sebagai Kegiatan Pembelajaran Siswa di SMP Negeri Aceh Tamiang. *Jurnal IPA Dan Pembelajaran (JIPI)*, *1*(2), 165–170.

Pérez-Castán, J. A., Pérez Sanz, L., Fernández-Castellano, M., Radišić, T., Samardžić, K., & Tukarić, I. (2022). Learning Assurance Analysis for Further Certification Process of Machine Learning Techniques: Case-Study Air Traffic Conflict Detection Predictor. *Sensors*, *22*(19), 7680. https://doi.org/10.3390/s22197680

Safitri, M., & Aziz, M. R. (2022). ADDIE, sebuah model untuk pengembangan multimedia learning. *Jurnal Pendidikan Dasar*, *3*(2), 50–58. http://jurnal.umpwr.ac.id/index.php/jpd/article/view/2237

Shoffa, S. (2021). Buku Media Pembelajaran. In *Bintang Sutabaya* (Issue January).

Shoffan Shoffa, et al. (2021). *Perkembangan Media Pembelajaran di Perguruan Tinggi* (Issue February).

Sugiyono. (2022). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (II cet-4). Alfabeta.

Zahwa, F. A., & Syafi'i, I. (2022). Pemilihan Pengembangan Media Pembelajaran Berbasis Teknologi Informasi. *Equilibrium: Jurnal Penelitian Pendidikan Dan Ekonomi*, *19*(01), 61–78. https://doi.org/10.25134/equi.v19i01.3963.