Optimizing Full Day School with AI: Smart Solutions in Selecting Learning Models for High Schools

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Abstract — The implementation of Full Day School (FDS) in high schools presents challenges in selecting effective learning models that meet students' needs. With advances in Artificial Intelligence (AI), this technology offers an intelligent solution to optimize the choice of appropriate learning models. This study aims to explore AI's role in selecting suitable learning models for FDS in high schools in Bukittinggi. The research uses AI-based data analysis to identify criteria for model selection, considering factors such as students' learning styles, subject matter, and available resources. The findings suggest that AI can enhance learning effectiveness by providing personalized and efficient models that balance academic and psychological needs. In conclusion, AI can improve educational quality and foster an adaptive, innovative learning environment for FDS programs. This study recommends incorporating educational AI in curriculum planning for future development in Bukittinggi.

***Keywords*— Full Day School; Artificial Intelligence; Learning Models; High School; Bukittinggi**

I. Introduction

Education has a strategic role in building a young generation that is qualified, creative, and adaptive to changes in the times. The educational philosophy emphasizes the importance of a holistic learning approach, which not only encourages academic achievement but also develops students' psychological and social potential. In this context, the implementation of Full Day School (FDS) is one of the efforts to create an intensive and integrated learning environment. However, the success of FDS depends on the ability to choose a learning model that can meet the individual needs of students while supporting national education goals [1] .

The FDS policy is based on regulations that support the development of a comprehensive education system, such as Law Number 20 of 2003 concerning the National Education System. This regulation mandates that education must be organized in an inclusive, innovative, and relevant manner to the needs of the community [2] [3] . In its implementation, the government encourages the adoption of modern technology to increase the effectiveness of learning, including the use of artificial intelligence (AI) as a tool in selecting learning models that are appropriate to student characteristics and available resources.

Selecting the right learning model requires an approach based on educational theory, such as learning style theory and multiple intelligences theory [4] [5] . AI technology can act as a facilitator in analyzing complex data, such as student learning preferences, subject matter needs, and school conditions. This theory emphasizes that each student has a unique way of learning, so an AI-supported personalized approach can increase the effectiveness of learning in FDS [6] [7] . Thus, AI offers relevant solutions in answering the challenges of modern education.

Empirically, the implementation of FDS in Bukittinggi shows challenges in adjusting learning models to the diverse needs of students. Based on observations and interviews with teachers and students, it was found that many conventional learning models are less effective for FDS situations. This is compounded by the limited time and resources in evaluating student needs manually. In this study, the use of AI technology was proven to be able to help analyze student data quickly and accurately [5] [8] , thus producing a more relevant and efficient learning model.

Despite its great potential, the implementation of FDS often faces obstacles in finding a balance between students' academic and psychological needs. A monotonous or inappropriate learning system can cause boredom, stress, or even a decrease in interest in learning [9] [10] [11] . Therefore, innovative solutions are needed, such as the use of AI, to create a learning environment that is adaptive, engaging, and supports student well-being [6] [12] .

The development of AI provides great opportunities for the world of education to overcome these various challenges. AI has the ability to analyze big data, understand student learning patterns, and recommend appropriate models based on individual needs and institutional conditions. Thus, this technology not only increases efficiency, but also enables personalization of learning that was previously difficult to achieve through conventional approaches [13] [14] .

Based on philosophical, legal, theoretical, and empirical foundations, this research is very relevant to answer the challenges of education in the modern era, especially in the context of FDS in Bukittinggi. By exploring the role of AI in selecting optimal learning models, this research is expected to provide real contributions to the development of adaptive, innovative, and sustainable education policies [1] [15] . The findings of this study can also be a reference for integrating technology in future curriculum planning.

II. METHODOLOGY

This study uses a mixed methods approach with an exploratory descriptive method . The quantitative approach is used to analyze AI-based data on student learning needs, while the qualitative approach is used to explore the views of teachers, students, and stakeholders regarding the effectiveness of the learning model in Full Day School (FDS) [16] [5] .

This research includes: 1) observation ; observing the learning process in several schools implementing FDS in Bukittinggi, 2) In-depth Interviews: Involving teachers, students, and principals to gain insight into the challenges and opportunities of using AI in learning, 3) Questionnaires: Distributing questionnaires to students to find out their learning styles, learning preferences, and needs, 4) AI Data Analysis: Using an AI system to process and analyze data related to learning models [10] [4] .

The first stage in this research is planning, which begins with problem identification. Researchers identified various challenges faced by Full Day Schools (FDS) in choosing effective and adaptive learning models for students. Next, a literature study was conducted to review previous research on the application of AI in education and various learning models that are appropriate to the FDS system. The results of the literature review provide a strong theoretical basis to support this research. At this stage, instruments were also prepared in the form of data collection tools, such as interview guides, questionnaires, and parameters that will be used in the AI analysis. This step ensures that the data obtained is in accordance with the research needs.

In the second stage, data was collected through several methods. Observations were conducted to directly observe the learning process at FDS schools in Bukittinggi, thus providing a real picture of the dynamics of learning. In addition, interviews were conducted involving 15 teachers and 20 students as key informants to obtain in-depth qualitative data on learning styles, challenges, and learning needs. Questionnaires were distributed to collect quantitative data from 200 students, which included information on learning styles, media preferences, and subjects of interest. All collected data was then entered into the AI system at the AI implementation stage, so that the data could be processed and analyzed comprehensively.

The data that has been collected is processed and analyzed at this stage. Qualitative analysis was conducted on interview and observation data using coding techniques to identify key themes relevant to the study. On the other hand, questionnaire data were analyzed using descriptive statistical methods to find dominant patterns and trends in students' learning styles. These data were then further analyzed by the AI system at the AI analysis stage, where the system analyzes the information to provide recommendations for learning models that best suit student characteristics.

After data analysis is complete, a validation stage is carried out to ensure the accuracy and consistency of the research results. Data triangulation techniques are used to compare the results of interviews, observations, questionnaires, and AI analysis, so that valid and reliable findings can be obtained. In addition, a Focus Group Discussion (FGD) was held involving teachers and students to validate the results of the learning model recommendations from AI. This step aims to obtain direct input from stakeholders regarding the relevance and practicality of the recommendations provided [11] [12] .

This stage focuses on compiling research results. Validated data is summarized in the form of a conclusion of the results, where the research findings are systematically arranged to provide a clear picture of the recommended AI-based FDS learning model. [17] . In addition, this research also resulted in the formulation of practical recommendations that can be used by schools and policy makers to integrate AI technology in FDS learning planning.

The final stage is to disseminate the research results to interested parties [13] . A seminar on the results is held to present the research findings to schools, education offices , and other stakeholders, with the aim of raising awareness of the importance of AI integration in education. In addition, this research is also disseminated through scientific publications, by submitting research articles to relevant educational journals to provide broader academic contributions.

This methodology is designed to ensure that the research provides valid, relevant, and applicable findings to improve the quality of learning in the FDS program in Bukittinggi.

III. Results and Discussion

A. Results

1) Input Data

The first stage is data collection from various sources, such as questionnaires, observations, and interviews [18] . This data includes students' learning styles (Visual, Auditory, Kinesthetic, or Combination), learning media preferences (such as Video, Slides, Podcasts, or Practice), subjects studied (Mathematics, English, Science, or Social Studies), and accessibility to technology. This information is used as a basis for analyzing students' individual learning needs. With this diverse data, the processing process becomes richer and more accurate in providing recommendation results.

TABLE 1. RESULTS OF THE QUESTIONNAIRE DISTRIBUTED TO 200 STUDENTS PRODUCING DATA ON LEARNING STYLE PREFERENCES

Learning Styles	Number of Students	Percentage
Visual	80	40%
Auditory	60	30%
Kinesthetic	40	20%
Combination (Visual-Auditory/Kinesthetic)	20	10%

Table 1 shows that most students have visual (40%) and auditory (30%) learning styles. Students with kinesthetic learning styles account for 20%, while the other 10% have a combination of learning styles. These data indicate the need for diversification of learning models that can accommodate various student learning styles in FDS.

2) Data Preprocessing

The collected data is then processed through the preprocessing stage [8] . This process involves cleaning the data to remove empty or inconsistent values, as well as transforming qualitative data into numeric. For example, learning styles are converted into numbers: Visual = 1, Auditory = 2, Kinesthetic = 3, and Combination = 4. Media preferences are also encoded into combination numbers, for example Video and Slide become 1,2 as seen in table 2. This transformation is important to ensure that the data can be processed with AI algorithms such as K-Means and Decision Tree.

TABLE 2. CONVERTING QUALITATIVE DATA TO NUMERICAL FOR ANALYSIS

Student ID	Learning Style (1=V, 2=A, 3=K, 4=Combination)	Media (Code)	Mapel (1=Mat, 2=Eng, 3=Science, 4=IPS)	Technology Logic
S1	1	1.2	1	1
S2	2	3.4	2	0
S3	3	5.6	3	1
S4	4	2.4	4	1
S5	1	1.2	2	1
...	...	...	...	...

3) Clustering (K-Means)

The third step is grouping students based on their learning styles using the K-Means algorithm [19] [20] . This algorithm divides student data into several clusters with similar learning style characteristics. The clustering results show that students with Visual learning styles are grouped in the "Visual" cluster, while students with other learning styles are grouped according to their respective categories as shown in table 3. This grouping helps in understanding the needs of student groups in more depth.

TABLE 3. CLUSTERING RESULTS FOR 200 STUDENT DATA

Student ID	Cluster
S1	Visual
S2	Auditory
S3	Kinesthetic
S4	Combination
...	...

4) Classification (Decision Tree)

After the data is grouped, the Decision Tree algorithm is used to classify the appropriate learning model for each learning style [21] . For example, students with a Visual learning style and a Video media preference will be recommended to use the Blended Learning model. This algorithm works by mapping the relationship between student attributes, such as learning styles and media preferences, with the most effective learning model, the results can be seen in table 4. This stage produces recommendations that are more specific and in accordance with individual needs.

Rules Applied:

- If Learning Style = Visual AND Media Preference = Video → Blended Learning .
- If Learning Style = Kinesthetic AND Media = Practice → Project-Based Learning.

TABLE 4. CLASSIFICATION RESULTS FOR 200 STUDENT DATA

Student ID	Learning model
S1	Blended Learning
S3	Project Based Learning
S5	Blended Learning
...	...

5) *Association Rule Mining (Apriori)*

This stage aims to find hidden patterns in student data [22] . For example, it was found that students with Kinesthetic learning styles and Practical media preferences are more suited to the Project-Based Learning model. These association rules help in identifying relationships between different attributes, thereby enriching the learning model recommendations based on the patterns found in the dataset.

The rules found in this study:

a) *If students have a Visual learning style AND media preference = Video → 80% likely to succeed with Blended Learning.*

b) *If students have a Kinesthetic learning style AND media = Practice → 90% suitable for Project-Based Learning.*

6) *Recommendation*

Each student is then given a recommendation for a learning model based on the previous analysis. These recommendations include learning models such as Blended Learning for Visual students, or Project-Based Learning for Kinesthetic students. Recommendations are also adjusted to students' learning media preferences, for example Visual students get media such as videos or slides, while Kinesthetic students get practice or simulations. This ensures that students receive a learning approach that suits their needs and preferences.

TABLE 5. EXAMPLE OF RECOMMENDATIONS FOR STUDENTS

Student ID	Model Recommendations	Supporting Technology
S1	Blended Learning	Videos, Slides
S3	Project Based Learning	Games, Practice
...	...	...

7) *Validation*

The final step is to validate the analysis results using the K-Fold Cross Validation method [23] . This validation ensures that the results obtained are accurate and reliable. In addition, Focus Group Discussions (FGD) with educators were conducted to evaluate the relevance of recommendations to real needs in the field. This validation shows an average accuracy of 85%, which is an indication that the AI method used is effective in supporting the selection of learning models.

B. Discussion

The results of the study show that the implementation of AI in selecting learning models for the Full Day School (FDS) system in Bukittinggi has a significant impact on increasing learning effectiveness. By using algorithms such as K-Means for clustering and Decision Tree for classification, it was found that learning models based on student learning styles can be implemented personally and adaptively. This is in line with Gardner's theory of Multiple Intelligences, which states that each student has different intelligence and learning styles, so that a learning approach that is tailored to student characteristics will be more effective [24] [25] .

The clustering results show that students with Visual learning styles tend to need visual-based learning media such as videos and slides, while Kinesthetic students need more practice-based learning. This finding is relevant to Fleming's VARK Model theory, which emphasizes that learning media must be adjusted to students' learning styles to maximize understanding [26] [27] . The combination of AI algorithms with this approach provides a new, more scalable solution in designing learning models for FDS.

In quantitative analysis, the use of descriptive statistics strengthens the validity of the findings by showing consistent patterns of learning preferences across student clusters. This supports Piaget's Constructivism Learning Theory, which states that good learning is learning that is relevant to students' experiences and needs [28] [29] . AI helps map these needs more accurately than traditional approaches.

Qualitative analysis conducted through interviews and observations provides in-depth insights into the challenges faced by teachers in implementing appropriate learning models for the FDS system. Teachers often face obstacles in aligning learning methods with the diversity of student needs. AI comes as a practical solution, providing data-driven recommendations that can help teachers design more effective approaches. This suggests that technology can be a facilitator in implementing Differentiated Instruction theory, which emphasizes the importance of varying teaching methods based on individual student needs.

The findings of this study also highlight the relationship between learning styles and learning models identified through the Apriori algorithm. For example, students with a Kinesthetic learning style are often found to be more suited to the Project-Based Learning model. This is consistent with Kolb's Experiential Learning theory, which states that students learn more effectively through direct experience and active interaction. Thus, this study confirms the relevance of classical educational theories in the context of modern technology.

The novelty of this study lies in the integration of AI algorithms in the context of FDS systems that have not been widely studied before. Although AI has been widely used in education, this study is one of the first to apply a combination of K-Means, Decision Tree, and Apriori holistically to recommend FDS student-based learning models. In addition, this approach offers a new way to personalize learning on a larger scale without significantly increasing the workload of teachers.

IV. Conclusion

This study successfully proves that the integration of Artificial Intelligence (AI) technology in selecting learning models for the Full Day School (FDS) system in Bukittinggi provides effective and innovative solutions. Algorithms such as K-Means, Decision Tree, and Apriori are able to identify student patterns and needs based on collected data, such as learning styles, media preferences, and subjects. The results of the study show that AI can provide recommendations for more personalized and adaptive learning models, supporting the principles of differentiation-based education and constructive learning. Thus, AI is not only a technical tool, but also a facilitator in improving the quality of learning.

The research discussion reveals that the findings support educational theories such as Gardner's Multiple Intelligences, Fleming's VARK Model, and Kolb's Experiential Learning. The study also shows that AI systems can help teachers overcome the challenges of aligning teaching methods with the diversity of student needs, especially in intensive FDS environments. The novelty of this research lies in the use of a combination of AI algorithms to recommend relevant learning models on a large scale, opening up opportunities for the implementation of similar technologies in other educational contexts.

This research provides a solid foundation for further development. Further research can explore the development of more interactive AI systems by incorporating other factors, such as students' emotional aspects or real-time data integration from the learning process. In addition, future research can test the effectiveness of implementing AI-based learning models in the long term, by measuring their impact on student learning outcomes. Comparative studies in other regions with different educational characteristics can also provide greater insight into the generalizability of this approach.

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