Data and Metadata. 2024; 3:.615
doi: 10.56294/dm2024.615

ORIGINAL

Effect analysis of AI-assisted multimedia creation platform in college teaching

Análisis de efecto de la plataforma de creación multimedia asistida por IA en la enseñanza universitaria

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Cite as: Chen R, Tan Yeen Ju H, Mal N. Effect analysis of AI-assisted multimedia creation platform in college teaching. Data and Metadata. 2024; 3:.615. https://doi.org/10.56294/dm2024.615

Submitted: 25-01-2024 **Revised:** 22-07-2024 **Accepted:** 27-12-2024 **Published:** 28-12-2024

Editor: Adrián Alejandro Vitón Castillo

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ABSTRACT

Introduction: recent advancements in educational technologies, particularly the integration of artificial intelligence (AI), have transformed the creation, distribution, and consumption of educational materials. This study explores the impact of an AI-assisted multimedia creation platform (AI-MCP) on college teaching, emphasizing its role in enhancing the teaching and learning experience by utilizing AI's capabilities alongside rich multimedia content.
Method: the AI-MCP architecture was developed to facilitate interaction with students through features such as speech recognition, visual perception, and intelligent behavior, all of which foster a humanistic approach to learning. The framework incorporates the Advanced Monkey Search Algorithm (AMSA) to manage and optimize the teaching system across diverse records, data, and multimedia elements. Traditional assessment methods were employed to compare student performance outcomes and evaluation metrics against conventional teaching methods.
Results: the implementation of the AI-MCP demonstrated significant improvements in student engagement and understanding across various information technology disciplines. Performance metrics indicated enhanced learning outcomes, suggesting that the integration of AI technologies can effectively support instructional design and student interaction.
Conclusions: this study confirms that AI-assisted multimedia platforms can significantly enhance college teaching by improving student performance and engagement. The findings advocate for the broader adoption of AI-MCP in educational settings, highlighting its potential to revolutionize the teaching and learning process in higher education.

Keywords: Artificial Intelligence (AI); Multimedia Creation Platform; College Teaching; Advanced Monkey Search Algorithm (AMSA).

RESUMEN

Introducción: los recientes avances en tecnologías educativas, particularmente la integración de la inteligencia artificial (ia), han transformado la creación, distribución y consumo de materiales educativos. Este estudio explora el impacto de una plataforma de creación multimedia asistida por AI (AI-MCP) en la enseñanza universitaria, haciendo hincapié en su papel en la mejora de la enseñanza y la experiencia de aprendizaje mediante la utilización de las capacidades de AI junto con rico contenido multimedia.
Método: la arquitectura AI-MCP fue desarrollada para facilitar la interacción con los estudiantes a través de características tales como el reconocimiento de voz, la percepción visual y el comportamiento inteligente, todos los cuales fomentan un enfoque humanista para el aprendizaje. El marco incorpora el Advanced Monkey Search Algorithm (AMSA) para gestionar y optimizar el sistema de enseñanza a través de diversos registros, datos y elementos multimedia. Se emplearon métodos tradicionales de evaluación para comparar los resultados del desempeño de los estudiantes y las métricas de evaluación con los métodos convencionales de enseñanza.

Resultados: la implementación del AI-MCP demostró mejoras significativas en la participación y la comprensión de los estudiantes en diversas disciplinas de tecnología de la información. Las métricas de rendimiento indicaron mejores resultados de aprendizaje, lo que sugiere que la integración de tecnologías de ia puede apoyar eficazmente el diseño instruccional y la interacción del estudiante.
Conclusiones: este estudio confirma que las plataformas multimedia asistidas por ai pueden mejorar significativamente la enseñanza universitaria al mejorar el rendimiento y la participación de los estudiantes. Los hallazgos abogan por la adopción más amplia de AI-MCP en entornos educativos, destacando su potencial para revoluel proceso de enseñanza y aprendizaje en la educación superior.

Palabras clave: Inteligencia Artificial (IA); Plataforma de Creación Multimedia; Enseñanza Universitaria; Advanced Monkey Search Algorithm (AMSA).

INTRODUCTION

Technology has quickly revolutionized what instructors teach and how students engage with course content. Among these innovations, the infusion of artificial intelligence (AI) on the learning platform was the one that stood out.[1] The AI changed the traditional teaching methodology to make learning more interesting, personalized, and interactive. Among few progresses in the field, the new development was AI-assisted multimedia creation platforms, where media technology and the computing ability of AI were combined to advance learning and teaching.[2] The variety of channels visual, aural, and interactive multimedia tools long been acknowledged as a source of educational enrichment. Traditional approaches to the creation of multimedia content require a lot of time and possess certain requirements for the knowledge and abilities of the teachers.[3] AI-assisted platforms address these issues by automating and simplifying the multimedia creation process. These systems were made possible by cutting-edge technology like speech recognition, visual processing, and intelligent decision-making, which enable them to create excellent, flexible instructional resources that meet a range of learning requirements.[4] The field of higher education has much promise in AI-assisted multimedia platforms, as students struggle with difficult ideas and different learning styles. AI-assisted multimedia platforms enhance the design of such instructional materials, making subjects seem more in-depth and, therefore, more significant to students.[5] They also enhance the quality of teaching and learning as well as students' involvement. They have been acting as tools for putting abstract concepts into practice, especially in the context of information technology.[6] To the technological revolution provided, the use of AI in multimedia creation platforms has revolutionized education by enabling educators to provide dynamic, data-driven insights into their student's learning habits and releasing them from the limitations of static teaching tactics.[7] Teachers could focus on areas that would influence the students to think more critically and creatively by personalizing information and automating ordinary work.[8] They entail making the material more accessible to each learner with unique preferences and skills, thus creating diversity. The paradigm shifts highlight how AI will increasingly influence education in the future by improving the effectiveness, impact, and engagement in teaching.[9]

To promote higher education in universities and colleges, Wenge developed the AI-assisted Real-Time Communication and Multimedia Services Framework (AI-RCMF).[10] Dimensional pose estimation from augmented reality objects and data extraction from AI multimedia resources were two applications for the Recurrent-Convolutional Neural Network. The accuracy of the imitation examination done for the outline was 94,68 %. The study compares the suggested model with other higher education frameworks by evaluating additional performance indicators.

Addresses the programming of multimedia systems for student communication using the Intellectual Computer-Aided Artificial Intelligence (ICA-AI) framework. The framework supports a number of curricula, such as debate moderating, research, reviews, drills, and multimedia-based lectures. The instruction mechanism incorporates the genetic algorithm, and the dependability of Chen was examined.[11]

Learning was essential to education, particularly in the context of contemporary distant learning. With the growing popularity of online courses, designers need to create feedback that promotes learning. Based on AI education courseware, the article by Zhang presented technologies for audio-visual communication for multimedia computer-assisted instruction (CAI) courseware.[12] These technologies were necessary for the creation of successful and captivating online learning environments.

In web-based online learning systems, learning strategies based on multimedia and image processing were becoming more and more significant. Multimedia tools were crucial for interactive instruction and meeting course objectives, based on a Kumar examined their efficiency in training and knowledge. The teaching method of the future will be multimedia-based online learning.[13,14,15]

Enhancing teacher-student interactions and enabling individualized learning were the goals of AI-assisted education. It integrates AI into various intelligence frameworks through the use of intelligent speech and picture interaction. This approach modifies traditional teaching methods by developing a wide range of talents, creativity, and problem-solving abilities and also bridging the gap between current and future workforce demands. Palarimath offered proof of its effectiveness.[16]

The most powerful incentive source for teachers and students was the digital learning environment. Being assisted by numerous factors, such as multimedia, etc., encourages the learner to think previously established frameworks and discover their intellectual interests. The technology was a power play of electronic media that followed sets of rules or guidelines for the production and administration of educational materials on the open market. Bharatkar discussed the various constituent parts and how the numerous coherent structures of electronic media, like multimedia, could be exploited.[17]

The addition of AI in higher teaching, the potential to transform teaching and knowledge, as well as the creation of an AI-based implementation framework, were all explored by Muhie.[17] AI can greatly improve student learning in several subject areas, but more work is required to fully reap its rewards. It produced an AI-based framework that will influence education in the future as an outgrowth of its analysis of contemporary problems in higher education along with the development of AI technology.

To assess how an AI-assisted multimedia creation platform might improve college education by increasing student engagement and instructional effectiveness. It aims to evaluate the platform's effectiveness using important technical and instructional parameters.

Design of the research: literature work is compiled in Phrase 2, a methodology is laid out in Phrase 3, the performance evaluation is shown in Phrase 4, the discussion is shown in Phrase 5, and the results are presented in Phrase 6.

METHOD

Assessment of the AI-MCP Method The development of multimedia education

To improve system performance, use the AMSA optimization technique in conjunction with the AI-MCP framework. It increases the precision, effectiveness, and flexibility of tasks, including speech recognition, visual perception, and intelligent behaviour. In general, an AI-assisted multimedia creation platform for college instruction looks similar to this. Figure 1 displays the system's three main modules are organized as follows: intelligent behaviour, speech recognition, and visual perception. The platform's visual components are guaranteed to be engaging and instructive due to the visual perception module's assessment of media quality, content clarity, and aesthetic appeal. It emphasizes the accuracy of the system, the aural clarity of the speech, and the effectiveness of the engagement; the voice interface facilitates fluid exchanges between the teacher and the system. For the system to modify content and provide insights based on student performance, the intelligent behaviour module addresses adaptive learning, decision-making assistance, and problem-solving skills. The system will communicate with the database that contains user data, performance results, and learning outcomes. Since all modules communicate with the core AI engine (AI-MCP) that is the processing unit, it incorporates an effective learning environment for both teachers and students.

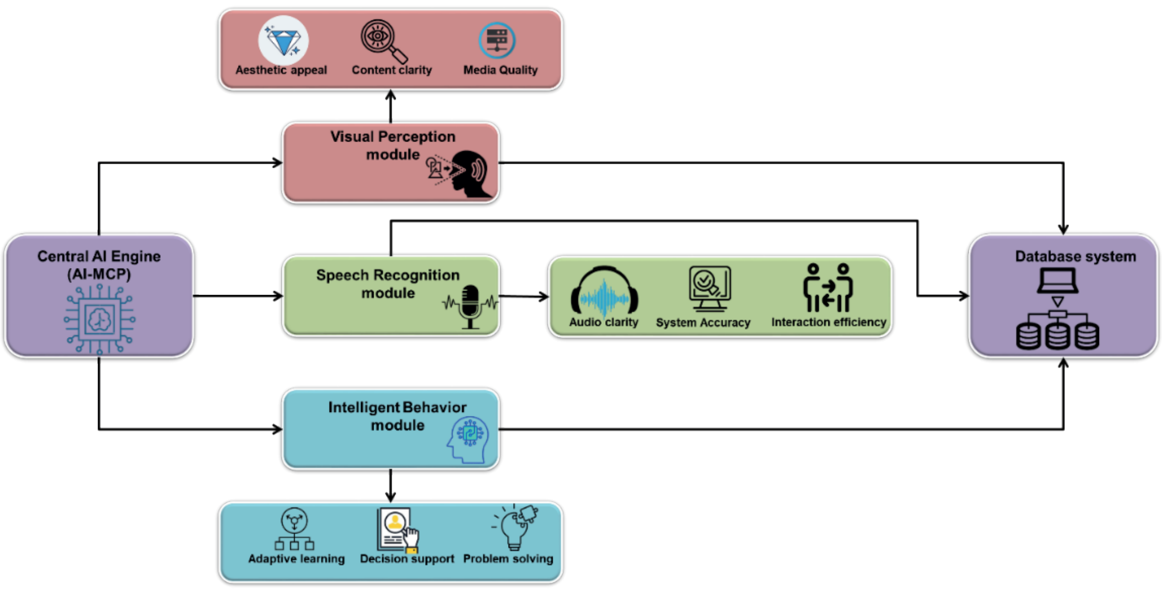

Figure 1. Building Multimedia College Teaching Using the AI-MCP Model

Table 1. AI-MCP Model Multimedia Instruction Evaluation Factors

Evaluation Index	Main Index	Secondary Index
Visual Perception	Aesthetic Appeal	Clear text and visuals, color harmony, and reduced visual fatigue.
	Content Clarity	Course content aligned with curriculum; easy to understand and visually engaging.
	Media Quality	Appropriate use of multimedia tools to support visual learning and engagement.
Speech Recognitions	System Accuracy	High accuracy in recognizing student responses and teacher instructions.
	Interaction Efficiency	Real-time feedback capability and seamless integration in classroom interactions.
	Audio Clarity	Clear and easily understandable audio output for students.
Intelligent Behavior	Adaptive Learning	Customizes content based on students' responses and performance.
	Decision Support	Provides actionable insights to teachers based on student behavior.
	Problem-Solving	Enhances students' critical thinking and decision-making skills through simulations.

Table 1 separates each component into discrete, quantitative indices, allowing users to carefully assess how effectively an AI-assisted multimedia production tool performs in college classroom. The assessment is divided into three sections: intelligent behaviour, speech recognition, and visual perception. Each area is split into primary and secondary indices for a more in-depth analysis of certain features such as aesthetics, content readability, system accuracy, interaction efficiency, and adaptive learning. It was made to guarantee a thorough evaluation of how different multimedia tools affect engagement, learning results, and teacher-student interaction. It guarantees a comprehensive image of the platform's performance, enables focused enhancements in particular areas, and aids in identifying the system's advantages and disadvantages. These organized indexes make the evaluation process simpler and clearer.

Algorithm for applying the advanced monkey algorithm (AMSA) to the AI-MCP method

The AI-MCP is optimized using the AMSA, to increase the effectiveness of processing real-time data, improve decision-making, and boost system performance in general. Through improved resource allocation and more accurate predictions, AMSA facilitates faster adaptation and the investigation of optimal solutions for teaching complicated situations. AMSA contains the steps that follow,

Step 1: the initial information provides the fundamental details currently available about the subject being examined. The analysis object's current model is also initialized. At this point, a subset ω_j is used to fill each column of the decision matrix D.

Step 2: early data processing that considers the level of uncertainty. This step involves initializing the fundamental state model of the studied item and accounting the type of uncertainty regarding the object to be examined. There are three levels of uncertainty: complete awareness, partial unpredictability, and complete uncertainty.

Step 3: MSA vector is created for every MSA while accounting for the level of unpredictability: The MSA motion direction vector is created to initiate the motion process.

$$\omega_j = \left((\omega_{j1} \times \eta_{j1}), (\omega_{j2} \times \eta_{j2}), \dots, (\omega_{jm} \times \eta_{jm}) \right) \quad (1)$$

$$\Delta\omega_j = \left(\Delta\omega_{j1}, \Delta\omega_{j2}, \dots, \Delta\omega_{jm} \right) \quad (2)$$

The MSA motion direction vector is created to begin the motion process:

$$\Delta\omega_{ji} = \{b, \;\; if\ s = rand(0,1) > \tfrac{1}{2}; -b, \;\; if\ s \leq \tfrac{1}{2} \quad (3)$$

Where the step length chosen based on the examined region is i=1,2…, m, b(b>0).

Step 4: figuring out the MSA movement's starting speed. The following equation determines each MSA's starting speed v_0:

$$v_j = (v_1, v_2, \dots, v_t), v_j = v_0 \quad (4)$$

Step 5: the MSA solution's fitness function is calculated.

$$e'_{ji} = \frac{F(\omega_j + \Delta\omega_j) - F\left((\omega_j + \Delta\omega_j)\right)}{2\Delta\omega_{ji}} \quad (5)$$

Where i=1,2,…,m, and F is the MSA solution's fitness function.
Step 6: finding the MSA movement's height:

$$z_i = \omega_{ji} + b * \left(e'_{ji}(\omega_j)\right), i = 1,2,\dots,m \quad (6)$$

Step 7: confirm the fulfilment of the local climb requirements.
The locations of the vector ω_j are swapped out for the locations of the vector z if the resultant vector z is valid. ω_j Stays constant. Steps 1 to 6 are performed until the search termination condition is met or the maximum number of repetitions is achieved.
Step 8: creation of coordinates for the local search aircraft. The range $(\omega_{ji}$-a)k, $(\omega_{ji}$+a)k are used to construct the numbers z_i, accounting for the initial data's degree of noise (k). The vector $z=(z_1, z_2,\dots,z_m)$ is designed.
Step 9: if $F(z)>F(\omega_{ji})$ and the vector z has valid values, the vector ω_j positions can be substituted by the vector z places. If incorrect, steps 6-8 are repeated until an improved rate is achieved or until all iterations have been exhausted and a choice concerning the viability of a worldwide MSA rely is made.
Step10: establishing the global search area's coordinates. Given the quantity of noise in the output data, the global reliance range [c,d] yields a uniformly distributed real value, where c,d are the method parameter.
Step 11: it specifies the global search vector $z_i=\omega_{ji}+b^*(o_i-\omega_{ji})$,i=1,2,…,m .
Step 12: distribution of searches within the MSA flock. Every equation needs to be typed independently: Search distribution within the flock of MSAs. Each equation must be inputted separately:

$$o_i = \frac{1}{N}\sum_{j=1}^{N} \omega_{ji}, i = 1,2,\dots,m \quad (7)$$

The point $o=(o_1$,o_2,…,$o_m)$ represents the present centre of gravity, and o is the population's total amount of monkeys.
Step 13: modifying the MSA movement's pace. A change in speed is made:

$$v_j^J = v_j + \omega_j(w^* - w_j) \quad (8)$$

When the approximate value of all MSA by η→max is (w^*-w_j)
The locations of the vector ω_j are swapped out for the places of the vector z.
Step 14: If the gained vector z is suitable and the value $F(z)>F(\omega_{ji})$, ω_j leftovers unaffected. Steps 10 through 14 are repeated until a higher value is attained or the maximum number of repetitions is reached.
Step 15: MSA knowledge foundation instruction, uses a training methodology based on growing AI developed to teach the knowledge bases of each MSA.
The creation of an AI-assisted multimedia college teaching approach using the AI-MCP method
The educational AI network is intimately integrated with the framework for evaluating the quality of multimedia instruction, which is utilized as a subsystem of the educational construction. However, a certain amount of independence is necessary to promote the system's further expansion. The essential data processing, appraisal index management, measurement and oversight, and findings management are all included in the framework. As per system specifications, the AI-MCP framework comprises useful elements like a database administration element, an element for evaluating management parameters, an assessment element for predictive management, and a management evaluation of outcomes element. The principal structure evaluation flow chart is shown in figure 2. First, the course selection perspective was used to build the entity-relationship diagram for teachers' assessments. AI technology combines the essential diagram and an administrator could accomplish it.

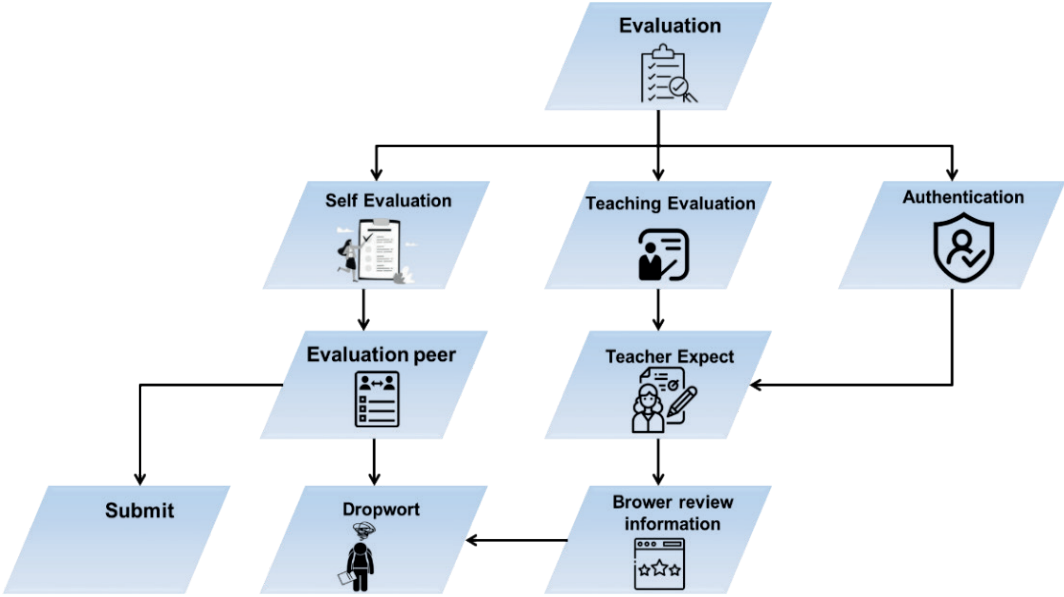

Figure 2. Creation and design of multimedia training

The teacher's basic knowledge management form is in figure 2, which displays the teacher-specific data that was previously added through the text box. The download page's category box covers the current collection categories. Before the data is entered in specifics, the add button can be clicked to save the relevant instructor info in the folder. If the teacher's identity is submitted as either a manager or a teacher, the information is restricted in the TEACHER by itself. The teacher number is kept in ALL-SCORE table to be used to record the instructor's evaluation score, and the teacher's name is preserved in the TEACHER table. The student's pre-added essential info is introduced by the administrator into the Basic Knowledge text box. A collection of all current lines is included in the department-specific drop-down menu. Click the "add" button once the basic narrative is finished, and the folder for each student's information will contain the required student data, as indicated by the student administration form. By utilizing the "Edit" or "Delete" buttons to eliminate the chosen records, the administrator has been making changes to this record, the "valuable teacher" hyperlink displays the student's evaluable instructor. After instructors, administrators, and supervisors implemented the system, the AI Network evaluated the quality of the teachers. The list box drop-down has been used to test the teacher. For every evaluation item, the assessment grade is chosen in the assessment score column. Click the submit button to add the teacher assessment score to the folder. The following is an investigation of the assessment results of instructor productivity. Specific information regarding the steadiness valuation effects of coaching, such as the findings of a student, educational leadership, and supervisory assistance evaluations, has been sought after the teacher's insight into the approach. College executives' assessment findings show the consequences of a student assessment, the outcomes of the monitoring assessment, and the specific scores, however, detailed evaluation outcomes are presented hierarchically, as described in the result section.

RESULTS

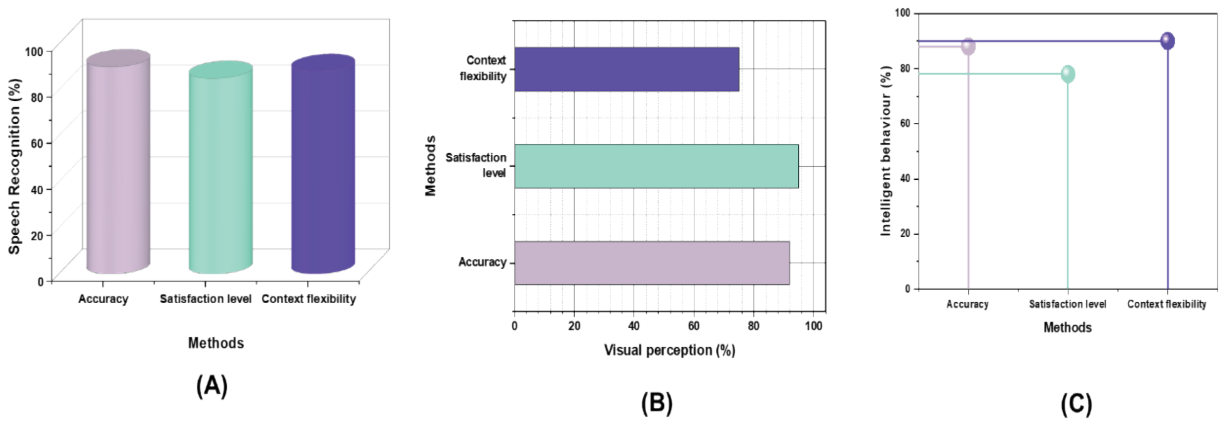

Figure 3. Evaluation of Intelligent Behavior (C), Visual Perception (B), and Speech Recognition Systems' Performance (A)

https://doi.org/10.56294/dm2024.615

Using the Python 3.11 programming language, a laptop running Windows 10 with an Intel i7 CPU and 32 GB of RAM was used for performance outcomes of the AI-assisted multimedia platform divided into three modules: Intelligent Behavior, Visual Perception, and Speech Recognition. Speech recognition demonstrated effective auditory processing with 90 % accuracy, 85 %. Visual perception attained 92 % accuracy. Intelligent Behavior demonstrated its versatility in educational contexts with 88 % accuracy. And also determining the degree of satisfaction and context flexibility. These outcomes highlight the platform's usefulness and user-friendly layout. The three modules' efficiency statistics demonstrate how responsive they are in real-time applications in figure 3 and table 2. Speech recognition ensures instant feedback with a response time of 1,2 seconds.

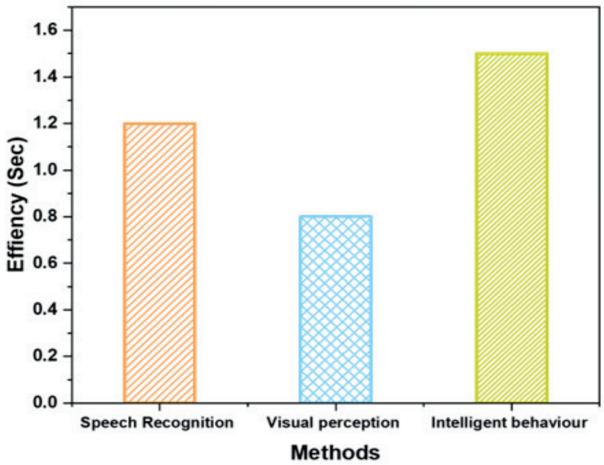

Figure 4. Assessment of Effective Results in Intelligent Behaviour, Speech Recognition, and Visual Perception

Figure 4 and table 2 display that speech recognition ensures instant feedback with a response time of 1,2 seconds. The most efficient response time is 0,8 seconds for visual perception and 1,5 seconds for intelligent behavior. The three modules' efficiency statistics demonstrate how responsive they are in real-time applications. Speech recognition ensures instant feedback with a response time of 1,2 seconds. The most efficient response time is 0,8 seconds for visual perception and 1,5 seconds for intelligent behavior.

In the proposed method, AI-MCP performs better than the conventional machine learning models K-NN, SVM, and DT, with 88 % accuracy and a 90 % F1 score.[18] When compared to traditional methods based on real-world instances, it is obvious that AI-MCP will be utilized to improve classification performance among the data.

Table 2. Evaluation of Speech Recognition, Visual Perception, and Intelligent Behavior Systems' Performance

Method	Speech recognition	Visual perception	Intelligent Behavior
Accuracy	90 %	92 %	88 %
Satisfaction level	85 %	95 %	78 %
Context Flexibility	88 %	75 %	90 %
Efficiency	1,2sec	0,8sec	1,5sec

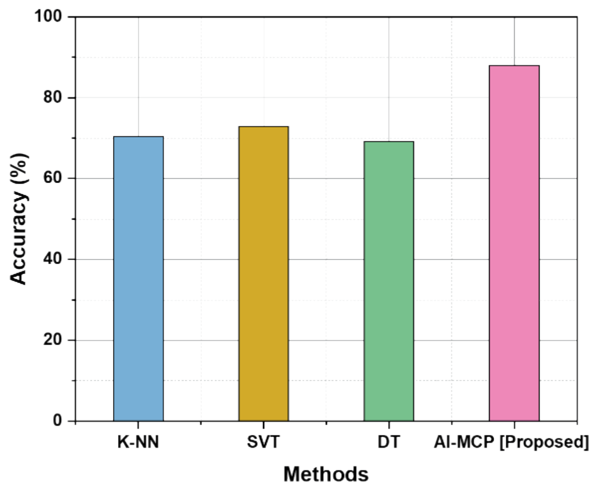

Figure 5. Comparative Assessment of Accuracy

https://doi.org/10.56294/dm2024.615

Accuracy values demonstrate in table 3 and figure 5 how well various approaches classify the data. K-Nearest Neighbors (K-NN) scores 70,5 %, Support Vector Machine (SVM) outperforms it at 73 %, and Decision Tree (DT) comes in at 69,2 %. By attaining 88 %, the suggested AI-MCP approach considerably enhances performance. This leads to the demonstration of the AI-MCP's excellent prediction capacity in comparison to the conventional ways of performance, which is obviously advantageous in terms of increased classification precision and accurately reflects the real-world application with excellent results.

F1 Score

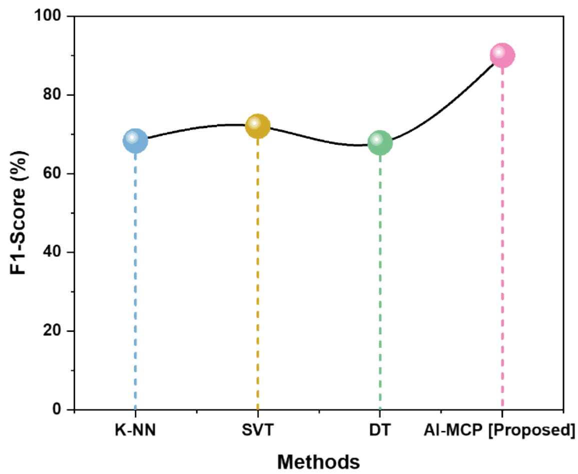

Figure 6. Comparative Assessment of Accuracy

F1 Score values are shown in table 3 and figure 6 how each categorization system balances recall and precision. K-Nearest Neighbors (K-NN) performs an F1 Score of 68,3 %. With 72 % performance, Support Vector Machine (SVM) at 67,8 %, Decision Tree (DT) received a marginally lower score. With an F1 Score of 90 % and exceptional precision and recall, the suggested AI-MCP approach proved to be highly successful for precise categorization.

Table 3. Evaluation of model performance

Methods	Accuracy	F1 Score
K-NN[19]	70,5 %	68,3 %
SVM[19]	73 %	72 %
DT[19]	69,2 %	67,8 %
AI-MCP [Proposed]	88 %	90 %

DISCUSSION

To cover an assessment of how well AI-powered multimedia platforms can improve college teaching. The three tested modules intelligent behavior, visual perception, and voice recognition are examined in the present research. The existing processes, K-NN, SVM, and DT, have performed poorly, with moderate F1 scores and accuracy rates of 70,5 %, 73 %, and 69,2 %, respectively. These processes are known to experience lower accuracy, especially in complex multimedia settings, also limitations in adaptive learning as well as inefficiency in processing real-time data.

The AI-MCP solution addresses all these problems since it utilizes state-of-the-art AI techniques that enhance intelligent behavior, clarity of visuals, and speech recognition. The system achieves a noteworthy accuracy of 88 % with an F1 score of 90 % that improves content delivery and experience of the user. This shows that AI-MCP outperforms conventional constraints since it gives strong, real-time interaction and adaptable learning abilities that boost educational quality and enhance engagement among learners.

CONCLUSIONS

Instruction at college level is much enhanced through an application of AI-powered multimedia creation. Such integration harmoniously brings the advancement in technology with rich multimedia, hence more effectively providing content, significantly improving teaching efficacy, and holding students' interest. The potentialities, such as speech recognition, visual perception, and intelligent behavior, enhance the system's precision, fast reaction, and agility toward offering a dynamic and interactive learning environment. While students can enjoy more interactive and personalized learning experiences, the teachers benefit from better classroom management and streamlined instructional processes. The evaluation framework focuses on the software's key strengths in terms of usability, cost-effectiveness, aesthetic appeal, and functionality, all serving to support the promise of an innovative platform for flipping classrooms. AI-based multimedia systems usher in a more accessible and efficient teaching future in tertiary learning institutions, focusing on important instructional challenges and promoting innovation.

The system has a high upfront cost and depends on technology and teacher education for effectiveness. There are possible biases in AI algorithms and their integration with current systems. Enhancing AI flexibility, integrating personalized learning analytics, and extending applications to many educational contexts that can be the main areas of future research.

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FINANCING
The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION
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