Transforming Physics Education Through Artificial Intelligence: A Systematic Review

Ms. Ashwini Ashok Dighe
Nowrosjee Wadia College, Pune , Maharashtra

Abstract
Artificial Intelligence (AI) is progressively transforming the landscape of education, offering novel approaches to teaching, learning, and assessment. Artificial intelligence (AI) is advanced technology and physics is old natural science. The merging of two fields and setting new trends in physics education is inspiring for students. AI is an interesting learning tool for physics education. AI tools are efficiently applied in physics to enhance data intensive techniques. In physics education, characterized by abstract concepts and complex problem-solving, AI tools hold significant potential to enhance both instructional methods and learner outcomes. This paper reveals the reviewed data about AI- driven tools and its application in physics education. This systematic review examines the current applications, trends, and implications of AI technologies in physics education across secondary and higher education contexts. By analyzing studies published over the last decade, author identify key AI technologies employed, including personalized learning, machine learning-based assessment tools, adaptive learning platforms, and AI-powered simulations. A comprehensive search strategy will be applied across major academic databases including Google Scholar and Web of Science, focusing on studies published between 2020 and 2024.Our review highlights how these technologies contribute to personalized learning experiences, improved conceptual understanding, and increased student engagement. Through a thematic analysis of selected literature, we also explore future directions for research and development. The review concludes by offering recommendations for educators and policymakers aiming to leverage AI in physics education, stressing the need for evidence-based strategies and ethical considerations. Overall, this paper provides a comprehensive overview of how AI is shaping physics education today and suggests pathways for its effective and responsible use in the future. This article aims to provide review of the AI paradigm in physics and inspire physics learners to explore new advances in physics.

Keywords: Physics, artificial intelligence, application, tools, challenges, Review study

Introduction

“Education enables the mind to find out the ultimate truth, which gives us the wealth of inner light and love and gives significance to life,” (Rabindranath Tagore). We come across many such sayings about education by great philosophers and leaders. To establish global peace and understanding is the first priority of education. Thus it gave education importance in the daily life of humans.

In 21st century, education is not just a knowledge tree but a fuel which drives the economic development of the world (Shah, 2015). Artificial intelligence is one of the sciences which drives the economy of the nation in the current era. AI has marked significant growth in the field of physics education where large data structure is analyzed and reasoned for further predictions. Physics is science of many discipline and mother of various technology. Physics has contributed to Artificial intelligence (AI) by bagging the Nobel Prize in 2024 awarded to John J Hopfield and Geoffrey E. Hilton, for geometric deep learning, energy- based models and thermodynamics inspired diffusion models in the generation of AI. The AI revolution has potential to transform the old trends in industries and education. AI can set new trends in physics education to fulfil the goal of curriculum in short time or at a distance level.

AI has ability of many techniques and applications that enable machines to mimic Human intelligence, learn from data and make decisions based on pattern and insights. Artificial intelligence (AI) has many algorithms and modelling tools to access the large data sets and analyze the data for further needs and evidences. Realizing the need of these applications in daily physics education and other disciplines of physics researchers are developing and exploring the field of “AI + Physics”.

Physics is science of energy, space and time and relation between them. Physics is science of matter and their microscopic interventions. Physics majorly deals with the motion dynamics and forces acting on the objects. Such theories has many experiments in physics with large datasets and analysis that cannot be solved manually where AI methods turn out to be fruitful. These methods are very useful in particle physics, astrophysics and quantum mechanics. AI is helpful in formulating new theories and laws in physics and modelling.

AI is beneficial in physics to avoid misconceptions and analysis of data in right direction. AI in physics research has proved to be very fruitful as it gave easy techniques for synthesis of data, pattern recognition technique and simulation techniques. AI in research helped learners to bring new and innovative ideas.

AI's role in physics education is increasingly recognized as crucial for improving learning outcomes. AI technologies can provide personalized feedback, identify student misconceptions, and enhance the overall learning experience (KT Kotsis, 2024). Studies by CW Cheah (2021) highlight the opportunities AI presents in physics education, such as adaptive learning environments and real- time feedback mechanisms. AI allows for incorporating experiential learning and project based assignments into curriculum, to tackle real world problems (S. Suhonen, 2024) explore integrating AI-based methods into qualitative research, suggesting that computational grounded theory can lead to new developments in student learning behaviors and misconceptions (Konstantinos T Kotis, 2024) reviewed the literature on AI in physics problem-solving, emphasizing the potential of AI tools like ChatGPT to assist students in understanding complex concepts. AI ensures that all students, irrespective of their learning challenges, can access and succeed in Physics education (H Kemosuss, M Khaldi, 2025).

Implementation of AI in Physics Education

Physics is study of nature and natural phenomena. As these study consist of macroscopic as well as microscopic view it is very difficult to sometimes make any generalizations based on large datasets without analysis. Analysis and synthesis of data is very important step in physics. To understand the critical and complex events and observations AI methods are very helpful to students. Now, here AI helps studies of these events and understanding the concept. Also it serves as great accessible mode for study. Students can enhance study techniques using AI. AI is smart and intelligent learning style which every students can adopt as per his strength and weakness. AI gives opportunity for personalized learning, intelligent tutoring systems, automated grading and simulation based learning. We will discuss them in details as follow:

(1) Personalized learning: AI trains the individual student to adopt the system as per his need, abilities and learning styles. AI provides students with personalized content, pace and difficulty level for study as per needs of students. AI has various methods to analyze the information and provide right content to user for personal study. It gives immediate feedback and responses to the individual to guide them in right direction to specify the goals of the study. Personalized learning helps students for better understanding, retention and academic performance. Personalized learning keeps students engage and give benefits in less time. It makes learning interesting and more pensionable.

(2) Intelligent tutoring systems (ITS): ITS refers to computer-based programme for personalized learning where students learn as per their pace, are evaluated and given feedbacks without human inventions. The components of ITS are domain model based on theory of learning, student model which tracks step by step students works and progress, tutoring model which accepts responses from domain model and student model and provide learning techniques accordingly. The important benefit of this technique is it provides quick feedback and targeted instructions to keep individual constantly engage and facilitate overall learning.

(3) Automated grading: AI-powered evaluation techniques like puzzles, test and assignments with appropriate feedbacks (without human interventions). Automated grading is time saving and consistent grading technique. It is not bias and improves learners' efficiency. Examples of automated grading systems are CoGrader, EssayGrader, Smodin, GradeCam and SnapGrader.

(4) Simulation-based learning: Simulation- based learning is interactive preface for individual and proved to be immersive environment to students. It provides real world simulations to interact and allows individual to apply their skills in safe and controlled environment. It provides experiential learning techniques to understand the concept and construct the knowledge. It improves retention capacity, increases engagement and gives risk free learning. Types of simulations are virtual reality simulation, serious games, and interactive scenarios.

Simulation software:

a. PhET interactive simulation is free online simulation for teaching physics.

b. Open source physics simulations are used for physics education

c. Algodoo is 2D mechanics simulation software for educational purpose.

(5) APP for physics learning:

An app for physics education provides interactive simulations, tutorials, and problem-solving tools to help students grasp complex physics concepts. It often features AI-driven personalized learning paths and real-time feedback. Following are example of APPs used for physics education.

1. Physics solver AI: This app provides wide range of numericals with proper and detailed explanation as per the board or academic requirement. Photo recognition abilities from textbook or worksheet.

2. Khan academy: Offers comprehensive high quality online videos on Ai Khanmigo. They provide practice exercise as per the school or board in free. They give personalized learning experiences to learners.

3. Wolfram: Computational engine Interactive interface for visualizing physics concepts and solving complex numericals.

4. Physics toolbox Suit: It is collection of apps which uses smartphone sensors to collect, analyses and interpret data for a virtual experiment in physics.

5. Physics Wiki: Free app which provides detailed concepts in physics, exercise and various formula for calculation. It is available on both Android and iOS devices.

6. Physics scholar Well-designed for interactive and engaging learning experience for students.

7. Quizlet This app provides adaptive learning method to focus on the improvement area.

8. TED-ED: Ai powered video lessons, quizzes and discussions on various academic topics in physics.

9. PhysicsMaster: Provides online calculators for solving numericals, experimental calculations and quizzes.

10. Pocket physics Provides quick references for assignment like formula and description.

11. Complete physics: Comprehensive app which covers topic like current

Electricity, thermodynamics and mechanics

(12) Data Analysis and Graphing software: Logger pro, Vernier graphical analysis, origin are some of the data analysis and graphing software's used by physicist.

Objective of this study

The primary objective of this research paper is to systematically review and synthesize existing literature on the application of Artificial Intelligence in physics education. Specifically, it aims to identify the types of AI technologies used, evaluate their impact on learning outcomes and teaching methodologies, and analyze challenges and limitations faced in their implementation. Additionally, the review seeks to map trends,

highlight gaps in current research, and propose future research directions. A comprehensive review of previous research is essential to map the current landscape of AI applications in physics education. Reviewing existing studies helps identify successful implementations, recurring challenges, and unexplored opportunities. It also aids in avoiding redundant efforts and ensures that future research builds upon a solid foundation of established knowledge. Moreover, such a review supports informed decision-making for educators and policymakers by highlighting evidence-based practices and guiding the ethical and effective integration of AI tools in physics education.

Research method

In this research, researcher has used narrative literature review for study from past 5 years journals published on Google scholarly and Web of science. It is a comprehensive knowledge created from existing data sources present online. This research assembles and critically evaluates the data from existing published research papers with the keywords AI and Physics education. This research reviews the data using keywords AI and physics education findings by many authors. The data collected are authentic and trusted more many research journals published on google scholarly. The findings and conclusions discussed are review of study of these literature. The review process in this research adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure transparency, reliability, and reproducibility. The researcher systematically searched two major databases: Google Scholar and Web of Science, focusing on journals published over the past five years. The search was conducted using specific keywords such as "Artificial Intelligence," "AI," and "Physics Education." Inclusion criteria were applied to select only peer-reviewed articles related directly to AI applications in physics education. The initial pool of studies underwent a rigorous screening process, including title and abstract review, followed by full-text analysis to confirm relevance and quality. Data from selected studies were extracted using a standardized form, capturing information on AI technologies used, educational outcomes, research methodologies, and key findings. Multiple reviewers independently assessed the quality and authenticity of the articles to reduce bias. The collected data were then subjected to thematic analysis and synthesis, critically evaluating the effectiveness, challenges, and trends identified in the literature. This structured PRISMA-based approach ensured a comprehensive and methodical review, providing a solid foundation for the conclusions drawn in the study.

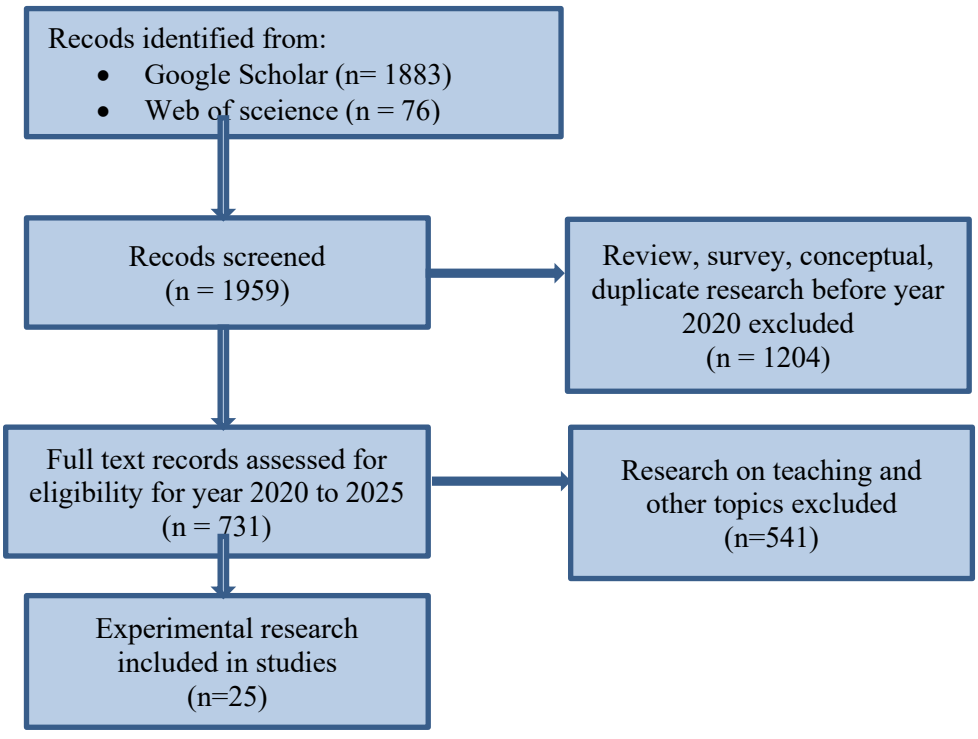


Fig:1 Screening of research appers using PRISMA method

Total research identified from Google scholar were 1883 and from Web of Science were 76 as per Scopus data database bibliometric study related to key words "AI in Physics education". Out of which 1204 studies were excluded as they were review research, survey research, conceptual, duplicate research or other topic based research before year 2020. Full text record found from year 2020 to 2025 on the bases of key words "Application of AI tools in Physics learning" or AI in Physics education were 731. Out of which 25 were included in studies by researcher which were rigorously chosen by observing the experimental conclusions of the researches. 25 studies are experimental research conducted in high school level to identify the effectiveness of AI and its efficiency in physics learning. These studies were conducted to check the implementation of AI-learning methods like personalized learning techniques, intelligent tutoring system, and assessment of physics using AI. These research were systematically studied to analyses each tool of AI and its implementation in Physics education.

The result of this study found that AI-driven tools are key factor to inspire students for learning physics and engaging them in problem-solving and active learning. The result of this study showed that AI driven tools are more effective and have positive impact on students emotionally and motivationally (J.Henze, A Bresges, S Becker-Genschaw). Majorly use of ChatGPT at varius level are discussed on large scale and are experimentally verified in the studies. Use of AI application like interactive simulation, visualization, virtual labs help students to construct concept and solve numerical (Warini, Y Yolando, OPU gumay). Findings reveal that AI holds significant potential for personalizing physics education through adaptive learning systems, virtual labs, and intelligent tutoring tools, enhancing engagement and supporting diverse learning needs. However, key challenges such as teacher readiness, data privacy concerns, and balancing AI reliance with fostering critical thinking were identified (B Jalali, Y Zhou, A Kadambi). The necessity for continuous evaluation of student's engagement and academic achievements can be emphasized using AI in the educational field and its impact is more appreciating then traditional evaluation method. This ongoing assessment is crucial for understanding AI's effectiveness in education and making informed decisions about its future use (Konstantinos T Kotsis). AI enhances emotional engagement and higher motivation, to create a more positive and supportive learning environment (J Henze, A Bresges, AB Genshaw).

Studies which are include for review show significant relation between use of AI-driven technology and learning experience in physics. These studies under review also highlight the use of ChatGPT for enhancing physics knowledge and language with proper scientific analysis. These study gibe deep and broad vision for future study in physics education.

Role of AI in Physics education: A brief view

Sr. No	Title of research	Authors	Year	Role of AI in Physics education	Research aspects
1	AI adoption for teaching and learning of physics	EEUkoh, J Nicholas	2021	Teacher should integrate ICT programme to make work easier and simple	App
2	ChatGPT as teacher assistant for physics teaching	Konstantinos T Kotis	2024	ChatGPT facilitates interactive and inquiry based learning techniques to construct theory	AI benefits are discussed
3	The Utilization of Artificial Intelligence (AI) in Physics Learning for Physics Education Students	Warini, Y Yolando, OPU gumay	2025	AI application like interactive simulation, visualization, virtual labs help students to construct concept and solve numerical.	AI- based applications are discussed

4	The Potential of ChatGPT to Enhance Physics Education in Vietnamese High Schools	P Bruneau, J Wang, L cao, H Truong	2023	AI helps to enhance physics education and provide insights into capabilities of AI-driven technologies like ChatGPT	AI- based application are discussed
5	Physics language and language use in physics—What do we know and how AI might enhance language-related research and instruction	Peter Wulff	2024	This research characterizes physics language and understanding language use in physics as important goals for research on physics learning and instructional design	AI- powered research perspective is mentioned for improving physics language
6	Developing a gamified AI-enabled online learning application to improve students' perception of university physics	Da yang Tan, Cin Wei Cheah	2021	Gamified applications on digital tablets and mobile phones were prepared to enhance physics education	Application based research
7	AI for Enhancing Physics Education: Practical Tools and Lesson Plans.	Georgia, Vakarou; Georgios, Stylos; Konstantinos, Kotsis T	2024	Incorporation of Einsteinian physics (EP) into high school curriculum and the potential benefits of integrating artificial intelligence (AI) into EP education.	Application based research
8	Physics on autopilot: exploring the use of an AI assistant for independent problem- solving practice	Andrii V. Riabko, Tetiana A. Vakaliuk	2024	A customised chatbot was developed using ChatGPT to provide step-by-step assistance through a structured problem-solving algorithm for 12 grade students.	Application based research
9	Enhancing physics education through Artificial intelligence Tools	K. Anbu	2025	Using AI tools like PhET, Labster, ChatGPT and Squirrel AI and analyzing their roles in structure 60 minutes virtual physics class model helps to motivate and	Experimental and application based research

				inspire retention capabilities of students.	
10	From Chalkboard to chatbot: The future of physics education through Artificial intelligence integration	KT Kotsis	2025	AI driven personalized learning experiences in physics potentially transforms students engagement.	Benefits are discussed.
11	Navigating the AI era: Analyzing the impact of artificial intelligence on learning and teaching engineering physics	S. Suhonen	2024	AI promises to enhance teaching efficiency, teaching material production and curriculum design. AI can be a powerful tool for students learning at home, offering personalized support and enhancing both conceptual understanding and problem-solving skills in learning physics	Application based research.
12	Artificial intelligence in physics courses to suppose active learning	Victor R Rella, B.Y. Toh	2024	Large Language Models (LLMs) like OpenAI's ChatGPT and Microsoft's Copilot, is transforming educational methodologies, including undergraduate physics courses for engineering students. LLMs improve students problem solving capacity	Experimental research.
13	Enhancing physics education for O-level students using AI	S.Arsalan, NB Nehal, S Jabeen, SS Zehra, F Kashif	2025	Personalized learning is more conceptual in understanding, but has challenges like technical limitations, lack of teacher training, and over-reliance on technology has to be overcomed	Experimental and application-based research
14	Aritificial intelligence technology as a method to simplify physics learning	BMS Mansour, BMM Bekhet, MEA Nagy	2024	Through the analysis of data and outcomes, it is evident that AI-powered methods can significantly enhance comprehension and retention of complex physics concepts	Experimental research
15	Physics teaching with artificial intelligence (AI): A personalized approach to	H Kemosuss, M Khaldi	2025	AI can offer personalized learning solutions, adapted to the specific needs and preferences of learners	Application based research

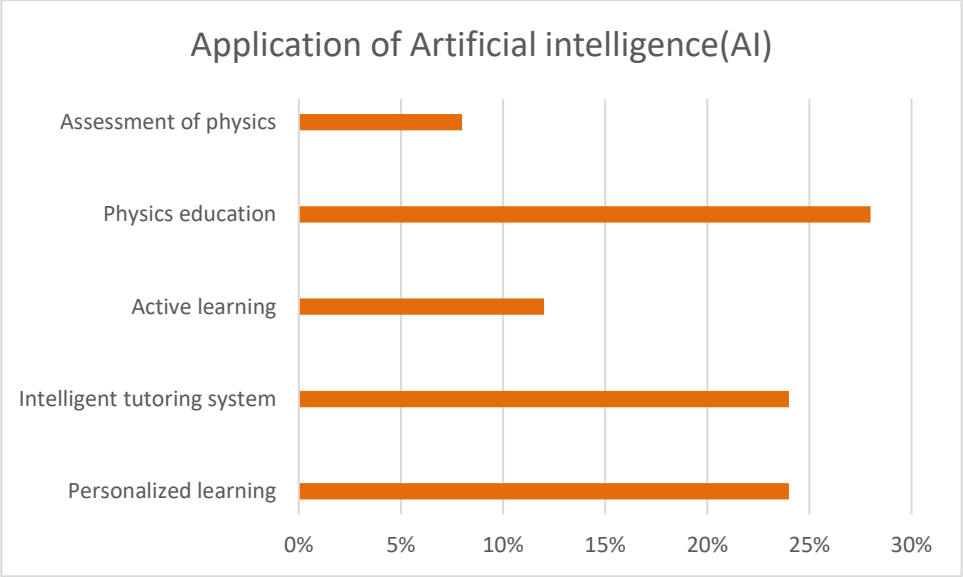
	accommodator-style learners				
16	Use of artificial intelligence technologies in studying the phenomenon of eclectric current in physics education	M. Borisova, S Hadzhikoleva, E Hadzhikoleva ICVL proceeding	2023	The web-based application, Tinkercad, used for teaching 'Physics and Astronomy' subject in the 7th grade at 'Otets Paisiy' primary school in Topolovo village, has caused significant interest among the students	Application and experimental research
17	ChatPLT: An intelligent tutoring system for teaching physics in higher education	A Naya-Faorcano, M Gracia-Bosque, E Cascarosa	2024	Intelligent tutoring systems have been claimed to have the potential to become key tools to enhance the teaching-learning	Experimental research
18	Towards AI grading of students problem solutions in introductory physics: A feasibility study	G Kortemeyer	2023	In this feasibility study, using sample handwriting and a synthetic dataset of problem solutions, GPT has shown considerable potential for grading freeform student work in physics	Application research
19	Exploring durham university physics exam with large language models	W Yeadon, DP Halliday	2023	Current AI models struggle with university-level Physics questions, an improving trend is observable	Application based research
20	Making a revolution in physics learning in High school with ChatGPT: A case study in UAE	K Larbi, M Halaweh, H Tairab, NR Alsalhi, F aldarmaki	2024	ChatGPT is useful to enhace the performance in physics of High school students	Experimental research
21	AI-supported data analysis boosts student motivation and reduces stress in physics education	J.Henze, A Bresges, S Becker-Genschaw	2024	AI in physics education, provides critical insights into its impact on learning outcomes, emotional engagement, and motivational variables. Impact of AI is positive in learning and	Experimental research

				motivating students.	
22	Enhancing physics a hand-on Lab through online educational tool	B Jalali, Y Zhou, A Kadambi	2022	AI offers promising applications, from intelligent tutoring systems and adaptive assessments to automated feedback and data-driven personalization	Application based research
23	Comparing ChatGPT and deepseed in Addressing misconceptions about Physics concepts.	Konstarinos T Kotsis	2025	By harnessing the capabilities of both ChatGPT and DeepSeek, educators can develop hybrid tools that not only address misconceptions but also foster a deeper conceptual understanding of physics.	Application research
24	From intuition to understanding: Using AI Peers to overcome physics misconceptions	R Weijers, D Wu, H Betts, T Jacod, Y Guan	2025	AI-led dialogue has promising potential to remediate deep-held misconceptions in educational settings. Further research is warranted to explore potential improvements to the design of the AI Peer	Experimental research
25	Integration of AI in high school physics teaching	Hassane Kemouss	2025	Personalized learning is more effective according to students' individual preferences and learning style	Experimental

Result and findings.

In recent years, artificial intelligence (AI) has experienced rapid progress in Physics education. Advancing science and technology has rapid impact on physics learning. This research is keen to find how the AI tools like personalized learning, intelligent tutoring and automated grading can help the learner for preparation of the physics. For this the researcher used the google scholar and Web of Science researches to study the "Use of AI in Physics education". This study leads to understand the transformative approach of AI in physics education. According to available data on Google Scholar there are over 731 publications related to topic "Artificial intelligence (AI) in Physics education", with notably increase in research output from 2020 to 2025. The number of publications increased five times from last year, which signifies consistent increase in academic activities. It is also found that these research focus on diverse contributions and international collaboration. 10 articles were published in the year 2024, 8 articles were published in the year 2025, 4 in the year 2023, one research in the year 2022 and 2 research in year 2021.From last five years data, we found that these researchers have focused on AI driven learning techniques in physics education. Researches were reviewed on the bases of key words physic education, AI-driven learning techniques, learning in physics, and Ai tools in physics. A brief review of the studies carried in direction of "AI in Physics Education", is discussed below:

1. Personalized learning through AI: From last five year research paper analysis, researcher found 24% studies employed AI-powered personalized learning techniques in physics education to improve efficiency of students, to solve problem and learn complex events or concepts. Personalized learning is more effective to individuals need and capabilities. Da Yang Tan, Cin Wei Cheah took a survey of 24 FY B Sc students for use of gamified personalized learning techniques in physics supports daily learning. DY Tan and CW Chwah found that the key outputs at current stage are as follows: the implementation of the gamified user interface to enhance attractiveness of the application and incorporation of the game mechanics within the web application. H Kemosuss, M Khaldi experimentally proved and explained integration of AI in High school Physics learning using Kolb's model of learning is more effective and energetic to learn deep concept.
2. Intelligent tutoring system: 24% studies engaged AI in education for intelligent tutoring system. These studies in physics education showed use of intelligent tutoring system like ChatPLT, ChatGPT.and so on. KT Kotsis found that integrating artificial intelligence, such as ChatGPT, into the classroom can redefine pedagogical approaches, particularly in subjects like physics, which often pose significant challenges for young learners. KT Kotsis also explained in his studies that by utilizing interactive AI-driven platforms, educators can create a more personalized learning environment that caters to the unique needs of each student, enhancing engagement and understanding. Kotsis verified the fact that AI technologies enable hands-on experimentation and simulation, allowing students to visualize complex concepts and apply theoretical knowledge to practical scenarios. Peter Wulf discussed the use of LLMs such GPT-3 for developing student's physics language in classroom.
3. Support active learning: 12% studies revealed that AI-powered active learning programme in physics education are more efficient and increases capacity of student for experiential learning method. Active learning through use of AI tools gives real world experience and real time feedback. VR Rello, BY Toh showed that Large Language Models (LLMs) such as OpenAI's Chat Generative Pre-Trained Transformer (ChatGPT) and Microsoft's Copilot show immense potential in content creation and coding.
4. Physics education: Majority of 28% studies engage AI to enhance physics education and enhance learning in physics. Many studies suggest that AI help to develop physics language and knowledge that enhances the learning capacity of students. The AI-powered Physics Education Technology (PhET) Interactive Simulations together with ChatGPT enables students to experiment with concepts by applying detailed explanations on complex physics theories to help abstract knowledge become more understandable (M Shafiq, MA Sami, N Bano, R Bano, M Rashid). BMS Mansour, BMM Bekhet, MEA Nagy succeded to prove the effectiveness of AI powered learning techniques in Physics. K Anbu fornd that Using AI tools like PhET, Labster, ChatGPT and Squirrel AI helps in understanding of deep concepys in physics more effectively.
5. Assessment of learning: Records found in studies showed that 8% studies use AI for Assessment of Physics and automate grading in Physics subject. Automated grading system help to track physics progress and achievements. The feasibility study explores an AI-assisted workflow to grade handwritten physics derivations using MathPix and GPT-4 discuss by G Kortemeyer. W Yeadon, DpP Halliday formulated in there research two assessment models using GPT-4 and GPT-3.5 before pandemic COVID and found that no threat to the fidelity of Physics assessments.



Limitations and challenges in implementation of AI in physics

(1) Interpretability: In deep learning models and machine learning models, it is difficult to understand the predictions made by black boxes. It is crucial to build trust and confidence about the result estimated and paramount the mechanism. AI Driven tools, they face problem to interpret the data on their own i.e., they fail to think critically and give reasons. So AI gives only limited solutions and interpretations. In AI, interpretability is always questioned since there is large usage of data sets for analysis and reasoning. Authenticity and trueness are crucial factors in interpretability of data derived from AI. It is difficult to rely totally on solutions of AI because of its insufficient reasoning sometimes.

(2) Data dependency: Data dependency is a relationship expressed as a function, where one quantity depends on the other. In physics it is difficult to estimate this dependency without large data sets which are not readily available or accessible. This develops a gap between AI and physics for drawing results and conclusion since AI requires large train data to estimate results. Also AI-powered app need the manual data to do analysis or needs the individual to feed the data and run the program. As this dependency is crucial, AI lacks perfection in interpretation.

(3) Overfitting: AI is prone to overfitting, as it performs well on train data but fails to generalize to new, unseen data. This leads to inappropriate conclusions and manipulated, bias predictions.

(4) Lack of contextual understanding: AI fails to understand interdisciplinary views in complex phenomena and lack potential to avoid misinterpretation. AI gives limited ideas and views which are available in it, further it does not evaluate the authenticity of the reasoning's framed.

(5) Ethical concerns: AI raises ethical issues related to data bias, privacy and the potential for job displacement in the field of physics. AI collects large data sets about student's behavior and achievements which are confidential, then the problem arise about storage and protection of data. These data are to be kept confidential ethically, where AI lacks many times.

(6) Creativity and intuition: AI lacks human intelligence and capacity to create new ideas, intuition to bring new insight that can drive scientific advances. AI needs manual commands to work, so it lacks creativity on its own. Also Ai restricts the creativity of students as it ihas limited views and conceptualization. Large usage of AI –driven tools in daily life hinders the creativity of students and restricts the imagination somewhere. AI cannot create new theories on its own and formulate the experimental data. It lacks over here and restrict the learner to advance further in studies.

(7) Affordable resources: Ai driven technologies are not easily affordable to all individuals. Although AI is more effective in learning physics concepts and solving problem, Its resources and equipment's are not readily available to all individuals of different economic status. This creates inequity in learning experiences and understanding of students.

(8) Train tutors: To learn the use of AI, students need well trained tutors. In India, we face problem of managing with well-trained tutors who can teach and guide use of AI-driven technology to students. This leads ti incomplete knowledge and misconceptions about the concepts.

Conclusion

AI is dominating the world of physics in every context. AI empowered the learning techniques in physics. The physics education is more enjoyable and refreshing with AI tools and application. AI-driven personalized learning, experiential learning and intelligent tutoring system has marked the students' progress and achievements with real-world experiences to construct concept and understanding about complex phenomenon. AI has made teaching-learning in physics more interactive and flexible as per need and pace of students. Application of AI is increasing five times in physics education. This will surely develop the intellectual and experiential capabilities of students in advance physics. In 21 st century students will be capable of competing with the world using AI application for future growth.

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