World Journal of Education and Humanities
ISSN 2687-6760 (Print) ISSN 2687-6779 (Online)
Vol. 6 No. 5, 2024
www.scholink.org/ojs/index.php/wjeh

Original Paper

Revolutionizing Education through AI: Alleviating Educator Stress, Personalizing Learning, and Enhancing Economic Sustainability

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Received: August 27, 2024 Accepted: September 29, 2024 Online Published: October 20, 2024

doi:10.22158/wjeh.v6n5p113 URL: http://dx.doi.org/10.22158/wjeh.v6n5p113

Abstract

The current education industry faces critical challenges, including overwhelming educator workloads, a lack of personalized student learning, and unsustainable financial models. This paper explores how artificial intelligence (AI) can offer solutions to these systemic issues, focusing on three key areas: reducing teacher burnout, enhancing student engagement through personalized education, and improving the financial sustainability of educational institutions. The study investigates the advantages of adaptive learning systems for customizing educational experiences for each student, the impact of automated tools in easing administrative burdens on teachers, and the optimization of institutional resources to lower operating costs through a thorough analysis of current AI-based projects. These results demonstrate how AI has the potential to revolutionize conventional educational approaches. Still, they also show that to fully realize its promise, more extensive systemic changes are required.

Keywords

AI in Education, Personalized Learning, Teacher Burnout, Adaptive Learning Systems, Educational Technology, Economic Sustainability in Education, Artificial Intelligence in Classrooms, Student Engagement, Automated Educational Tools, Higher Education Reform

1. Introduction

1.1 Contextual Overview

In recent years, the education sector has experienced a series of incremental changes. Despite rapid advancement in areas like AI and digital platforms, it continues to struggle to fully adapt to the digital age. Traditional education models, like those designed for industrial economies, are much less adequate in meeting the demands of the modern knowledge society, which is characterized by rapid change, complex networks, and an excessive reliance on information. Research shows that despite technology being present in schools, it often fails to enhance student outcomes or ease the workload of educators (OECD, 2021). While online learning and digital resources have become more accessible, many education systems remain rigid and bound to outdated pedagogies that hinder the integration of innovative solutions on a larger scale. Although technology has been widely implemented, it does not necessarily result in better outcomes for students, educators, or institutions. Additionally, Altbach et al. (2019) highlight the widening gap between school programs and skills required in the workforce, leaving students unprepared for the labor market.

This struggle is particularly evident in countries like the United States and Australia. In the U.S., schools facing budget cuts, experience teacher shortages, and witness dissatisfaction among teachers and students. Teacher attrition in the U.S. is alarmingly high, with almost 30% of teachers leaving the profession during the initial five years due to burnout and inadequate assistance (Carver-Thomas & Darling-Hammond, 2019). Similarly, in Australia, the rise in student population and the shifting demographic trends deliver better results, but with fewer resources at hand. Although the emergence of AI and machine learning technologies provides a wide array of possibilities in terms of both learning outcomes and operational efficiency, only a small percentage of schools were identified to integrate AI to improve learning outcomes (Zawacki-Richter et al., 2019). Thus, a pressing need for systemic change in education has never been more critical.

1.2 Current Challenges in Education

The education sector is currently facing three main problems that hinder its ability to effectively assist students and society: educator burnout, lack of personalized learning and financial stability within higher education.

1.2.1 Educator Burnout

Research consistently highlights the growing crisis of teacher stress and attrition. RAND Corporation's 2024 State of the American Teacher Survey reveals that teachers work, on average, nine hours more per week than other professionals, with 77% of teachers reporting frequent job-related stress or burnout. This study highlights that workload is a significant factor contributing to teachers' stress and their considerations of leaving the profession. Pew Research Center (2024) has produced similar findings, revealing that 84% of teachers feel there is insufficient time during their regular work hours to complete necessary tasks like grading, lesson planning, and administrative work, with 81% attributing this to simply having too much work. EdSurge (2024) has also emphasized that workload is a critical

factor affecting teacher well-being. The report suggests that the increased workload, often exacerbated by additional responsibilities, is one of the leading causes of burnout among teachers, which ultimately impacts their job satisfaction and retention .

1.2.2 Lack of Personalization for Students

Nowadays, education still follows a one-size-fits-all approach, which does not align with the diverse learning needs of students. Still, a standardized curriculum is being applied, whereas real education addresses the needs of the students to think critically and learn at their own pace and abilities, resulting in disengagement and underperformance. Research shows that personalized learning techniques can be a major factor in improving education outcomes, particularly in reading and math (Pane et al., 2015). However, in larger classroom with limited resources, teachers will find it difficult to utilize these methods on the whole scale of their classes. Personalized learning strategies are treated as a novel teaching method; this is evidenced by the fact that in the United States, only 10% of schools apply personalized learning strategies more effectively (The Christensen Institute, 2020). Schools in Australia experience a similar problem in the bent of instruction to heterogeneous student bodies.

1.2.3 Economic Pressures on Institutions

The way forward in higher education, especially in countries such as the U.S., is still very uncertain, given the exorbitant tuition fees. Such issues of funding in college and university schools due to the overdependence on tuition, which is, in addition, accompanied by the decreased public funding, raise a real question – whether these institutions are sustainable at all. In Australia, government cuts and a high price tag for university education are no exception. Therefore, most of the universities and some colleges have become dependent on the tuition of international students. However, due to the outbreak of COVID-19, there was a dramatic drop in international student enrollment, which lead to severe financial shortfalls for universities (Hurley, 2021).

1.3 Purpose

The education sector faces urgent challenges—educators are overwhelmed, students lack personalized learning experiences, and higher education's economic model is unsustainable. This paper uses case study analysis, data synthesis, predictive modeling, and economic analysis, coupled with a literature review of relevant articles to explore how AI is currently addressing and is expected to solve these systemic problems, transforming the future of education from both global and regional contexts. We will analyze how AI can provide solutions to these problems both on the individual level (teacher, student) and institutional (financial planning, institution) levels.

2. The Educator’s Perspective

Teachers in Australia face a range of challenges, which are quite similar to those encountered by their global counterparts, including high workloads, stress, and burnout. According to the Australian Institute for Teaching and School Leadership (AITSL), as many as 50% of teachers consider leaving the profession within the first five years due to overwhelming stress and inadequate support (AITSL, 2020).

Furthermore, these challenges have been exacerbated by the administrative burdens that increased during the COVID-19 pandemic, which has intensified the pressure on educators (Dabrowski, 2020).

Teacher burnout not only affects educators but also has a direct impact on teaching quality and student outcomes. For instance, a study conducted by Monash University, commissioned by the Australian Education Union (AEU), found that 55% of teachers reported experiencing work-related stress or mental health challenges, which were largely attributed to excessive workloads and behavioral issues in the classroom. Consequently, burnout was seen to diminish teachers' ability to maintain high teaching standards, leading to a decline in student engagement and performance (Australian Education Union, 2021). Moreover, the Black Dog Institute highlighted that burnout could potentially halve the Australian teaching workforce, as nearly half of the surveyed teachers were contemplating leaving the profession due to mental health issues (Black Dog Institute, 2022).

In response to these ongoing challenges, the integration of AI technology is increasingly being adopted in Australian education to help alleviate teacher stress and reduce workloads. Examples of AI applications include:

1. Automated Grading Systems: Universities like the University of Melbourne have implemented AI-driven grading tools that streamline the grading process. This enables teachers to save time and focus on providing more meaningful, personalized feedback to students (AIED, 2021).

2. Lesson Planning Tools: Australian schools have also trialed AI-based tools such as “Wootube,” developed by Eddie Woo, which helps teachers customize lesson plans based on real-time data about student progress. This not only saves time but also ensures that the teaching content is better aligned with student needs (AI in Schools Report, 2022).

3. AI-Powered Administrative Tasks: AI platforms like Compass Education are being used to automate routine tasks, such as attendance tracking and report generation, which significantly reduce teacher workloads (Compass Education, 2021).

2.1 Examples of AI Integration Include

1. Western Australia AI Pilot Program: A $4.7 million AI pilot program was launched by the Australian and Western Australian governments, specifically aimed at reducing teacher workloads across eight schools. Through this program, AI tools were utilized to automate tasks like lesson planning and curriculum alignment, which allowed teachers to dedicate more time to engaging with students. Early results from this pilot suggest improvements in teacher well-being and job satisfaction (Western Australian Government, 2023).

2. AI Tools in Administrative Tasks: The "Real Fast Reports" platform is another example of how AI is being used in Australian schools to automate grading and report writing. Teachers who have adopted this platform report spending significantly less time on administrative tasks, which, in turn, allows them to focus more on one-on-one interactions with students (EdTech Impact, 2022).

Overall, the integration of AI technology in education presents a promising solution to some of the most pressing issues faced by teachers. By automating time-consuming tasks and providing

personalized tools, AI not only reduces the burden on educators but also enhances the quality of teaching, leading to better outcomes for both teachers and students.

3. The Student's Perspective

The Gonski Review highlighted the limitations of standardized, one-size-fits-all models in Australian education, emphasizing the need for more personalized approaches to meet the diverse needs of students (Gonski et al., 2018). In large lecture settings, students often struggle to stay engaged, and the application of theoretical knowledge—particularly in fields such as STEM and business—remains underdeveloped (Hanushek & Woessmann, 2020).

AI technologies are transforming education by enabling personalized learning experiences. Key applications of AI in this context include:

1. **Adaptive learning systems:** Tools like Smart Sparrow, developed in Australia, adjust lesson content in real-time based on student performance. This ensures that lessons are tailored to each student's pace and comprehension level (Deakin University, 2021).
2. **Tailored content delivery:** AI-powered platforms, such as those used at TAFE Queensland, provide personalized learning pathways based on student data. This approach improves both knowledge retention and practical application (TAFE Queensland, 2020).

Globally, educational institutions are increasingly adopting AI-driven adaptive learning systems to enhance student engagement, improve academic outcomes, and streamline teaching processes. These systems use advanced algorithms to analyze student performance data, enabling the creation of personalized learning paths that adapt to individual needs. Across various sectors—higher education, vocational training, and private tutoring—the shared principles of adaptability, real-time feedback, and data-driven customization lie at the core of these technologies. The following case study provides a better illustration.

3.1 Personalization and Adaptability

A key advantage of AI-driven systems is their ability to offer personalized learning experiences tailored to the unique needs of each student. For example, the University of Sydney has implemented adaptive AI systems in business courses that analyze real-time performance data, creating customized learning paths. This initiative led to a 15% improvement in student retention, a clear sign of increased engagement and satisfaction. Similarly, Tsinghua University's Rain Classroom in China adapts course content based on student participation and progress, resulting in a 30% rise in engagement during online and hybrid classes. Both examples highlight how adaptive systems make learning more accessible by customizing educational content to meet individual needs.

3.2 Real-Time Feedback

Another fundamental feature of these AI systems is the provision of real-time feedback, which allows for immediate adjustments to the learning process. Victoria University and Arizona State University (ASU) have both integrated AI tools that provide ongoing feedback, helping educators quickly identify

and address learning gaps. For instance, ASU's collaboration with Smart Sparrow significantly increased pass rates and reduced dropout rates, particularly benefiting students from underserved backgrounds. The ability to provide immediate, personalized feedback not only keeps students engaged but also allows for timely interventions that improve learning outcomes.

3.3 Data-Driven Insights

A core strength of adaptive learning systems is their reliance on data analytics, which offers deep insights into student performance and behavior. Institutions like California State University (CSU) and TAFE Queensland use AI tools that continuously analyze student data, tailoring course content to individual learning needs. This data-driven approach helps educators identify patterns, predict potential dropout risks, and intervene early to improve retention. Additionally, by automating routine tasks, these systems alleviate the administrative burden on educators, allowing them to focus more on meaningful student interactions.

3.4 Scalability and Efficiency

AI-driven adaptive learning platforms also demonstrate scalability and efficiency, making them effective even in large or resource-intensive educational environments. For example, TAL Education Group in China efficiently uses AI to provide personalized tutoring to millions of students, resulting in measurable improvements in academic performance, particularly in subjects like math and science. Similarly, Knewton's adaptive platform at CSU helps students tackle traditionally challenging subjects, such as mathematics, by tailoring content to their individual levels of understanding. These examples illustrate that AI can deliver personalized education on a large scale, ensuring that diverse student populations receive individualized support without overwhelming institutional resources.

The widespread adoption of AI-driven adaptive learning systems underscores a shared commitment among educational institutions to improve learning outcomes through personalization, real-time feedback, and data analytics. By customizing content to individual needs, these systems enhance student engagement, boost retention, and improve academic performance. Furthermore, they streamline educational processes by automating tasks, reducing the workload on educators, and enabling efficient management of resources. As these technologies continue to advance, they promise a more inclusive, personalized, and adaptive future in education, addressing long-standing challenges and catering to the diverse needs of learners in an evolving educational landscape.

Research from the Australian Council for Educational Research (ACER) reveals that AI-driven learning systems have resulted in a 20% boost in student motivation and a 10% increase in grades across numerous schools in Australia. Similarly, a report by the McKinsey Global Institute indicates that AI-based personalized learning can enhance student performance by up to 30%, particularly in STEM disciplines (McKinsey Global Institute, 2020). These systems have shown significant benefits in both China and the United States. For example, at Tsinghua University, the Rain Classroom platform has driven a 30% rise in student participation and a 12-15% improvement in test scores, positively impacting over 50,000 students. In the U.S., Arizona State University's collaboration with Smart

Sparrow resulted in a 22% increase in pass rates and a 45% reduction in dropout rates in STEM courses, especially benefiting underserved students. Likewise, China's TAL Education Group reported a 10-15% improvement in test scores among millions of students using their AI-driven tutoring system, proving its scalability and effectiveness. At California State University, the use of Knewton helped raise course completion rates by 12%, particularly in high-failure subjects like mathematics. Overall, research suggests that AI-driven adaptive learning technologies can enhance retention by 25-30% and improve learning outcomes by 15-20%, enabling students to complete courses 20% faster. By personalizing the learning experience, these systems are effectively addressing educational inequalities, offering tailored support to students in need, and making education more efficient and accessible.

4. Economic and Commercial Sustainability

AI brings several economic benefits to the education industry. With AI technology, it can be used to predict the analysis of the resources usage prototype of the university, to make a better schedule on how to make a reasonable usage of the various teaching equipment with good maintenance and utilization. As regards reducing operational costs, AI can predict the necessity for facilities and resources, it can optimize the use of schedules to lessen unused time by analyzing past data. AI systems can automatically arrange classes and events, to ensure the use of the equipment efficiently. Moreover, AI can manage energy to stay up-to-date, so it can adjust heating, cooling, and lighting to deduct utility costs.

Regarding AI financial planning, AI can optimize the staff from both the capacity for physical labor and an automated management system to grade, schedule, and communicate. As AI in financial planning, it can manage the budget efficiently using both data-driven and scenario-planning insights by analyzing the data in the past to foretell the financial status in the future to make informed decisions. It can be discussed from the perspective of cost control, which involves expense tracking and allocating resources. When an unexpected expense happens, scenario planning will help users assess the budget boundary make informed decisions and suggest an alternative strategy through continuous monitoring of spending models.

According to news reported by (Microsoft News Center, 2020), one notorious case is the University of Sydney, the AI was implemented as AI-driven chat-bots for students to inquiry. The way helps the university to reduce the administrative workload and respond in time significantly.

The chatbot of the University of Sydney, "Ask Sydney" was launched in 2020. It handled between 200 and 400 individual student inquiries daily for the first year which led to a reduction in staff workload. This gives the staff a chance to concentrate on more complicated student issues. The success of the chatbot showed that it saved the cost of administrative tasks and improved the satisfaction rates of students. Besides dealing with inquiries, the chatbot has scheduled academic support services with streamlined appointments, cutting time wasted on administrative tasks. In terms of economic sustainability, AI will ensure the financial practices to support long-term growth without impoverishing

resources. It involves efficient resource usage promotion, renewable technologies investment, and job creation innovation.

5. Analysis of Existing AI-Based Case Studies

5.1 Introduction to AI-Based Case Studies

In the existing analysis of AI-based case studies, IBM Watson Education applies AI to tailor personal learning experiences in the year of 2016. Project Members are partnered with different K-12 schools and districts across the U.S. The Characteristics of the project are personalized, data analysis, interaction learning, and solution in a scale. Right now, IBM Watson Education enlarged its initiatives and offers a wide range of education institutions, focused on educational outcomes and accessibility improvement.

Carnegie Learning's MATHia tutors the software to alter the learning pace of each student in the early 2000s. The characteristics of the project offered tailored learning with a customized pace and tools for interaction. It is being widely used across considerable schools, reached out to lots of students, and is suited for various learning environments in a continuous way for enhancing its capabilities.

5.2 Comparison of Traditional vs. AI-Enhanced Models (Teachers)

According to the research made by (Sun & Song, 2023), it aims to examine the data analytic and artificial intelligence (AI) on the performance of teachers in the education system of China. In the research, the main purpose of this research is to prove how technology has the potential impact on teachers' performance meanwhile investigating how the data accuracy function and the technology function in the process. Once the ramifications are understood by teachers, these insights will help them to better lead professional development, with skills they can appropriately use the power of AI to improve the education quality through modifying the curricula to reduce the workload and stress.

Figure 1. Conceptual Framework

H1	Usage of Big Data Analytic & Teacher Performance
H2	Usage of Big Data Analytic & Teacher Performance
H3	Usage of Big Data Analytic
H4	Adoption of Artificial Intelligence
H5	Teacher Performance
H6	Data Accuracy
H7	Data Accuracy
H8	Technological Literacy
H9	Technological Literacy

From Figure 1 above, it can be seen that there are 9 hypotheses.

Hypothesize 1 The application of big data analysis has a substantial and affirmative effect on the performance of teachers.

Hypothesize 2: The adoption of AI has a substantial and affirmative effect on teacher performance.

Hypothesize 3 The application of big data analysis has a substantial and affirmative effect on the accuracy of data.

Hypothesize 4 The adoption of AI has a substantial and affirmative impact on the accuracy of data.

Hypothesize 5: The accuracy of data has a substantial and affirmative impact on the performance of teachers.

Hypothesize 6: The accuracy of data interceding the correlation between the big data analysis and teacher performance.

Hypothesize 7 The accuracy of data interceding the correlation between AI adoption and teacher performance.

Hypothesize 8: Technology literacy interceding the correlation between data analytic usage and teacher performance.

Hypothesize 9: Technology literacy interceding the correlation between AI adoption and teacher performance.

Based on a quantitative methodology, the cross-sectional survey uses the context of Chinese instructors from various elementary and secondary schools. With a sample size of 900 individuals, the Morgan and Krejcie was used, actual diverse 750 surveys were gathered, which offers fresh insights. The subjects were delivered the independent questionnaires via email and online platforms. Descriptive statistics contains frequencies, percentages, means, and standard deviations, to obtain the demographics of the subject and its related survey items. The research hypotheses were verified through inferential statistical techniques.

The study implies that the need for teacher professional development strengthens that a reasonable application of big data analysis and AI promotes the educational institutions to focus on training programs for teachers to search and utilize the potential technology to improve their teaching quality. Another implication relates to the development of data infrastructure, the education institutions via accurate and trustworthy data to allocate the resources and prioritize the accurate and safeguarding measures, to enhance instructed strategies and student outcomes.

Table 1. Demographic Profile of Respondents

Demographic Variable		Frequency	Percentage
Age	18-25 years	150	20.00%
	26-35 years	200	26.67%
	36-45 years	180	24.00%
	45-55 years	120	16.00%

	56+ years	100	13.33%
Genger	Male	350	46.67%
	Female	400	53.33%
Years of Teaching Experience	Less than 1 year	50	6.67%
	1-5 years	180	24.00%
	6-10 years	220	29.33%
	11-15 years	150	20.00%
	16+ years	150	20.00%
Education Level	High School Diploma	40	5.33%
	Associate's Degree	100	13.33%
	Bachelor's Degree	280	37.33%
	Master's Degree	270	36.00%
	Doctoral Degree	60	8.00%
Teaching Level	Elementary School	170	22.67%
	Middle School	180	24.00%
	High School	160	21.33%
	College/University	240	32.00%
Subject Area	Mathematics	140	18.67%
	Science	170	22.67%
	Humanities	120	16.00%
	Arts	110	14.76%
	Social Science	130	17.33%
	Other	80	10.67%
Comfort Level with Technology	Very Comfortable	240	32.00%
	Comfortable	260	34.67%
	Neutral	120	16.00%
	Uncomfortable	100	13.33%
	Very Uncomfortable	30	4.00%

Table 1 shows a specific decomposed of 750 subjects who are taking part in the study. The age of the subjects mainly includes the age between 26 and 35, accounting for 26.76%. The classification of working experience of the subjects is 6-10 years, accounting for 29.33%. The most popular degrees mastered by subjects were mainly Bachelor's and Master's degrees, accounting for 37.33%. The teaching level is mainly college and university, accounting for 32.00%. The subject area is widely

arranged with mathematics, Science, Humanities, Arts, Social Science, and others. The majority (34.67%) of the subjects reported that they feel to some extent comfortable when using technology.

Table 6. Regression Analysis

Hypothesis	Relation	Beta	T value	P value	Decision
H1	UBDA->TP	0.738	9.875	0.001	Accepted
H2	AAI->TP	0.239	3.482	0.001	Accepted
H3	UBDA->DA	0.522	6.877	0.001	Accepted
H4	AAI->DA	0.111	2.009	0.046	Accepted
H5	DA->TP	0.179	3.120	0.002	Accepted

From Figure 6, it can be seen that with regression analysis, 5 hypotheses were accepted, which means there is a substantial and affirmative correlation relationship between big data usage and teacher performance.

The study of the whole process explains what samples are used in the entire data, research methods, how to make assumptions, and how to test the authenticity of assumptions through data, to draw a conclusion that the use of AI is positively related to the teacher's teaching performance. The use of AI has improved teachers' teaching quality and teaching performance. This indirectly improves teachers' satisfaction with teaching work, reduces work pressure, and reduces turnover rate.

5.3 Comparison of Traditional vs. AI-Enhanced Models (Students)

Under research made by (Bhutoria, 2022), the trend of the United States, China, and India as three EdTech (Education Technology) leaders dominated the competition in the world was discussed. All of them now are concentrated on designing a product that will cater to the personalized agenda with the integration of AI. 'A Human-In-The-Loop (HITL)' model was used in the systematic method (Fig. A1) to review via a series of formulated questions and quote the data to extract and analyze the data, to conclude the result with inclusion criteria and exclusion criteria.

Figure A1. Steps Followed for the Systematic Review

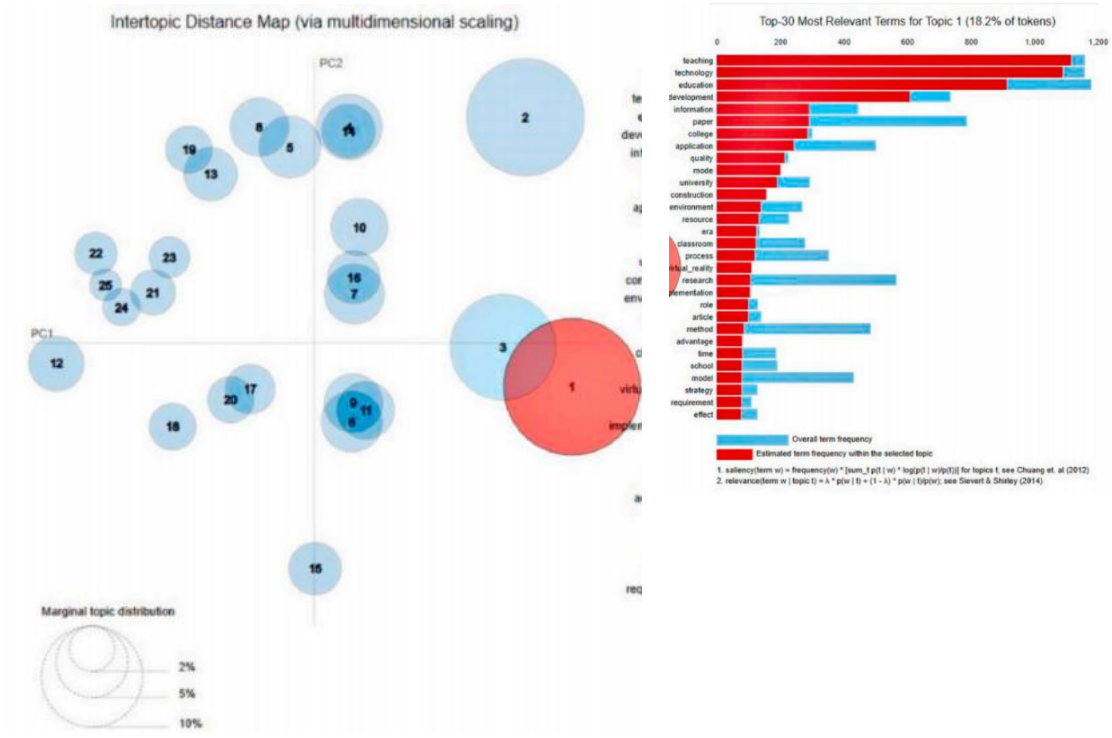
Process	Outcome	No. Of Papers
Definition: Review, Scope, Keyword, Research Question	Scope finalization	
Search for Papers from the digital library IEEE Xplore	Aggregate Papers	2067
Removing duplicate documents	Set of papers on which the LDA has to be run	1709
Building LDA model for topic	Set of papers belonging to 3	999

modelling	relevant topics	
Building LDA model for subtopic modelling from 3 topics	List of relevant papers for subtopic modelling	353
Reading Abstracts	Set of papers explicitly on education AI, personalization read in full	30

In terms of analysis, there is a process of searching and extraction of data. Using the keywords such as "Education", "Learning", "Teaching" and "AI" or the location ("China", "USA" AND "India"). There were 2067 journal articles related to the topic being searched from IEEE Xplore. (Figure 1)

Figure 1. Topic Modelling using LDA (Latent Dirichlet Allocation): Snapshot of the Model Results

Inter-topic Distance Map (via multidimensional Scaling)	Top-30 Most Relevant Terms for Topic 1 (18.2% of tokens)

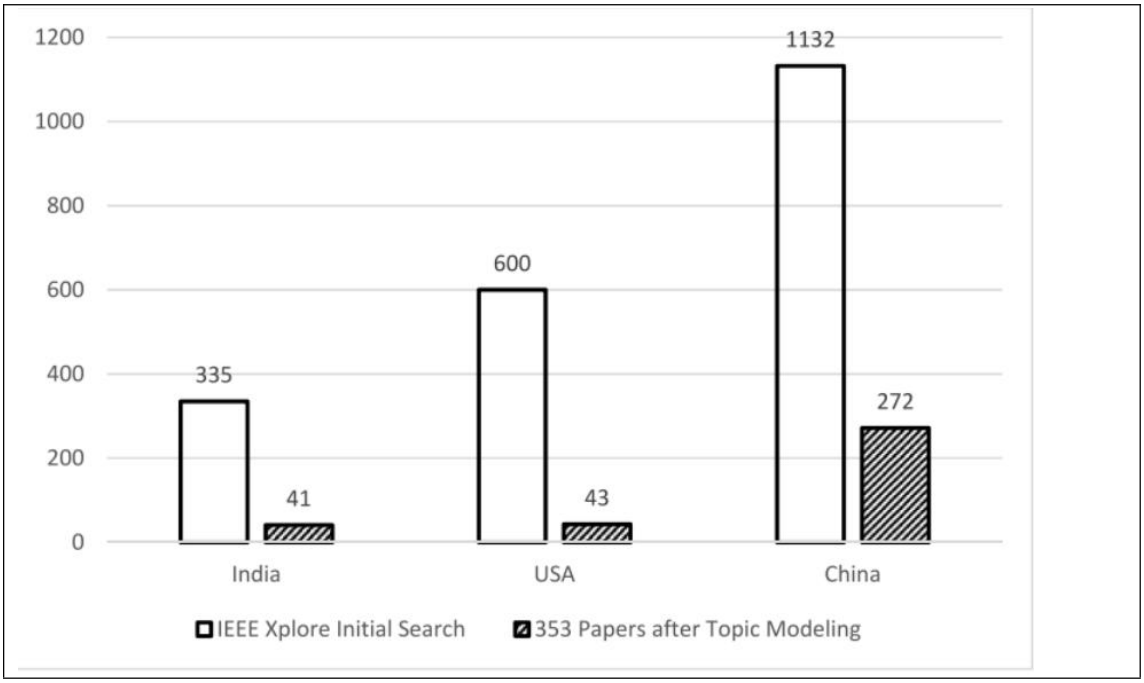


Then "Natural Language Processing (NLP)" as topic modeling was employed based on a hierarchical Bayesian analysis. The essence of topic modeling is to recognize a variety of words and conclude a

particular topic. The LDA (Latent Dirichlet Allocation) modeling document collection was the most commonly used with automatic probabilistic method.

From the picture shown, on the top right, it can be seen that the red stands for the estimated term with the selected topic and its frequency. The blue area stands for the overall term frequency. There was a total of 30 topics that were most relevant terms for Topic 1 (18.2% of tokens). The keywords of 'teaching', 'technology', 'education', and 'development' are among the top list in the keywords list, then following various kinds of related keywords. On the top left, from the inter-topic Distance Map (via multidimensional scaling), the obvious one was topic 1 (teaching)in red circles around 10% margin.

Figure 2. Distribution of Papers among Three Countries



The samples are coming from three different areas: India, the USA, and China. On IEEE Xplore initial search respectively India 335, USA 600, China 1132. On 353 Papers after Topic Modeling, India 41, USA 43 and 272 China. (Figure 2)

From the data analysis above, it can be concluded that AI was being found that it offered the chance for the students to be self-motivated. Through exploration and discovery all by themselves, the student can participate in the learning process and adapt to the pace of themselves which will make the study experience more engaging. Then further it will avoid the failure of dropout.

AI as a personalized education system provides an inclusive platform for all kinds of learners. The design of the system caters to the particular needs of each individual via the customized materials and learning ability of each of them. Each individual is unique one with various levels of skills and knowledge. As the system pushes toward customization and overall efficiency. Integration of each

learning style, and learning habits, even the average student can do better to be excellent when empowering the AI technology.

Furthermore, customized learning paths can make the student more engaged and committed, through prediction of data analysis, AI can make out the risk of disengagement and suggest proactive measures to the students to avoid wastage rate. Meanwhile, students' well-being and emotions can be monitored through indicators, to give the student social and emotional support.

5.4 Comparison of Traditional vs. AI-Enhanced Models (Economic Sustainability)

As per research made by (Visconti et al., 2023), the analysis of the effectiveness of artificial intelligence on the EBITDA (particularly on cash flow) of the company of both financial and economic margin through enhancing revenues and lessening the running expense.

Fig. 2 Value-Creating Patterns Ignited by AI. Circular Process: AI Creates Incentive for Stakeholders and then Positive Impact on EBITDA

1. .(Positive) impact of AI adoption on
   .a) EBITDA
   .b) digital networks mastered by bridging platforms
2. Improved market value of the firm inertial real option value
3. Partitioning among the stakeholders of the value “pie”
4. Incentive for the stakeholders to co-create value

From Fig.1, it can be seen that there is a value chain created by AI. Firstly, EBITDA and digital networks were impacted positively by the adoption of AI. Secondly, the market value of the company was improved through inertial real option value. Thirdly, the value was divided among the stakeholders. Fourthly, the motivation for the stakeholders to create value together.

Table 1. Cash Flow Statement and Link with the Cost of Capital

Sales (monetary revenues)
-OPEX
=EBITDA (A)
±▲ Operating Net Working Capital

±▲ fixed assets (CAPEX)		
=Operating cash flow (unlevered cash flow to the firm-FCFF)(B)		To be discounted at the Weighted average cost of capital (WACC)
-Financial charges	debt	
±▲ net financial liabilities	service/bank-ability	
± Extraordinary income and charges		To be discounted at the cost of equity (Ke)
-Taxes		
±▲ Equity		
= Net (free) cash flow to the shareholders (levered cash flow-FCFE)(C)		

From Table 1, it can be seen that the cash flow statement of the value chain is linked with the cost of capital. EBITDA is the beginning parameter for evaluating the market value of the company. (A) Discounted cash flows (DCF) (B) Market multipliers. Once the present value of the cash flows has been decided, the market value of the company can be calculated.

Table 2. EBITDA Determination

Income statement (input data)	Impact of AI
Monetary revenues (Sales)	AI improves sales (new AI-based products and markets; new clients with customer segmentation and service analytic, etc.)
-Monetary OPEX	AI improves the supply chain efficiency, optimizing the service operations, and reducing the OPEX
=EBITDA	EBITDA improves

From Table 2, when the data was put in the income statement, sales minus operating expense, the EBITDA can be determined.

Table 3 Impact of AI on the company's key parameters

Sensitivity analysis			
	AI intervention		
	Base Case	**Sales +5% Opex -5%**	**Sales +10% Opex -10%**
Average sales t1-3	€1,21,36,667	€1,33,11,250	€1,45,60,000
Average Opex t1-t3	€97,09,333	€88,27,000	€80,00,000
Average EBITDA t1-13	€24,27,333	€44,84,250	€65,60,000
Avergae net result t1-t3	€13,18,203	€27,70,397	€42,35,000
Avergae net financial position t1-13	€1,99,549	€22,04,533	€42,20,977
Average equity t1-t3	€54,48,563	€77,91,670	€1,01,49,333
Equity value (DCF)	€185,99,227	€3,64,11,256	€5,43,76,197
Equity value (multiples)	€1,78,06,273	€3,45,90,713	€5,15,28,833
Enterprise value (DCF)	€2,05,99,994	€3,84,12,023	€5,63,76,964
Enterprise value (multiples)	€1,98,07,040	€3,65,91,480	€5,35,29,600

From Table 3, it can be seen when AI intervened, the average sales increased by 5%, and the average operating expense decreased by 5%, €1,33,11,250 and €88,27,000 respectively, and the average EBITDA €44,84,250. The average sales increased by 10% and the average operating expense decreased by 10%, €1,45,60,000 and €80,00,000 respectively, and the average EBITDA was €65,60,000. From the sensitive analysis, the impact of AI on the company's key parameters was positively correlated.

6. Data-Based Recommendations for Future AI Education Reforms

6.1 Case Review

In terms of teachers' stress management, the corresponding data from the two studies show that teachers' satisfaction has actually improved. Through the disclosure of the project research content, it is known that the current achievements are attributed to the intervention of AI in administration and student management, such as academic performance or behavior, but there is no action to involve AI in teaching methods to reduce the huge workload of educators. Compared with the products of image design AI, such as Mid-Journey, which greatly improves designers' drawing efficiency and reduces their work pressure, the "intervention" of AI in the current "teacher position" appears to be relatively weak. For example, there is no evidence that the reduction of administrative work has the opportunity to alleviate the "brutal" situation in higher education where one professor is responsible for more than

100 students.

At the angle of profits and performance, the information from the two studies concluded that a common current situation in the education industry is to use AI as a tool to control or reduce operating costs generated in the education process. They increase profits through resource integration or optimization, but there is no evidence or case that educational institutions have or attempt to increase profits through structural business model reform or increasing profit channels outside the traditional model, such as deriving profit models other than tuition fees. The current development trend inevitably leads to two concerns: 1. The development of AI in the education sector only plays the role of adding an "equipment", just like the development of a 5-seater vehicle into a 7-seater, increasing the number of passengers. But it has not achieved to a milestone like the transformation of gasoline cars into electric cars, let alone driverless technology. 2. Further development to increase profits by streamlining costs and integrating resources carries the risk of significantly increasing the unemployment rate in the education industry in the future. At the same time, this development trend does not provide evidence that the new kind of jobs created by the development of AI will be provided to balance the unemployment rate even if the unemployment rate is likely to increase.

From the perspective of student individualization, there has been a major breakthrough. Such achievement can be made theoretically, and by data-based on students' behaviors, preferences, habits, strengths and weaknesses, which are ignored by traditional education. It is worth noting that traditional education only improves when (students') problems occur, while AI predicts the occurrence of problems and adjusts by providing diagnosis and solutions. This kind of data analysis and predictive behavior has been proven feasible in more complex scientific research fields. Although there is no doubt about the professionalism of AI in various fields - it can provide data-driven insights, currently AI training is all about data analysis, and the lack of participation of industry experts may limit the ability to operate more sophisticated teaching behaviors. For example, students are not easily captured by AI when they face certain emotional challenges that are more easily achieved by human teachers. Secondly, what is worthier of mention is the "the Needed Training Period" - neither set of experiments mentioned the time required to obtain student behavior data for effective personalized education. This is generally considered to be partly dependent on the time, activity and effective interaction of the participants (i.e. students) spent in the AI. At present, it seems that the situation is uncontrollable. In other words, the personalized learning operated in the current form might be more suitable for some vocational education (such as the example of TAFE in Queensland) and institutions who are aim at "long-term education", such as, the long-term cultivation of courses including science or second language acquisition for primary school learners. However, practically, it may not be completely suitable for higher education. For instance, learners in higher education institutions are told to complete 4-5 required courses in 90 days.

6.2 The Possible Education Revolution

Simply optimizing certain algorithms, for example, cannot fundamentally change these

long-established "stubborn diseases" in the education sector. For example, the stereotype of traditional education, such as studying business, must require compulsory sources such as finance, accounting, and management. As long as it is not subverted, personalized education will not be truly realized. In other words, to solve these problems, the education industry needs a revolution.

Though out the history, the Industrial Revolution is considered as a "revolution" because when machines replaced workers in handicraft categories, new types of work were born — skilled workers who use and operate machines, rather than simply for traditional handicraft workers, such as, the tailor gets a sharper pair of scissors. From this definition, we can know that two essential factors are needed to meet the "revolution": 1. Changes in the education model; 2. The birth of new types of work.

Take higher education as an example. In colleges and universities in the AI era, a "discipline" should be a "Lego brick" that allows for disassembly and free combination. Assuming that the framework has been set in the early stages of study, then its "possibilities", that is, its personality and human creativity, will be limited. For example, if architecture students are always told that buildings must be rectangular or square, then designing a building to be circular would be just a "black swan idea." The combination of professional courses chosen depends on the student's interests, that is, what kind of persons he wants to be in the future. For example, student A hopes to establish an English education company after graduation, and he believes that to engage in a certain industry, one must understand the operation of the core tasks of the industry. Therefore, student A can choose to study pedagogy (understanding the structure of education and teaching techniques, etc.), educational psychology (understanding the psychological factors that affect learning), and sociology (understanding the social system of the target group to study the learners' problems arising from the social system and Learning habits), second language acquisition in linguistics (understanding the factors that affect language learning, including phonemes and grammar, etc.), neurology of language (if student A hopes to find a breakthrough in educational methods from brain movements, this is also an option for him scope), management (understanding how to operate and manage a business), market strategy (understanding how to set strategies based on industry characteristics or find strategic characteristics that can be used as differentiation for your own company), finance (understanding accounting-related financial knowledge). What AI needs to do is to provide different combination possibilities according to the needs of students and each possibility needs to predict its executability.

At the same time, higher education should no longer set age barriers for learners. For example, some majors, such as law, require students to complete university general education courses and only allow further study at the graduate level. Because AI can track students' learning behaviours, such as frequent mistakes or ignoring certain points, to predict whether students need additional assistance, adjust difficulty or change education methods (for instance, some students like theoretical courses based on textual materials, and some prefer video or case studies). Conversely, if the student is deemed capable of handling the challenge, the level of difficulty increases. In other words, as long as students physically meet the study conditions for higher education, they can be considered for admission to

higher education institutions.

Before higher education, the education students participate in should focus on three directions: interest, “maximization” and general knowledge. Regarding interest, without excessive description, this is the literal meaning of popular meaning. “Maximization” refers to the learning items that are most easily acquired under the conditions created physiologically at a certain age. For example, in second language acquisition, students in the critical period can easily achieve bilingual that are more difficult to be in adulthood. General subjects are also the basic theories of various subjects understood in the traditional sense. After all, from the perspective of interest, learners need to be exposed to basic theories to judge whether they are interested. Different from the traditional meaning, AI needs to be considered. This is not limited to how to use AI, but also includes ethics and, more importantly, critical thinking. For example, after you make a choice of university subject based on your career plan, assuming that the AI prediction tells you that this path has a low fit with market demand, would you just give up without thinking about it? In this revolution, the responsibilities of educators will also undergo tremendous changes.

Trained professional educators: This type of educator is mainly responsible for educational research and training AI models. The essential purpose of participating in the teaching is only to obtain practical data to optimize the system model. The training of AI is to shorten the time for AI to obtain the optimal education method through the learner's behavioural habits and to reduce the probability of AI misjudgement. At the same time, this position also requires correction of student behaviour data and judgments provided by AI to avoid AI's "illusion". For example, AI can analyze students' oral or written answers to open questions through Natural Language Processing (NLP) to analyze the depth of students' understanding of a certain knowledge. However, without professional training in AI, it is easy for AI to create illusions to mistakenly believe that learners simply using a large number of "textbook theories" are already an elite in the industry.

This type of educator can be an academic staff employed by an institution or a college, a researcher in a laboratory, or a practitioner working in a related field, or some organizations that were born due to the AI education reform and are specifically focused on education, scientific research and AI training.

Accompanying educator: This type of role is mainly about teaching and accompanying. They do not need to spend a lot of time on traditional lesson preparation work and they only need to make the quality of a course more in-depth and practical through interaction with AI when AI lectures. In other words, their lesson preparation is also centred around this purpose. For example, AI can be used to conduct group previews of previous classroom data and students' performance, and based on the results of these data, the points and directions to be deepened and explained in detail in the classroom can be judged. At the same time, since AI cannot capture learners’ expressions and emotional fluctuations to determine the actual learning challenges of students, accompanying educators can serve as the “eyes” of AI. However, accompanying educators need to be familiar with the functions of using the developed AI, for example, using AI to preview the experimental results based on a student's answer in a physics

class. The teachers do not need to conduct separate assessments of homework; however, they need to conduct data reviews based on AI's assessment of students and AI's adjustments to students' education plans to determine whether human intervention is needed. Interventions can be in the form of office hours or tutorials. The errors in these data also need to be recorded and fed back for system optimization.

Accompanying educators can be teachers employed by schools, students with excellent academic performance in senior grades, or practitioners with rich industry experience. They can also be companies born out of the AI education reform that specialize in educational companionship.

Creative educators with materials and educational methods: AI learning is not limited to data analysis and training, but also the accumulation and learning of knowledge bases based on natural language. These knowledge bases can be textual knowledge, audio and video files, or educational methods proved through academic research.

This type of educator is not limited by background or status.

From an educator's perspective, such educational reforms and prospects are likely to reduce the pressure on today's teachers. This is reflected in the fact that AI not only takes over some of the existing teachers' tasks, such as lesson planning, assessment and even teaching, but also the work of educators is further subdivided to avoid overlapping responsibilities of multiple positions. At the same time, non-traditional educators in professional fields can also get involved in the education industry. In other words, the situation of one teacher corresponding to hundreds of students will be alleviated. The opportunity to choose is the foundation of personalized education, and this opportunity cannot be limited by the current "template" education model. On the contrary, it should be an incubator for "talents" that are completely different from others." Educational reforms involving AI will end the era of "assembly-line products" produced by traditional education. The business model of education will also be changed. Talents from non-traditional education industries are allowed to enter the education market, and tuition fees will not be the only one, and may not even be the profit model — these talents will create more diversified business models.

6.3 The Possible Challenges

However, AI education revolution will inevitably create practical and ethical challenges.

Data privacy: AI will collect a large amount of sensitive data, such as students' grades, behaviour patterns and preferences. Especially with the further development of AI, it is inevitable that groups of students include minors. However, how to ensure the privacy and security of this data is particularly important.

Illusions and biases in algorithms: Artificial intelligence systems must undergo rigorous training to avoid frequent hallucinations that may be counterproductive or even strengthen biases. This bias is acquired because the trainer wants to see certain data while guiding the learner through AI. If AI is trained on the basis of bias, it may provide unequal educational opportunities to different learning groups. For example, a university conducts introductory training in order to increase the enrolment rate

of a certain course; a researcher conducts introductory training in order to increase the profits of a content manufacturer with which he has an interest. How to reduce and control these artificial illusions and prejudices is a concern.

Intellectual property rights: Soft works are usually difficult to effectively protect their property rights. How to protect the fairness of the interests of knowledge creators is the core and challenge of the development of AI education.

Unemployment rate and new occupations: AI will lower the barriers to entry for education to a great extent, which means that people outside the education industry will be one of members in this industry to compete with those within the industry. At the same time, how to set salaries in new professions and protect the right of the existing, how to protect the interests of educators with different responsibilities, and how to implement efficient vocational training are the key to this challenge.

Subversion of education models and government policies: Under the educational transformation of AI, higher education or vocational education may advance. In this case, does it mean that the government needs to change the existing offer of time for compulsory education? Extend or shorten? On this basis, will educational institutions that receive government funding need to change how and how much they charge tuition? Increase or decrease? Are graduation certificates and related technical certificates still important criteria for judging whether students are strong enough to enter society? Can today's training institutions with school qualifications jump to become educational units of peer universities? All of these are considered challenges that the education industry and the government need to calculate in the development and reform of AI.

7. Conclusion

The opportunity for any revolution is the interaction of multiple factors. The education revolution led by AI is more likely to occur in developed countries. The first factor is closely related to education level. In the past 50 years, driven by factors such as global integration, economic development, and government policies, the average educational level in the United Kingdom, the United States, Australia, Canada, and Europe has increased significantly.

1. United States: In the 1970s, the average years of schooling were around 11 years, and by recent estimates, this has increased to over 13 years. The proportion of the population holding a bachelor’s degree has also grown to about 40% as of 2020.

2. United Kingdom: The U.K. has followed a similar trajectory, with average years of schooling rising from approximately 10 years in the 1970s to over 13 years today. The higher education attainment rate has steadily increased, with around 50% of the population now holding higher education qualifications.

3. Australia and Canada: Both countries have seen a consistent rise in education levels, with average years of schooling increasing to over 12-13 years. Higher education completion rates are similarly high, with both countries reporting around 40-50% of the adult population having completed post-secondary education.

4. Europe: European countries vary, but in general, Western and Northern Europe have some of the highest educational attainment levels. For instance, Germany, Sweden, and the Netherlands all boast averages of 12-14 years of schooling, and significant proportions of their populations hold higher education degrees.

However this does not mean that there are no opportunities for education reform in developing countries. For example, China has seen the most dramatic rise in educational attainment. In the 1970s, the average schooling years were around 4-5 years, but due to substantial investments in education, this number has risen to approximately 9-10 years by 2020, with a growing percentage of the population attaining tertiary education, particularly in urban areas.

The increase in average educational level patterns during the agricultural revolution in Britain in the 18th century increased food production, promoted population growth and urbanization, provided a labor force, and laid the foundation for the Industrial Revolution.

Secondly, the rapid development of AI technology that can be applied in the field of education, such as data collection and analysis, predictive capabilities, and adaptive systems. These technologies have been proven to effectively improve the quality of education and reduce operating costs.

The opportunity of rigid demand is an indispensable factor. Pressure from faculty, stereotyped education, and single business models all scream for revolution. To explain further, taking the business model as an example, educational institutions have been operating heavily on tuition fees and government subsidies for 40-50 years. For example, after the GI Bill, especially starting in the 1980s, public universities in the United States turned to tuition fees as their basic funding due to reductions in government funding. This trend began to intensify in the early 2000s as government subsidies failed to keep up with the cost of education. Although other profit models have subsequently been generated and promoted expansion, such as online courses on the cooperation of MOOC platforms and universities, corporate partnerships, individual donations, programs for vocational education, and some entrepreneurial incubation systems, they only supplement but cannot replace them.

To sum up, in other words, in today's economic system, it is obvious to the naked eye that the greater demand for improving education cannot be met by the conservative education system, and the development of AI has accelerated the possibility of change. Next, it depends on which government takes the first step to introduce stimulus policies to promote the revolution.

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