



## “Universities Devoid of Teaching Staff” Can AI Replace the Role of Professors in the Near Future?

**Dr. Sherif M. Hamdy**

Pharaohs-Higher Institute for Computer  
Information Systems & Management, Giza, Egypt  
Sherifhamdy@yahoo.com

**Dr. Zeinab Abbas Zaazou**

Modern Sciences & Arts University (MSA)  
Cairo, Egypt  
zabbas@msa.edu.eg

### Abstract

*Artificial Intelligence is rapidly expanding and has the potential to transform all aspects of our social interactions. In the education sector, AI is beginning to create new teaching and learning tools, which are currently being tested in various environments. This paper, intended for education policymakers, explores the impact of AI on education to help guide informed and suitable policy decisions.*

*This study is investigating the impact of Artificial Intelligence in the coming decades, focusing on how this evolving technology will reshape and challenge our academic institutions. This study is also predicting the possibility of replacing university professors in the near future with artificial intelligence programs. The researchers developed a set of different scenarios that oscillate the predicted percentage of replacement over fifty years. The pessimistic scenario predicts a replacement annual rate of 2% for university professors around the world with Artificial Intelligence (AI) programs. The moderate scenario predicts a replacement rate of 1%, and the optimistic scenario predicts a replacement rate of 0.5%. The researchers also came up with a mathematical formulation using Gaussian distribution function to obtain the normal distribution of the estimated replacing curve and parameters. Finally, they developed an action plan of 10 steps presenting implications for the rational use of technology and the synergy between skilled and well-trained man-power and AI programs in the educational sector.*

**Keywords:** Artificial Intelligence (AI), Gaussian Distribution Function, Man-Power, Mathematical Formulation, Rate of Replacement.

### Introduction

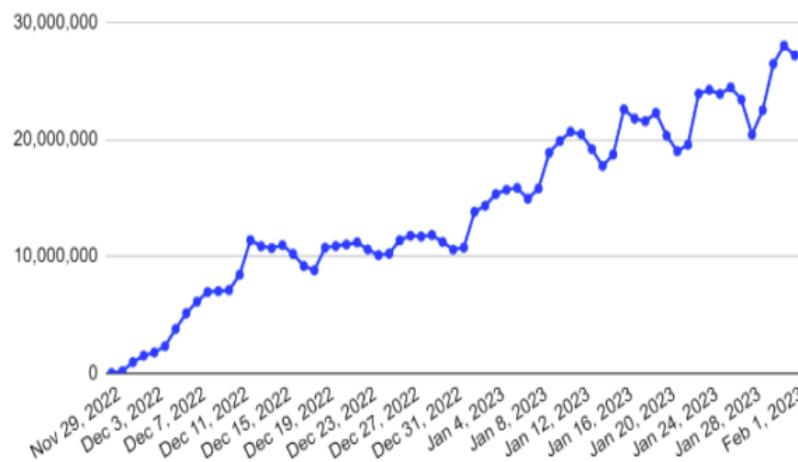
Artificial Intelligence (AI) is one of the most powerful technologies of our era. (AI) is increasingly used in our daily lives and covers a wide range of application areas. This growing use is driven by machine learning, computer modeling, and algorithm creation supported by massive data sets (Khare et al., 2018), but as artificial intelligence becomes more prevalent in all aspects of human activity, this use is also becoming more widespread. Effectively implement specific AI responses. Some countries such as France, Australia, Estonia, South Korea, China, and the United States have even issued national artificial intelligence strategies (UNESCO, 2019).

It's important to pinpoint that Chat GPT is one of an (AI) tools that gained a million users in less than five days and hit 100 million users two months after its launch in 2022, setting a record as the fastest-growing consumer app. It is characterized by the ability to understand complex and diverse human language and to create rich and organized human language (Lim et al., 2023). The following figure is presenting Chat GPT growth rate from Nov. 2022 till Feb. 2023. This is an indicator of the growth rate of AI in the near coming future.

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Rapid technological change, especially in the digital age, is continually widening the gap between the current and expected knowledge and skill levels of human workers. However, failure to keep up with the required levels of knowledge and skills can create a large gap between actual and desired levels of human competitiveness. Furthermore, adapting to technological changes is a major challenge today (Arslan et al., 2021).

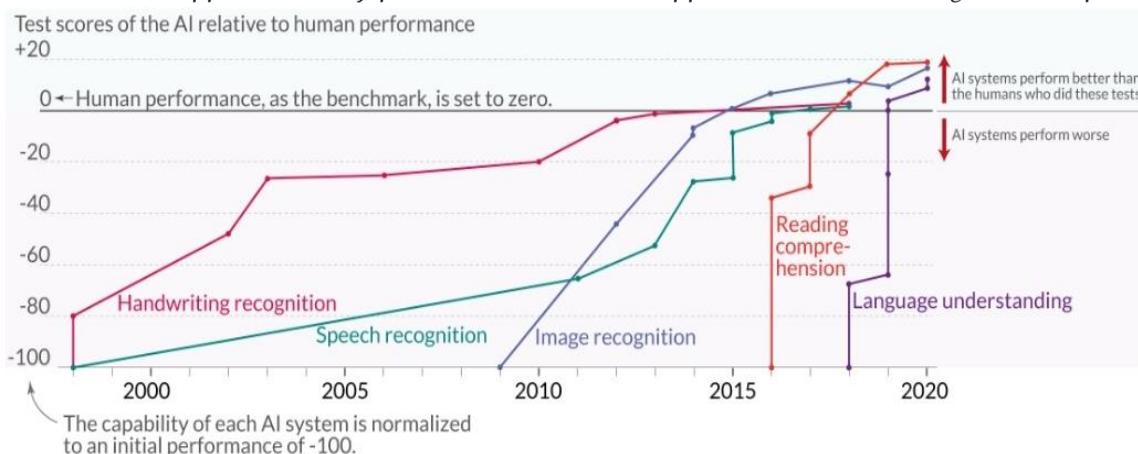


Source: chat.openai.com

**Fig. (1) Chat GPT's Growth Rate from Nov. 2022 to Feb. 2023**

Although researchers realize and believe that (AI) is one of the technological tools that helps humanity accomplish many tasks with a negligible error rate, as is the case with many other technological tools that have often helped humanity achieve many of its legitimate dreams, authors' core research question is whether we should treat Artificial Intelligence (AI) as a competitor or as supporting and collaboration tool.

Many of these technological tools have sometimes turned into disasters for humanity, and at other times threaten the possibility of their extinction. Therefore, researchers seek to develop a set of predictive scenarios that sound the alarm about the possibility that Artificial Intelligence will take a major role in replacing employment. Humanity, given the superiority of (AI) and the human tendency to always feel comfortable and submissive as long as there is someone to play this role. Is it possible that the day will come when professors will be dismissed and replaced by Artificial Intelligence programs and models or cobots, and this human profession will disappear like many professions that have disappeared due to technological development?



Kiela et al. (2021). Dynabench: Rethinking Benchmarking in NLP

**Fig. (2) Language and Image Recognition Capabilities of AI Systems Have Improved Rapidly**

This paper contributes to the existing literature on AI and presents a vision of the widespread use of artificial intelligence programs during the near future and its control over a number of jobs instead of the human workforce, especially in the field of higher education. This paper ends with important action plan points summarizing how university professors can maintain their jobs in the future and how to keep up with this rapid technological development, transforming AI technology from a competitor to an assistant to achieve the maximum benefit for the student and the success of the entire pedagogical process.

## Literature Review

Artificial intelligence (AI) refers to computing systems that possess the ability to perform tasks resembling human capabilities, such as learning, adapting, synthesizing information, self-correction, and utilizing data for complex processing. The progress of AI is rapidly advancing and already making a profound impact on various services within higher education.

It is important to recognize the field of “machine learning” as a promising aspect of AI. Machine learning can be defined as a subfield of AI that encompasses software capable of recognizing patterns, making predictions, and applying newly discovered patterns to situations that were not initially part of their design. (Popenici & Kerr, 2017).

According to Rodway, P., & Schepman, A. (2023) it is important to acknowledge that technological advancements have historically led to changes in the job market. As certain tasks become automated or enhanced by AI, the demand for specific skills may shift. While some job roles may be affected or even replaced by AI technologies, new opportunities and job roles are also likely to emerge.

The increasing prevalence of AI technologies like ChatGPT has raised concerns among certain academics regarding the potential for future job displacement. There is a belief that the advancement of machine learning and AI technologies may bring about changes in people’s roles and work processes within the labor market. (Livberber & Ayvaz, 2023).

Zouhaier, S. (2023) stated that AI has been playing a significant role in transforming the learning and teaching process, particularly in blended learning and e-learning environments. In these contexts, AI technology can have an impact on the traditional role of the professor or tutor.

Ultimately, while AI and machine learning technologies may lead to shifts in the labor market, they also offer opportunities for innovation, increased efficiency, and improved productivity. The current discussion surrounding Generative AI in education often revolves around the challenges it poses for professors or the opportunities it presents for both professors and students. (Rodway & Schepman, 2023).

Stone, P., Brooks et. al., (2022) mentioned in their study, Sir Anthony Seldon made a prediction in September 2017 that robots would replace human professors by 2027. This prediction has gained more significance with the recent introduction of ChatGPT, a generative AI software capable of producing human-like responses on various topics, and the continuous advancements in AI technologies. The use of AI technologies, such as intelligent tutors, is likely to expand significantly in the classroom and home settings over the next fifteen years.

The advent of AI and automation technologies is impacting various industries and changing the structure of the workforce. Many traditional human tasks are being replaced or augmented by machines, leading to transformations in job roles and the skills required in the job market. (Talwar, 2023)

Furthermore, Hale, K. E. (2022) argued that the decline in the number of special education teachers over the past decade has posed significant challenges for school districts in the United States. The recruitment and retention of qualified special educators have become increasingly difficult and costly, which forced educational technologists to explore alternative approaches to address the needs of students with disabilities in the classroom. One potential solution being considered is the use of robots or artificial co-teachers, often referred to as special education cobots.

However, Chan, C. K. Y. & Tsi, L. H. (2023) believe while some are convinced that AI has the potential to replace professors in the future, others contend that human professors bring distinct qualities to the table. These include critical thinking, creativity, emotional intelligence, and the ability to address psychological and value-related matters, rendering them indispensable. The study underscores the significance of social-emotional competencies that evolve through human interactions, an aspect not currently replicable by

AI technologies. The researcher suggests that instead of seeing AI as a substitute, professors can incorporate it effectively to augment the teaching and learning experience.

AI, along with related technological progress, is anticipated to replace certain professions, rendering didactic roles unnecessary. Simultaneously, other professions are expected to undergo significant transformations, necessitating the updating of didactic materials. Additionally, a substantial number of new vocations are predicted to emerge, requiring the establishment of innovative didactics.

In the realm of educational operations, AI is poised to act as both a reformer and a facilitator, reshaping the nature and distribution of tasks. (Alam, 2021, November) It's crucial to acknowledge that while AI will never entirely replace human professors, it can offer valuable support and enhance their effectiveness. Given the rapid advancements in this technology, it is prudent to leverage its benefits. The automation of administrative responsibilities, such as grading tests and evaluating student responses, has the potential to liberate professors' time for more meaningful tasks.

Presently, machines exhibit a high level of precision in executing these duties, and with ongoing progress, they are poised to handle more intricate and personalized assignments, such as grading essays. Moreover, students grappling with various subjects might discover that AI can aid them in devising tailored study plans, representing a considerable time-saving for professors. (Srinivasa et. al., 2022)

Finally, the question of whether AI can completely replace the role of professors is becoming increasingly controversial, but the possibility of this happening seems closer than ever before. The media has also started to explore the idea of professors being among the jobs that may be replaced, given the anticipation that over five million jobs will be taken over by AI. (Chan & Tsi, 2023)

As such, the researchers are becoming very eager to study this issue in-depth through exponential smoothing, which assigns weights to recent data points to emphasize more recent values, providing a forecast based on weighted averages.

### **The Requirements that Would Favor Artificial Intelligence Programs as an Alternative to Humans in the Academic Field**

- 1- **Cost**, the cost of (AI) programs must be within the reach of academic decision makers and those responsible for universities, and less than the cost of using humans in teaching.
- 2- **Degree, Volume of Learning Information, and their Modernity**, (AI) models must have a large volume of information about any subject being taught, in addition to developing their ability to self-learn, correct errors, and constantly update information.
- 3- **Carrying out Support Work**, the ability of (AI) programs to carry out all the tasks that assist academics accurately and efficiently, such as quality requirements, implementing statistics, and collecting surveys to develop the educational process, is one of the advantages that can be implemented through (AI).
- 4- **Adapting to Students' Reactions**, what distinguishes humans in academic professions from (AI) programs is that there is a direct and mutual reaction between the professor and the student. If (AI) models are developed to read body language, recognize student reactions, and be flexible in providing information and solutions according to each recipient and each situation.
- 5- **Availability**, ease of access to these programs at any time and any place is one of the most likely advantages.
- 6- **Technology Infrastructure**, the appropriate infrastructure must be created to receive these programs and be able to use them.
- 7- **Error Rate**, one of the important features of (AI) is its accuracy and low error rate.

- 8- **Dealing with Various Cultures**, (AI) programs must have the ability to deal with multiple cultures and ideologies in order to overcome any obstacle related to poor communication.

**Table (1): Humans Versus Artificial Intelligence (AI) in the Academic Profession**

No.	ITEM	Humans	(AI)
1	Cost		√
2	Degree, Volume of Learning Information, and their Modernity		√
3	Carrying out Support Work	√	√
4	Adapting to Students' Reactions	√	
5	Availability		√
6	Poor Technology Infrastructure	√	
7	Error Rate		√
8	Dealing with Various Cultures	√	

Source: Designed by the researchers

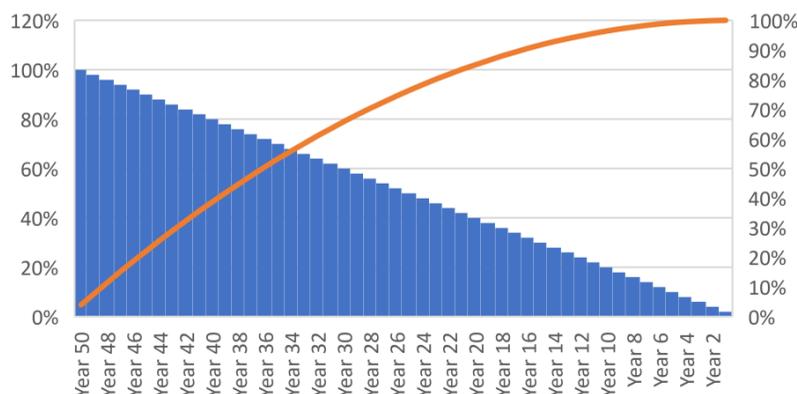
## The Novel Approach to Predicting the Rate of Replacing Professors with (Ai) Tools

### Predictive Scenarios

The researchers designed three scenarios regarding the rates of replacement of professors in universities with artificial intelligence models and programs during a time frame of fifty years. These scenarios varied from the most pessimistic scenario, passing through the moderate scenario, and ending with the most optimistic scenario. The researchers assumed three values, each value expressing the time rate of replacement. The first scenario which is the most pessimistic one predicts the replacement rate of 2% annually. The second prediction is the moderate scenario as it expects 1% replacement rate annually. Finally, the most optimistic scenario expects a 0.5% replacement rate annually. (All the details are explained in the attachments)

#### 1- The Pessimistic Scenario (A)

According to this scenario, researchers assume that during the next fifty years, and in accordance with the rapid spread of the use of AI technology, the rate of replacement of professors working in universities around the world will be replaced by AI models and programs at a rate of 2% annually, which will make artificial intelligence control all those jobs in the end of the assumed time frame and this is illustrated in Figure No. (3). This scenario is considered the most pessimistic, as if it comes true, there will be no place for human professors in those positions, which will harm a large number of workers in this field.

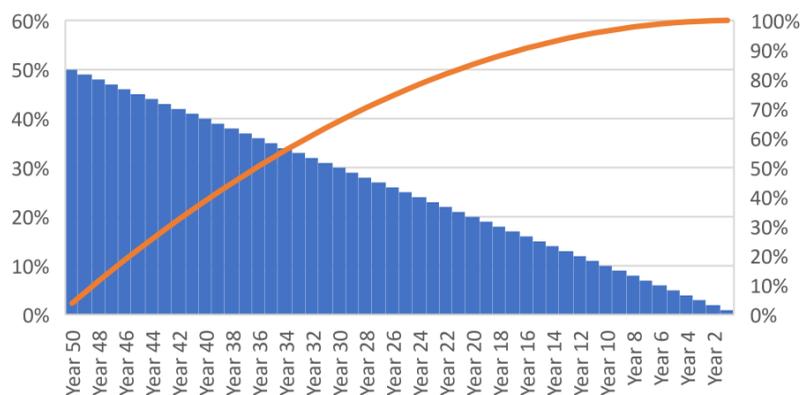


Source: Researchers' Own Work

**Fig. (3) Pessimistic Scenario (A)**

#### 2- The Moderate Scenario (B)

In this scenario, the researchers assume the rate of replacement of professors with artificial intelligence programs at a rate of 1%, as this scenario is considered the moderate scenario, which expresses the spread of artificial intelligence programs at a moderate



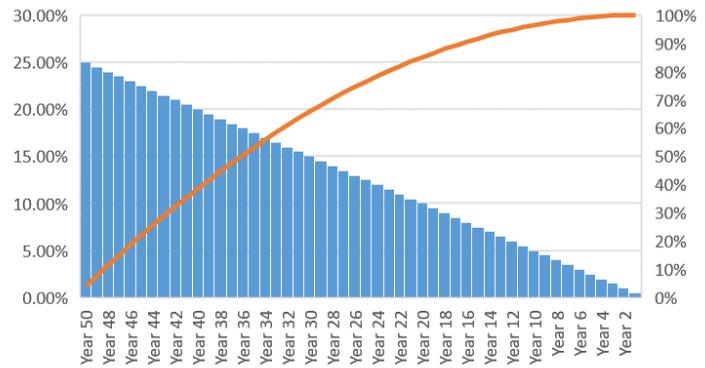
Source: Researchers' Own Work

**Fig. (4) Moderate Scenario (B)**

rate, with professors maintaining fifty percent of their jobs and leaving the other half to this modern technology to control, and this figure confirms this. No. (4)

### 3- The Optimistic Scenario (C)

The best scenario is shown in Figure No. (5), and a replacement rate of no more than 0.5% is assumed. This scenario assumes the ability of professors during the next fifty years to prevail in the competition with artificial intelligence technology by developing their skills, improving their abilities, and correcting their mistakes, and considering This technology is a support and not a competitor, by providing features that are not available in that technology, as the human element has human feelings and touches that are difficult for artificial intelligence programs to apply, especially when dealing with human students who expect those responses and emotions, and therefore this optimistic scenario assumes that the professors will maintain three-quarters of the jobs, leaving the rest to artificial intelligence technology, and this remainder is often the jobs that do not require direct human interaction with these students or the recipients of that educational service.



Source: Researchers' Own Work

Fig. (5) Optimistic Scenario (C)

### Mathematical Formulation

If we assume that the rate of replacement per time (t) is (dy/dt), where (C) is the expectation constant of the distribution, we can formulate a new approach to represent the replacement value at a certain time mathematically as following:

$$\frac{dy}{dt} = C \quad \frac{dy}{dt} = \frac{C}{t} \quad \therefore y = C \ln t \quad (1)$$

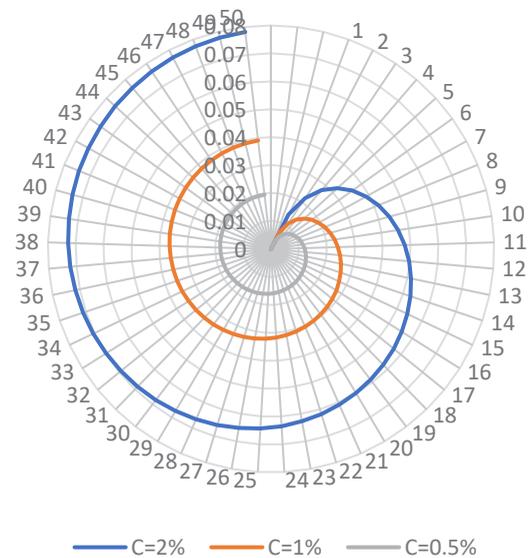
Since we have assumed three scenarios by putting three different values for the constant C= 2%, OR 1%, OR 0.5% therefore;

$$\therefore y_1 = 0.05 \ln t, \therefore y_2 = 0.01 \ln t, \therefore y_3 = 0.005 \ln t.$$

The following chart (Fig.6) represents the replacement action over for coming 50 years at three different rates 2%, 1%, and 0.5% per year.

Gaussian distribution is a statistical normal distribution which represents a type of continuous probability distribution for a real-valued random variable. The following Gaussian distribution function has been used to obtain the normal distribution of the estimated replacing curve, where the parameter C is the expectation constant of the distribution (and also its median and mode), while the parameter  $\sigma$  is its standard deviation.

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}} e^{-0.5 \left(\frac{y-c}{\sigma}\right)^2} \quad (2)$$



Source: Researchers' Own Work

Fig. (6)

The following graph in (Fig. 7) shows the substitution curve estimated by EQ. 1 (point curve) using  $C = 2\%$ , which is the worst scenario that expresses a rapid replacement rate for artificial intelligence at the expense of professors working in universities.

The following graph in (Fig. 8) show the substitution curve estimated by EQ. 1 (point curve) using  $C = 1\%$ , which is the moderate scenario that expresses the average replacement rate for artificial intelligence at the expense of professors working in universities.

Figure (8) shows the substitution curve estimated by EQ. 1 (point curve) using  $C = 0.5\%$ , which is the best scenario that expresses a simple replacement rate for artificial intelligence at the expense of professors working in universities.

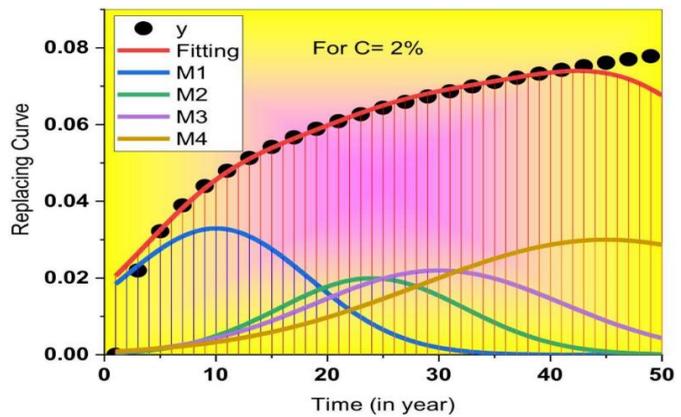
The previous graphs in fig. (7), (8) and (9) show the substitution curve estimated by EQ. 1 (dot curve) using  $C = 2\%$ ,  $1\%$  and  $0.5\%$ , as well as the Gaussian distribution curve (solid curves) based on EQ.2. As shown in the following table (2), the replacement rate reaches its maximum at four different times 10, 24, 30, 45, and 48 years.

**Table (2): Gaussian Distribution Parameters**

Time (in year)	10	24	30	45
	years	years	years	years
Max. replacing rate ( $C=2\%$ )	3.3%	2%	2.2%	3.5%
Max. replacing rate ( $C=1\%$ )	1.8%	1.1%	1.4%	2%
Max. replacing rate ( $C=0.5\%$ )	0.6%	0.55%	0.15%	0.16%

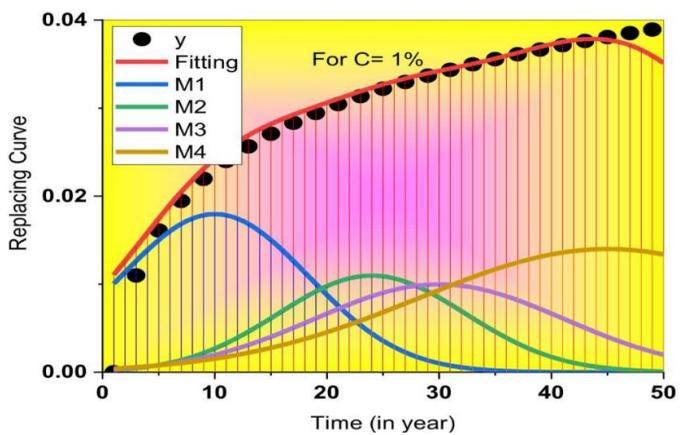
Source: Researchers' Own Work

As a result of the consistency between the proposed equation and the Gaussian distribution function, as shown in the previous figures, some significant barometers resulted that were recorded in Table No. (2), which includes the years in which the rate of replacing professors with artificial intelligence technology reached the maximum value for the different values of ( $C$ ). It appears that the highest replacement rate occurs at 45 years when the value of ( $C$ ) is  $2\%$ , and also in the same year the highest replacement rate reaches when the value of ( $C$ ) is  $1\%$ , as for the value ( $C$ ) when it equals  $0.5\%$ , the tenth year is the highest Replacement rate. As is clear from Justin's distribution function, the replacement rate fluctuates, ranging between increase and decrease over the fifty years, which is the time frame of the study, but it always reaches the highest value in years 10, 24, 30, and then 45.



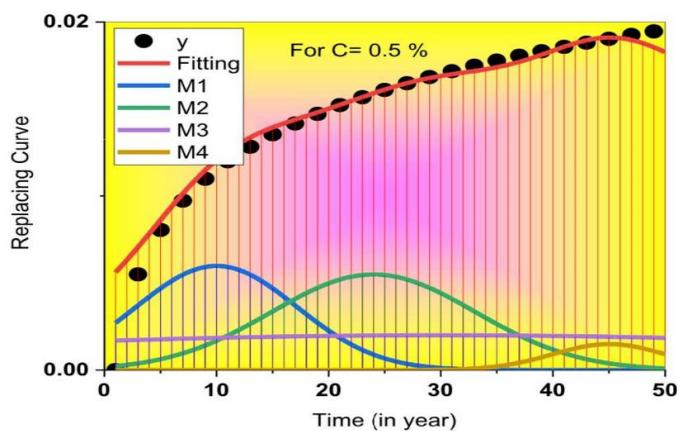
Source: Researchers' Own Work

**Fig. (7) (point curve) using  $C = 2\%$**



Source: Researchers' Own Work

**Fig. (8) (point curve) using  $C = 1\%$**

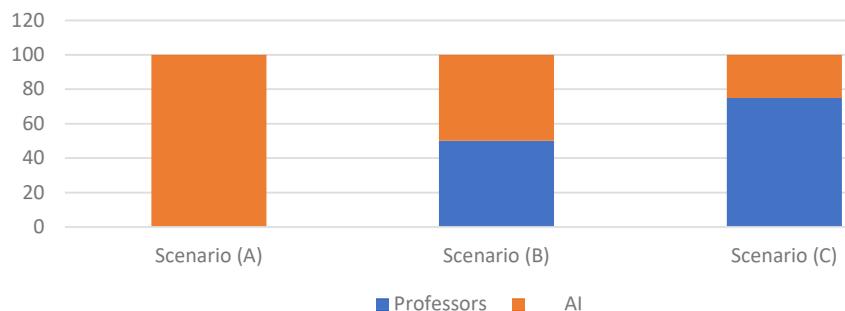


Source: Researchers' Own Work

**Fig. (9) (point curve) using  $C = 0.5\%$**

## Research Findings

According to a review of most of the previous literature that discussed the emergence and advancement of AI during the period from 2017 until now, this paper confirms the great speed of the spread of the use of artificial intelligence programs in all business sectors and its progress towards controlling the labor market for many jobs in the near future. The researchers decided to impose three scenarios that ranged from the very pessimistic, the moderate, and the most optimistic scenario regarding the rate of replacing university professors with artificial intelligence programs and models. The equation that was proposed to explain the increase in the rates of replacing professors with artificial intelligence confirmed that based on the proposed scenarios, the worst scenario is that during the next 50 years all professors working in universities will be laid off and replaced by artificial intelligence programs. As for the moderate scenario, it appears that only fifty out of every 100 university professors will keep their jobs, and the other half will leave for artificial intelligence programs. The best and most optimistic scenario confirms that artificial intelligence will control only a quarter of the jobs of professors in universities, and that professors will keep most of their jobs at a rate of seventy-five percent.



Source: Researchers' Own Work

**Fig. (10) The Three Scenarios for the Rates of Replacing Professors with (AI) in University Careers**

## Discussion

This paper presents a systematic review of the literature that addressed the importance of artificial intelligence as one of the technological tools that contribute to the completion of many works, and revealed the rapid spread of artificial intelligence in the world and its increased use in all different business sectors, knowing that the current models of artificial intelligence are considered prototypes that can be developed quickly.

In light of the ability of artificial intelligence to develop its capabilities, avoid its previous mistakes, and attract larger numbers of users in the near future, it raised the alarm that there is a hidden side to the expansion of the use of artificial intelligence models, which is the disappearance of some jobs and their replacement by those models, which exposes many workers to losing their jobs completely or partially, this was done through an analysis of 14 research papers published between 2017 and 2023, due to the novelty of the topic.

A model of the most important skills that, if available to any of the competitors in the competition between human labor and models and applications of artificial intelligence in filling jobs in the near future, will have a head start and success in seizing those jobs, and it is an important indicator that helps human workers in developing their skills to maintain their jobs in light of unequal competition.

Through the paper, the researchers developed three scenarios about their expectation of the process of rapid spread of artificial intelligence models to replace professors in universities and institutes around the world. This theory was launched by encouraging all the previous studies that were reviewed. These predictive scenarios varied from the most pessimistic scenario to the scenario.

The moderate and finally the most optimistic scenario, and a time frame was set to achieve this expectation, which is the next fifty years, and three hypotheses were developed to clarify these scenarios, which are the hypothesis of 2% as an annual replacement rate for artificial intelligence models for professors working in universities as the worst alternative, and 1% as an annual replacement rate for artificial intelligence models for professors working in universities as a moderate alternative, and 0.5% as the best proposed hypothesis.

Given the difficulty of obtaining historical data on the rates of replacing artificial intelligence models with professors in universities due to the novelty of the research topic, the researchers saw the difficulty of using predictive methods, which often rely on previous historical data such as quantitative forecasting methods, Regression Analysis, and statistical models for time series, and they were replaced by Using a mathematical modeling method and this information was confirmed with a Gaussian distribution, it is not necessary for the prediction to be based on the past, but it can be based on the present by monitoring the surrounding social, economic and political conditions. This motivates researchers to come up with a hypothesis that has future predictions.

**It must be noted that these proposed scenarios are subject to a set of Limitations that affect the accuracy of these forecasts, including:**

### ***State of Technological Infrastructure***

There is a direct relationship between the progress of the technological infrastructure and the speed of spread of the use of artificial intelligence models within those countries, and the ability of these models to control some functions due to the availability of a set of competitive advantages such as cost, availability and accuracy.

### ***Humanities are More Susceptible to Replacement than Other Sciences***

According to the paper, the impact of the spread of artificial intelligence affects the extent of the ability of professors to maintain their university jobs, whether completely or partially, in the near future. However, we must point out that the replacement of artificial intelligence models with professors in different universities varies and is subject to a group of factors, including that professors specializing in the humanities are more susceptible to replacement by other sciences, especially by professors specializing in experimental sciences that depend on practical tasks, taking into account that developing artificial intelligence capabilities in the field of simulations may help in overcoming this limitation.

### ***Inconsistency in Replacement Rate***

In this paper, the researchers presented three scenarios, and fixed annual replacement rates for professors with artificial intelligence programs were assumed, taking into account that the possibility of these increases fluctuating between increases and decreases according to various other variables included, but due to the nature of the study, a typical forecast scenario with a fixed rate of increase was presented, which the researchers adopted.

However, despite the possibility of the replacement value fluctuating increase or decrease from one year to another, with the total maturity over the fifty years, which is the time frame of the study, it is possible to ignore the possibility of the replacement rate fluctuating and assume its stability.

## **Conclusion**

We should prioritize what Dr. Peter Drucker once stated: "The optimal approach to foreseeing the future is to actively contribute to shaping it." Throughout history, those with bold visions are those who have the power of control and change. (Araya, D., & Marber, P., 2023)

We firmly advocate for the utilization of AI to gain a deeper understanding of both our students and our internal processes. This approach lays the foundation for the creation of novel and innovative methods to enhance student recruitment, improve student outcomes, increase institutional efficiency, contain costs, and achieve various other benefits. We view data as a strategic asset for our institution and emphasize its utilization as such.

Still, remains the question, will the application of AI threaten the sustainability of academic instructors and professors' jobs in the coming fifty years? Well, the researchers have presented three possible scenarios: an optimistic, pessimistic and moderate scenario. Researchers believe that the moderate scenario will prevail in the coming 50 years and a synergy between the education procedures and AI applications will

find place, although the percentages of educators’ synergy with AI can’t be precisely predicted. Hence, AIED (AI in education) should be employed in teaching and learning to facilitate the transition to hybrid models, enhance educational experiences, and support cloud-based academic research and Educational Technology (Ed Tech). AIED holds the potential to deliver on its promise of personalized learning experiences that substantially improve student performance at a systemic level.

To realize this, potential educational institutions must prioritize investments in teaching and learning, change management, and faculty capacity. The following ‘Action Plan’ steps are clarifying the responsible individuals/departments of this synergy; also presenting the progress and improvement of this synergy as well as the expected implementation date.

## The Action Plan Steps

<b>Action Plan Step 01: Curriculum Enhancement</b>		
Develop a comprehensive strategy for integrating technical competencies, such as programming and data analysis, into the education system.		
Responsible Department/ Employee		Pedagogic experts play a pivotal role in the process of implementing the curriculum and make a focal point in any endeavor related to curriculum development.
Resources Needed		The essential resources required to enrich the curriculum encompass subject matter experts, adherence to national and state standards, consideration of student needs and interests, utilization of pedagogical theories and models, and integration of technology and multimedia resources.
Progress		Should be monitored by systematic arrangement of concepts, content, and skills throughout various instructional stages forms a coherent structure, fostering the development of learners’ advanced cognitive abilities.
Completion Date		Should be stated by the curriculum developer and this depends on many factors, such as: developer’s skills, knowledge, resources availability and scientific standard.
Improvement		Curriculum improvements could be evaluated by the following factors: questionnaires, interviews, direct observations of the learning environment, and debriefing sessions with students at the conclusion of the course.
<b>Action Plan Step 02: Lifelong Learning Promotion</b>		
Establish programs that promote the concept of lifelong learning, emphasizing the need for professionals to consistently enhance their skills to remain competitive.		
Responsible Department/ Employee		It is imperative for teachers to maintain motivation, functioning as lifelong learning leaders within society. Their role extends to equipping students with the essential skills needed to navigate uncertainties and confront contemporary challenges.
Resources Needed		Educational programs and materials, industry partners to provide students with insights into real world applications and potential career opportunities, hands-on experiences, internships and practical projects.
Progress		Compiling a comprehensive list of short-term and long-term objectives and identifying available resources such as: courses, workshops, mentors, and online materials that can help in attaining these objectives.
Completion Date		No completion date as it is a lifelong process.
Improvement		Self-assessment and Measurement of lifelong learning characteristics. Also, Distillation and Retrospection leads to a more gentle learning curve for the target model.
<b>Action Plan Step 03: Shift to Project-Based Teaching</b>		
Transition away from exclusively producing specialists and focus on equipping students with project management skills.		
Responsible Department/ Employee		Educational people who are specialists of equipping students with project management skills.
Resources Needed		Critical thinking, problem solving, collaboration, and various forms of communication.
Progress		Can be assessed by content through tests, quizzes, reports, or essays that demonstrate students’ mastery of the concepts and facts.
Completion Date		Students work on a project over an extended period of time – from a week up to a semester.
Improvement		Can be identified through summative and formative assessments. These assessments should include content and skills and process and product assessments.

<b>Action Plan Step 04: Cultivate Emotional Intelligence</b>		
Emphasize the cultivation of emotional intelligence through project-based learning, enabling students to coordinate tasks delegated to computers.		
Responsible Department/ Employee		The educator can assist students in developing emotional intelligence by providing them with knowledge, expertise, and effective learning strategies.
Resources Needed		Existence of a positive adaptive learning environment that enhances students' self-awareness, self-regulation, motivation, empathy and social skills.
Progress		Could be identified by self-reporting, other-reporting, and ability testing.
Completion Date		It's an ongoing process that should start in childhood and continues till adulthood.
Improvement		Adopting certain attitudes and behaviors, implementing specific practices to improve students' well-being and classroom climate.
<b>Action Plan Step 05: Data-Driven Decision-Making</b>		
<ul style="list-style-type: none"> <li>•Foster a culture of data-driven decision-making within the education system.</li> <li>•Implement robust governance and ethics frameworks to ensure responsible data use.</li> </ul>		
Responsible Department/ Employee		The finance department, IT, and Business Intelligence Competency Centers (cross-departmental groups)
Resources Needed		Facts, Metrics, and Data to guide strategic business decisions that align with the entity's goals and objectives.
Progress		Needs consistent observation of the project performance by monitoring pertinent metrics and indicators. Evaluate the progress by comparing actual results with anticipated outcomes to detect any deviations. Regularly examine data, adjust strategies as needed, make course corrections, and ensure the success of the project.
Completion Date		The completion date is determined by the involved responsible entities that varies according to the nature of goals and objectives.
Improvement		Data holds a crucial role in making well-informed decisions, whether pertaining to company expansion, recruitment approaches, or sales and marketing initiatives. A robust data strategy empowers businesses to outpace competitors, enabling them to explore niche markets and anticipate emerging trends.
<b>Action Plan Step 06: Synergy with AI</b>		
<ul style="list-style-type: none"> <li>•Establish a synergy between AI applications and educators through collaborative robots (cobots).</li> <li>•Establish the integration of cobots in educational settings, leveraging their capabilities for enhanced learning experiences.</li> </ul>		
Responsible Department/ Employee		The individuals who either developed or are utilizing the AI system may bear partial or complete responsibility.
Resources Needed		Establishing the integration of cobots in educational settings, AI-driven platforms like chatbots or virtual tutors, Numerous AI tools offer data-driven insights into learning behaviors.
Progress		It can be monitored by encompassing continuous observation and analysis. This proactive approach functions as a means of preserving the health and efficiency of AI applications.
Completion Date		It should take as much time as needed till the synergy process completes. This differs from one institution to another according to the availability of resources and readiness of educators and students.
Improvement		Continuous improvement could be attained by adding new and fresh data, improving the existing data and algorithm.
<b>Action Plan Step 07: Faculty Recruitment and Support</b>		
<ul style="list-style-type: none"> <li>•Recruit faculty members based on their passion for teaching, with a balanced emphasis on research.</li> <li>•Provide support and acknowledgement for educators with a strong focus on teaching.</li> </ul>		
Responsible Department/ Employee		The office of Faculty Personnel is responsible for supporting and monitoring faculty recruitment activities.
Resources Needed		Utilizing various documents to inform the search and enlist faculty support for effective evaluation. Employ a forecasting spreadsheet, a comprehensive position description, screening questions, and an evaluation form to provide guidance throughout the process.
Progress		Monitored through developing a robust recruitment technology stack designed to automate and expedite your hiring procedures. The primary tool for tracking recruitment is the Applicant Tracking System (ATS), widely recognized and utilized in the field.
Completion Date		The hiring process spans three to six weeks on average. The duration is influenced by factors such as the position's level, the volume of applicants, and the level of experience of the hiring manager.
Improvement		Could be attained through creating an efficient application process, making the most out of screening calls, using skills assessments to narrow down the list of candidates, keep candidates updates and be transparent, automate and simplify tasks.

<b>Action Plan Step 08: IT Infrastructure Optimization</b>	
Empower IT teams to play a vital role as facilitators, collaborating across the university to organize and optimize data infrastructure.	
Responsible Department/Employee 	The infrastructure manager who is responsible for overseeing IT personnel, enduring that network costs align with the budget, and acting as a liaison between IT staff and project stakeholders.
Resources Needed 	Hardware encompasses a range of physical components such as servers, storage devices, workstations, routers, switches, and other tangible equipment.
Progress 	Can be monitored through: 1. Agent-based monitoring: This approach entails the installation of a software agent on each system slated for monitoring. 2. Agentless monitoring: In contrast, agentless monitoring operates without the need for installing any software agents.
Completion Date 	This depends on availability of resources and the readiness of responsible people.
Improvement 	By analyzing organization’s cloud, make the switch to hyperconverged infrastructure and increase WiFi capabilities. Also, automate processes, reduce manual efforts, and improve efficiency.
<b>Action Plan Step 09: EdTech and Big Tech Collaboration</b>	
<ul style="list-style-type: none"> <li>•Facilitate collaboration between EdTech and Big Tech to establish standardized data formats &amp; APIs.</li> <li>•Prioritize data security, governance, and privacy in joint efforts to impact teacher and student results positively.</li> </ul>	
Responsible Department/Employee 	Individual or team with responsibility for EdTech within the school/college.
Resources Needed 	Video conferencing, digital writing applications, wikis, and social bookmarking tools.
Progress 	By evaluating the existing evidence and feedback concerning their quality, effectiveness, and impact. This assessment may involve a scrutiny of research studies, user reviews, testimonials, ratings, awards, certifications, and accreditation.
Completion Date 	It could take months or years
Improvement 	Measuring the improvement of implementation by assessing the quality, effectiveness, and impact by reviewing available evidence and feedback. This encompasses various sources such as research studies, user reviews, testimonials, ratings, awards, certifications, and accreditation.
<b>Action Plan Step 10: Consensus on Data Standards</b>	
Work collaboratively to establish consensus on data collection standards that benefit teachers, students, and facilitate HyFlex instruction.	
Responsible Department/Employee 	Data standards can be formulated by diverse entities, including research communities, governmental organizations, or other large institutions.
Resources Needed 	Specifying the format and definition of commonly used data. Adopting consistent terminology and definitions for common data elements and databases.
Progress 	The advancement of consensus standards is demonstrated through collaborative efforts involving all parties interested in contributing to the development or utilization of the standard.
Completion Date 	Is determined by the responsible parties.
Improvement 	Constant efforts for establishing consensus on data collection standards that benefit the educational process.

By implementing these action plan steps, the education system can adapt to the upcoming transformations, ensuring students and educators are well equipped with the necessary skills for success in a rapidly evolving technological landscape. Hence, facilitating the transition to hybrid educational system AIED represents the synergy between AI applications and higher education system.

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## Appendix

This appendix explains three of the expected scenarios assumed by researchers for the process of replacing professors with artificial intelligence programs during the next fifty years.

Pessimistic Scenario (A)		Moderate Scenario (B)		Optimistic Scenario (C)	
Based on hypothesis 2% as the rate at which AI replace professors		Based on hypothesis 1% as the rate at which AI replace professors		Based on hypothesis 0.5 % as the rate at which AI replace professors	
Years	Replacement ratio	Years	Replacement ratio	Years	Replacement ratio
Year 1	2%	Year 1	1%	Year 1	0.5%
Year 2	4%	Year 2	2%	Year 2	1%
Year 3	6%	Year 3	3%	Year 3	1.5%
Year 4	8%	Year 4	4%	Year 4	2%
Year 5	10%	Year 5	5%	Year 5	2.5%
Year 6	12%	Year 6	6%	Year 6	3%
Year 7	14%	Year 7	7%	Year 7	3.5%
Year 8	16%	Year 8	8%	Year 8	4%
Year 9	18%	Year 9	9%	Year 9	4.5%
Year 10	20%	Year 10	10%	Year 10	5%
Year 11	22%	Year 11	11%	Year 11	5.5%
Year 12	24%	Year 12	12%	Year 12	6%
Year 13	26%	Year 13	13%	Year 13	6.5%
Year 14	28%	Year 14	14%	Year 14	7%
Year 15	30%	Year 15	15%	Year 15	7.5%
Year 16	32%	Year 16	16%	Year 16	8%
Year 17	34%	Year 17	17%	Year 17	8.5%
Year 18	36%	Year 18	18%	Year 18	9%
Year 19	38%	Year 19	19%	Year 19	9.5%
Year 20	40%	Year 20	20%	Year 20	10%
Year 21	42%	Year 21	21%	Year 21	10.5%
Year 22	44%	Year 22	22%	Year 22	11%
Year 23	46%	Year 23	23%	Year 23	11.5%
Year 24	48%	Year 24	24%	Year 24	12%
Year 25	50%	Year 25	25%	Year 25	12.5%
Year 26	52%	Year 26	26%	Year 26	13%
Year 27	54%	Year 27	27%	Year 27	13.5%
Year 28	56%	Year 28	28%	Year 28	14%
Year 29	58%	Year 29	29%	Year 29	14.5%
Year 30	60%	Year 30	30%	Year 30	15%
Year 31	62%	Year 31	31%	Year 31	15.5%
Year 32	64%	Year 32	32%	Year 32	16%
Year 33	66%	Year 33	33%	Year 33	16.5%
Year 34	68%	Year 34	34%	Year 34	17%
Year 35	70%	Year 35	35%	Year 35	17.5%
Year 36	72%	Year 36	36%	Year 36	18%
Year 37	74%	Year 37	37%	Year 37	18.5%
Year 38	76%	Year 38	38%	Year 38	19%
Year 39	78%	Year 39	39%	Year 39	19.5%
Year 40	80%	Year 40	40%	Year 40	20%
Year 41	82%	Year 41	41%	Year 41	20.5%
Year 42	84%	Year 42	42%	Year 42	21%
Year 43	86%	Year 43	43%	Year 43	21.5%
Year 44	88%	Year 44	44%	Year 44	22%
Year 45	90%	Year 45	45%	Year 45	22.5%
Year 46	92%	Year 46	46%	Year 46	23%
Year 47	94%	Year 47	47%	Year 47	23.5%
Year 48	96%	Year 48	48%	Year 48	24%
Year 49	98%	Year 49	49%	Year 49	24.5%
Year 50	100%	Year 50	50%	Year 50	25%