

## Digital Transformation in the Educational Institutions

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### Abstract

In this study proposes the idea of how to make the educational process more flexible in the post-pandemic period using the digital transformation technologies. Machine learning algorithms are used to solve this task, which will make the learning process more efficient and objective. Along with this, it will be adjusted to the ability of each student and will make the work of the teacher easier.

In the post-pandemic period, modern teaching methods are: face-to-face, online and hybrid teaching. Each method has its own advantages and disadvantages. Since the 21st century is era of globalization, online, distance and hybrid methods are considered to be a more acceptable form of teaching in the future.

The Author reviews all teaching methods. After the COVID-19 era, hybrid and online teaching methods are a new challenges in educational institutions, representing a more acceptable form of teaching worldwide. The situation now is that many institutions continue online classes and, at the same time, blend them with face-to-face classes. Hybrid Education is one of the most interesting concepts of the 21st century education system.

**Keywords:** Online and Face-to-face Learning, Modern Teaching Methods, Artificial Intelligent, Machine Learning Algorithm, Innovation Technology.

### I. INTRODUCTION

In this study main challenge is using digital transformation in the education systems, include main teaching methods: online, distance and hybrid learning. For this task I developed model to transition

from one teaching method to another using machine learning algorithms, which are a subset of artificial intelligence.

Artificial intelligence (AI) has been a topic of growing interest and investigation in various fields, including higher education. This research article explores the impact of AI on higher education by examining its effects on teaching and learning, assessment, ethics, required skills, and future careers.

The aim of the scientific paper is to create a blended and student-oriented system of the educational process. At the same time, the work related to the educational process should be facilitated for the Professor/Teacher. In the educational process, the effectiveness of any educational course is assessed by the learning outcomes obtained by the student. To achieve efficiency, the educational process service must be tailored to students, that is, the teacher must learn and improve various methods of working with the online platform.

The pandemic and the post-pandemic periods have brought about a very big change in the educational system. The growing pace of technology has become even more visible and has covered all fields, especially in educational institutions. Because online learning and a distance assessment system are still relevant today.

The COVID-19 pandemic has presented the entire world's education system with a new challenge. The number of online lectures (lessons) has increased, and at this time the teacher needs to make more efforts to conduct the educational process at a high level. Such a sudden change in the format of teaching has dealt a certain blow to both lecturers and students. It has become necessary to adapt to online teaching, create many new methods, study them and use them. A fairly large army of lecturers and professors-teachers has faced this challenge. During online teaching, the lecturer is always in the focus and has the eyes of many students. It is much easier to lead the educational process when teaching in the auditorium than when teaching online. Because the teacher has to take into account many factors. For example: sudden power outages (which are common in Georgia), getting to know his students online, establishing order during online teaching, and communicating with each student. Sharing their work, and a lot of technological, psychological, moral, and physical effort is required for a teacher to conduct the learning process at a high or good level [1].

## II. MATERIALS AND METHOD

In this paper presents an analysis of various teaching methods in the post-pandemic period (Table 1). The participants were asked which method between online, face-to-face, and hybrid education they preferred with the question "What is your teaching model preference?". 45.4% of students responded as "online education", 28.8% "face- to-face" and 25.8% "hybrid" (Table 2). These results indicated that most of the students preferred online education [2].

**Table 1.** Frequency Distribution of Teaching Model Preference

Model Preference	students	%
Online Education	2497	45.4
Face-to-Face Education	1587	28.8
Hybrid Education	1420	25.8
Total	5504	100

**Table 2.** Contingency Table Showing the Relationship Between Teaching Model Preference and Gender

Teaching model Preference		Gender		
		Female	Male	Total
Online Education	Number	1133	1364	2497
	%	45.4	54.64	100
Face-to-Face Education	Number	817	770	1587
	%	51.5	48.5	100
Hybrid Education	Number	758	662	1420
	%	5.4	46.6	100
Total	Number	2708	2796	5504
	%	49.2	50.8	100

**Table 3.** Contingency Table Showing the Relationship between Teaching Model Preference and Students' View of the Learning Management System Used as Complex

Teaching model Preference		Gender					
		Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	Total
Online Education	Number	884	988	311	177	105	2465
	%	85.9	40.1	12.6	7.2	4.3	100
Face-to-Face Education	Number	157	544	319	298	241	1559
	%	10.1	34.9	20.5	19.1	15.5	100
Hybrid Education	Number	172	592	287	226	118	1395
	%	12.3	42.4	20.6	16.2	8.5	100
Total	Number	1213	2124	917	701	464	5419
	%	22.4	39.2	16.9	12.9	8.6	100

### 1.2. III. OBJECTIVE and METHODOLOGY:

- a) Develop exam sample model on Python
- b) Evaluation of the effectiveness of the student's final result

Three paradigms are proposed for Artificial Intelligence in Education (AIED). They are: AI-direct, AI-support, and AI-empower [3].

- ❖ AI is used to represent knowledge models and direct cognitive learning in Paradigm One.
- ❖ AI is used to support learning while learners work as collaborators with AI in Paradigm Two.
- ❖ AI is used to empower learning while learners take agency to learn in Paradigm Three.

The main starting point in the learning process is the student. therefore, in order to get the best results, the teacher must develop the most effective methods of the exam. Machine learning algorithms help us in this approach, using which the exam process is comfortable for both the student and the lecturer.

### IV. RESULTS

In this study Author developed model of modern teaching method, according in which 5 components play a key role in the learning process:

$$FS(i = 1, 2, 3, 4, 5) \quad (1)$$

- 1) Student activity in the learning process
- 2) Adequate delivery of material by the lecturer
- 3) Management of the classroom by lecturer
- 4) Communication between lector and student
- 5) Respect for each other to achieve the best

### V. AI IMPACT ON THE LEARNING AND TEACHING PROCESS

According to an article in The Atlantic, (“Artificial Intelligence Promises a Personalized Education for All”), artificial intelligence holds the potential to “enhance human teachers’ abilities to tailor lessons to each student without knocking their class schedule off track,” eliminating the need for educators to “teach to the middle,” as often happens when their students have a range of skill levels and learning abilities.

Rose Luckin, a professor of learning-centered design at University College London, is quoted as saying that, “The real power of artificial intelligence for education is in the way that we can use it to process vast amounts of data about learners, about teachers, about teaching and learning interactions.” Ultimately, AI can “help teachers understand their students more accurately, more effectively”. She says AI in education will help us understand how we think [5].

My research mainly concerns the evaluation of the positive and negative between online and face-to-face learning. Based on their analysis, it is recommended to switch to a hybrid format to achieve effective learning results. The use of machine learning algorithms for the effectiveness of the learning process.

A two-and-a-half-year study of online learning at leading universities around the world, including Georgia (Country), has shown that the hybrid (blended) method of teaching is much better for both lecturers and students. Because human communication has a much better effect on both sides. During the pandemic, the least hit was for students and professors of the Faculty of Technology. The biggest and most devastating hit was suffered by professors of the Faculty of Humanities and Natural Sciences, because most teachers have not mastered technologies at the proper level. Based on this reality, which is present all over the world, my modest recommendation is as follows: the learning process in the future should be hybrid, which in itself includes online, distance and face-to-face learning in symbiosis.

As you know, the learning process consists of several components. For the perfect conduct of the learning process, both the teaching and assessment processes of students are important. During online learning, the teacher must be fully involved in the learning process and constantly provide his students with electronic learning materials: textbooks, lecture notes, presentations, etc. At the same time, he must conduct the assessment remotely.

The purpose of the work is to help professors and teachers around the world increase their knowledge in the distance learning process and gain more experience in effectively conducting the learning process. To solve this problem, machine learning (ML) algorithms and assessment methods have been developed, which will make the learning process more effective and flexible.

A teaching philosophy underlying this system revolves around prioritizing students as the primary beneficiaries, teachers as the driving force, industry feedback, and industry-specific guidance. Therefore, while constructing a quality evaluation system for higher education, the following two aspects should be considered:

1. *Student-Centered Approach*: Regardless of changes in teaching formats, students always play a central role in the teaching process.

2. *Teacher Leadership*: Teacher have a pivotal role in their courses, indicating the course's practicality.

Consequently, teachers can adapt teaching techniques and approaches based on the classroom dynamics and instructional context. By integrating students theoretical knowledge and practical abilities while enhancing their overall development, teachers have relatively more freedom in guiding the higher education curriculum. If all evaluation systems solely focus on assessing lectors performance, the inherent communicative and interactive functions of the course may be compromised. Therefore, the lecturer needs support and encouragement from the administration.

The implementation of practical activities mainly relies on extracurricular activities, which in turn can promote the understanding of classroom theory. Therefore, the teaching quality evaluation must adhere to the unity of theory and practice. With continuous maturity and development of internet application technology, ML algorithms is also increasingly being applied to teaching evaluation. At the end of each semester or during a certain period of study, the university will organize students to evaluate lectors on the official account or App at the specified time. If the evaluation cannot be completed in a timely manner, students will not be able to check their grades and perform other operations. This characteristic of short time and heavy tasks can make students perfunctory in evaluating, resulting in teachers receiving feedback that has no reference value. This kind of

"evaluating teaching for the sake of evaluation" ultimately only allows evaluation to become a formality. The quality evaluation of higher education mainly targets the teaching of teachers.

Therefore, the current evaluation system mainly introduces Western theories and research techniques. The lack of empirical research has led to the lack of guarantee for the scientificity of various evaluation indicators and the effectiveness of results, let alone the goal of improving the evaluation system in the long run.

### **How is artificial intelligence used in education?**

AI is used in education in numerous ways that enhance different aspects of teaching and learning. For example, adaptive learning platforms customize content for individual students. AI also automates grading and scheduling to free up teachers' time, and interactive tools make learning more engaging.

### **What is the future of AI in education?**

The future of AI in education is bright, with ongoing improvements in personalized learning and accessibility. We can expect more advanced tools for adaptive learning and immersive virtual classrooms that will make education more engaging and effective.

### **How is AI currently being used in higher education?**

AI is used in higher education in various ways, from detecting plagiarism and ensuring exam security to providing student support through chatbots. It also enhances online learning, transcribes lectures, tracks student progress, supports research and connects campuses. These diverse applications help streamline tasks and improve the learning experience for everyone.

### **Is AI good or bad for education?**

AI has the potential to greatly improve education by personalizing learning and making administrative tasks easier. However, it also raises concerns about data privacy and equity. Thoughtful and ethical use of AI can maximize its benefits while addressing these challenges.

Below is a list of benefits of AI in education [7]:

1. **Adaptive Learning:** AI-driven platforms assess students' skill levels in real time and tailor instructional content to meet individual needs. These systems adapt lessons dynamically based on student responses, providing customized pathways to help students master concepts at their own pace.
2. **Data and Learning Analytics:** AI helps analyze data from online learning portals, classroom attendance and grades. This data provides insights into student performance, helping educators identify trends and tailor instruction to address gaps in understanding and performance.
3. **Classroom Management:** Platforms use AI to gamify classroom management. AI tracks student behavior and engagement, rewarding positive actions with points and badges and providing teachers with insights into classroom dynamics to manage and motivate students.
4. **Intelligent Tutoring Systems:** AI-powered tutoring systems such as Carnegie Learning provide personalized feedback and support, adapting to individual learning styles and needs to help students understand complex concepts and improve academic performance.
5. **Automated Grading and Assessment Tools:** These tools use AI to evaluate assignments and provide detailed feedback, streamlining the grading process, ensuring consistency and saving teachers time. AI can also grade more abstract assessments like essays by analyzing the content for coherence and relevance.

6. **Chatbots and Virtual Assistants:** AI-driven chatbots such as [Mainstay](#) provide students with immediate support and assistance outside classroom hours. These chatbots answer questions, remind students of deadlines and guide them through administrative processes, enhancing engagement and promoting independent learning.
7. **Curriculum Planning:** AI helps educators plan curricula by analyzing educational data to identify trends and gaps. This ensures the curriculum remains relevant, comprehensive and aligned with learning objectives by suggesting updates based on the latest educational needs and standards.
8. **Personalized Learning:** AI learning platforms create customized learning experiences by adapting to the unique ways students understand concepts. This reduces cognitive load and ensures that each student receives instruction tailored to their learning style and pace.
9. **Language Learning:** AI tools like *Duolingo* use adaptive algorithms to personalize language learning experiences. The AI adjusts the difficulty of exercises based on the user's progress, ensuring an optimal learning curve and enhancing language acquisition.
10. **Virtual 3D Classrooms:** The metaverse creates *immersive virtual classrooms* where students can interact with classmates and teachers. Platforms like Engage VR offer virtual environments that enhance the learning experience beyond traditional methods, providing opportunities for interactive and experiential learning.
11. **Plagiarism Detection:** AI tools analyze student submissions for potential plagiarism by comparing them against a vast database of academic content, ensuring academic integrity and originality in student work.

## VI. CONCLUSION

In the era of globalization the crucial role online, distance and hibrid teaching. After the pandemic, such teaching methods have been recognized all in the world, although face-to-face teaching is still a priority.

In this study have been developed a modern teaching models, which criteria play a decisive role in the learning process, what the lecturer should focus on to achieve the best results.

## REFERENCES

- [1] I. Abuladze, I. Megrelishvili. The role of artificial intelligence for the effectiveness of the educational process. International Scientific and Practical Conference "Innovations and Modern Challenges 2022" dedicated to the 100th anniversary of the Georgian Technical University and the 65th anniversary of the Faculty of Informatics and Control Systems. Tbilisi, Georgia, 2022.
- [2] N. Hotara, M. A. Özcanb, B. Baranc, E. Karagözd, L. Ö. Güneye. Face-to-Face, Online or Hybrid, Which Model is Preferred by University Students and Why? Journal of Learning and Teaching in Digital Age, 8(2), 2023, pages 1799-180.
- [3] Ouyang, F., & Jiao, P. (2021). Artificial Intelligence in Education: the Three Paradigms. Computers and Education: Artificial Intelligence, 2(1), 100020. <https://doi.org/10.1016/j.caeai.2021.100020>
- [4] I. Abuladze. Programming Language Python. Technical University, Tbilisi, Georgia, 2021.
- [5] UCL. (2020, March 11). Opinion: AI in education will help us understand how we think. UCL News. <https://www.ucl.ac.uk/news/2020/mar/opinion-ai-education-will-help-us-understand-how-we-think>
- [6] E. M. Onyema, Kh. K. Almuzaini, F. U. Onu, D. Verma, U. S. Gregory, M. Puttaramaiah, R. K. Afriyie. Prospects and Challenges of Using Machine Learning for Academic Forecasting. Hindawi, Computational Intelligence and Neuroscience, 2022.
- [7] Administrator. (2021, December 7). 43 Examples of Artificial Intelligence in Education. University of San Diego Online Degrees. <https://onlinedegrees.sandiego.edu/artificial-intelligence-education>