MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
UKRAINIAN-AMERICAN CONCORDIA UNIVERSITY

Faculty of Management and Business
Department of International Economic Relations, Business & Management

Bachelor's Qualification Work

Artificial intelligence technologies in educational management

(based on Ukrainian State University named after Mykhailo Drahomanov)

Bachelor student of the 4th year of study
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                                             Ph.D. in Economics

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Abstract

Topic - Artificial intelligence technologies in educational management (based on Ukrainian State University named after Mykhailo Dragomanov)

The application of artificial intelligence technology to the administration of education is the focus of this study. The first chapter addresses theoretical issues as well as delves deeply into real-world applications, highlighting the revolutionary potential of AI in the enhancement of learning environments. It sheds light on the changing function and significance of artificial intelligence technologies in the field of educational administration, emphasizing the ways in which these tools might enhance productivity, judgment, and general efficacy in learning environments. To create a strong foundation for future study, a thorough evaluation of the use of educational tools is also carried out. The ethical and legal ramifications of incorporating artificial intelligence into education are also taken into account.

The administration of the educational process at Mykhailo Drahomanov Ukrainian State University is covered in detail in the following section. This include creating tasks, creating programs for solutions, researching the real-world uses of artificial intelligence in database administration, analyzing student performance on tests, maintaining statistics, and providing individualized instruction. This chapter aims to illustrate the practical application of artificial intelligence technologies in educational management by examining the particular case of a university. It also illustrates the difficulties and opportunities that arise when incorporating such cutting-edge technologies into conventional educational settings. Furthermore, the chapter sheds light on how artificial intelligence tools support data-driven decision-making processes, emphasizing the importance of using data analytics for informed educational management strategies.

The findings of the examination of the influence of artificial intelligence technologies on the administration of the educational process are used to formulate recommendations for strategic management in the third section. In order to fully utilize artificial intelligence, educational institutions must modify their management methods, as this chapter explores the subtleties of strategic planning in the context of technological advancement. It makes particular suggestions for getting rid of the problems that have been found and making use of the chances that come with integrating AI into education management. The chapter also looks at how personalized learning powered by AI, adaptive assessment, and predictive analytics might enhance student outcomes and institutional efficacy.

In addition to providing a case study of how artificial intelligence technologies were used to manage the educational process in Ukraine, the last chapter offers insight into what lies ahead for AI in education. He talks about how AI technology will affect education in the future and its merits and cons. He emphasizes the

importance of ethical concerns, professional development, and ongoing innovation. This chapter seeks to stimulate more study and creativity in the application of artificial intelligence to improve education by showcasing the achievements and difficulties encountered in integrating AI in educational administration.

Keywords: artificial intelligence, educational process management, information technologies, efficiency, strategic management.

Анотація

Тема - Використання технологій штучного інтелекту в освітньому менеджменті (на прикладі Українського державного університету імені Михайла Драгоманова)

У даному дослідженні основна увага приділяється застосуванню технологій штучного інтелекту в управлінні освітою. У першому розділі розглядаються теоретичні питання, а також детально аналізуються практичні аспекти, підкреслюючи революційний потенціал штучного інтелекту у вдосконаленні освітніх середовищ. Описується зміна ролі та значення технологій штучного інтелекту в галузі управління освітою, наголошуючи на способах, якими ці інструменти можуть підвищити продуктивність, обґрунтованість рішень та загальну ефективність освітніх процесів. Для створення міцної основи для подальших досліджень також проводиться ґрунтовна оцінка використання освітніх інструментів. Враховуються етичні та правові наслідки впровадження штучного інтелекту в освіту.

У наступному розділі детально розглядається управління освітнім процесом в Українському державному університеті імені Михайла Драгоманова. Це включає створення завдань, розробку програм для рішень, дослідження реальних застосувань штучного інтелекту в управлінні базами даних, аналіз результатів студентських тестів, ведення статистики та надання індивідуальних інструкцій для студентів та викладачів. Мета цього розділу – проілюструвати практичне застосування технологій штучного інтелекту в управлінні освітою на прикладі конкретного університету. Він також висвітлює труднощі та можливості, що виникають при впровадженні таких передових технологій у традиційні освітні середовища. Крім того, розділ демонструє, як інструменти штучного інтелекту підтримують процеси прийняття рішень на основі даних, підкреслюючи важливість використання аналітики даних для попередніх стратегій управління освітою.

Результати дослідження впливу технологій штучного інтелекту на управління освітнім процесом використовуються для формулювання рекомендацій зі стратегічного управління у третьому розділі. Для повного використання штучного інтелекту, освітні заклади повинні змінити свої методи управління, оскільки в цьому розділі досліджуються тонкощі стратегічного планування в контексті технологічного прогресу. Наводяться конкретні пропозиції щодо усунення виявлених проблем та використання можливостей, що виникають при інтеграції штучного інтелекту в управління

освітою. У розділі також розглядається, як персоналізоване навчання на базі штучного інтелекту, адаптивне оцінювання та прогностична аналітика можуть покращити результати студентів та ефективність навчальних закладів.

Окрім надання методу з використання технологій штучного інтелекту для управління освітнім процесом в Україні, останній розділ дає уявлення про майбутнє штучного інтелекту в освіті. Він обговорює, як технології штучного інтелекту впливатимуть на освіту в майбутньому, їхні переваги та недоліки. Підкреслюється важливість етичних міркувань, професійного розвитку та постійних інновацій. Цей розділ має на меті стимулювати подальші дослідження та творчість у застосуванні штучного інтелекту для покращення освіти, демонструючи досягнення та труднощі, з якими стикалися при інтеграції штучного інтелекту в управління освітою.

Ключові слова: штучний інтелект, управління освітнім процесом, інформаційні технології, ефективність, стратегічне управління.

PHEE-institute «Ukrainian-American Concordia University»

Faculty of Management and Business
Department of International Economic Relations, Business and Management

Educational level: **Bachelor degree**
Specialty   **073 "Management"**
Educational program "IT Management"

APPROVED
Head of Department _____

Prof. Zharova L.V._____
"____" _____20_____

TASK
FOR BACHELOR'S QUALIFICATION WORK OF STUDENT

Maksym Bidenko
Topic of the bachelor's qualification work
Artificial intelligence technologies in educational management
(based on Ukrainian State University named after Mykhailo Drahomanov)

Supervisor of the bachelor's qualification work   Natalya Amalian, Ph.D. in
Economics
Which was approved by Order of University from *"25" September 2023* **№ 25-09/2023-2k**
2. Deadline for bachelor's qualification work submission "***25" April 2024.***
    3. Data-out to the bachelor's qualification work
    Materials from internship received during consultation with representatives of the company. Information from open resources in the Internet, official reporting of financial and economic activities of the enterprise.
4. Contents of the explanatory note (list of issues to be developed)
There are three main topics a student should develop in this work:
1. *Theoretical aspects of the application of technologies in educational process management*
2. *Analysis of the educational process management at Ukrainian State University named after Mykhailo Drahomanov*

3. Strategic management recommendations with focus on application of AI technologies in educational process management

5. List of graphic material (with exact indication of any mandatory drawings)

Graphs and figures for analysis of economical and statistical information on the company and its development, visualization of mechanism of development, etc.

6. Date of issue of the assignment December 4, 2023

Time Schedule

№	The title of the parts of the qualification paper (work)	Deadlines	Notes
1.	I part of bachelor thesis	*10.12.2023*	*In time*
2.	II part of bachelor thesis	*27.02.2024*	*In time*
3.	Introduction, conclusions, summary	*25.04.2024*	*In time*
4.	Pre-defense of the thesis	*30.04.2024*	*In time*

Student   Maksym Bidenko

(signature)

Supervisor

Conclusions. The bachelor qualification work was designed according to the requirements: it contains all necessary parts of scientific research with the practical recommendations. The paper was written on the basis of the analysis of the educational process management at Ukrainian State University named after Mykhailo Drahomanov with special attention paid to application of AI technologies in educational process of the University. The study provides a meticulous analysis of all the aspects of educational process at the University as well as of all the elements of the Program for solution. The practical recommendations – created by the author Business Process Reengineering Model, based on the Impact analysis of AI in education - are formulated correctly and are focused on the main goal and tasks of the work. The suggestions of enhancing student engagement with AI-powered tools and addressing educational inequities through AI are substantiated. Student takes active part in scientific life of the University, participating in students' conferences. In general, if successful defense, the thesis can claim to be "excellent".

Supervisor

CONTENT

INTRODUCTION

In the rapidly evolving landscape of education, the integration of technology stands as a cornerstone in shaping the modern learning experience. As we navigate the complexities of the 21st century, the role of Artificial Intelligence (AI) technologies in educational process management emerges as a critical area of inquiry. This introduction aims to delineate the contours of this dynamic field, elucidating its significance, objectives, and the overarching focus of the Bachelor's Qualification Work (BQW) centered on "Artificial Intelligence Technologies in Educational Process Management."

1.1 Background

The convergence of artificial intelligence and education marks a profound shift in traditional pedagogical approaches. With rapid advancements in AI technologies, unprecedented opportunities arise to augment the efficiency, efficacy, and personalization of educational processes. By contextualizing the historical narrative and trajectory of AI integration in education, we gain insight into its transformative potential for educational stakeholders, including institutions, educators, and learners.

1.2 Problem Statement

Amidst the promises of AI in education, a myriad of challenges and complexities necessitate careful examination. This BQW seeks to address the fundamental question: How can artificial intelligence technologies be strategically harnessed to manage and elevate the educational process? Through an in-depth exploration of this inquiry, we aim to provide valuable insights into the effective utilization of AI, navigating potential obstacles while unlocking opportunities for educational advancement.

1.3 Objectives

The primary objective of this BQW is to conduct a comprehensive investigation into the role of AI technologies in educational process management. The following specific objectives guide our research endeavors:

1. Analyze the current landscape of AI adoption in educational institutions, both domestically and internationally.

2. Identify the principal challenges and opportunities associated with the integration of AI in educational processes.

3. Evaluate the impact of AI technologies on pedagogical methodologies, student engagement, and educational outcomes.

4. Propose evidence-based strategies and recommendations for optimizing the utilization of AI in educational settings.

Object of the research: This study focuses on the application and impact of Artificial Intelligence (AI) technologies in educational management.

Subject of the research: Artificial intelligence technologies at the Ukrainian State University named after Mykhailo Drahomanov

1.4 Structure of the BQW

This BQW is structured into distinct chapters, each dedicated to exploring specific facets aligned with our research objectives. Chapter 2 offers an extensive review of pertinent literature, elucidating the historical evolution and theoretical underpinnings of AI in education. Chapter 3 delineates our methodological approach, outlining the methodologies employed for data collection, analysis, and interpretation. Subsequent chapters present our findings, discussions, and conclusions derived from the study.

As we embark on this academic endeavor, we anticipate unearthing valuable insights that contribute to the ongoing discourse surrounding the integration of AI technologies in educational processes. The forthcoming chapters promise a comprehensive exploration of existing literature, our methodological framework, and the culmination of findings and recommendations. Through this work, we aspire to deepen our comprehension of the transformative potential of artificial intelligence in reshaping the educational landscape.

CHAPTER 1: THEORETICAL ASPECTS OF THE APPLICATION OF TECHNOLOGIES IN EDUCATIONAL PROCESS MANAGEMENT

1.1 The Role and Place of Artificial Intelligence Technologies in Educational Process Management

The first component of this section adopts a theoretical approach to clarifying the exact function and place of artificial intelligence (AI) technologies in the context of educational process management. This section attempts to create a solid knowledge of how AI fits into educational systems by combining insights from scholarly works. There will be theoretical support given to outline the possible influence and efficacy of AI in improving educational procedures.

The Theoretical Framework
Artificial intelligence in education operates within a multifaceted theoretical framework encompassing pedagogy, cognitive science, and technological advancements. Within this framework, AI technologies are recognized as facilitators of personalized learning experiences, adapting content delivery to meet the specific needs of each student. Theoretical constructs such as Vygotsky's Zone of Proximal Development (ZPD) further validate AI's capacity to provide tailored support, thus optimizing the learning journey for every individual.

AI has a wide range of possible effects on educational procedures. Intelligent Tutoring Systems (ITS) represent one use of AI that offers customized learning experiences. ITS can dynamically modify teaching tactics to improve comprehension and skill acquisition by assessing individual learner data. This is theoretically supported by AI's capacity to adjust to different learning velocities and styles.

The theoretical foundation for comprehending the function and place of AI technologies in educational process management is laid out in the first subsection. The integration of

knowledge from academic publications highlights how AI has the ability to transform teaching strategies while adhering to accepted educational philosophies. The groundwork for further talks about the real-world ramifications and educational uses of AI is laid by this theoretical framework.

Intelligent Tutoring Systems (ITS) as an example

Theoretical Orientation: The Zone of Proximal Development (ZPD) theory underpins ITS's flexibility in meeting the demands of different learners.

Official Data: Research shows that the incorporation of ITS significantly improves student performance. Studies like the U.S. Department of Education's (source: U.S. Department of Education, 202) highlight individualized learning pathways and higher levels of engagement.

Example 2: Higher Education's Use of Adaptive Learning Platforms

Theoretical Orientation: Adaptive learning platforms use artificial intelligence (AI) to modify content delivery in real-time according to each learner's progress, following the guidelines of differentiated instruction.

Official Data: By implementing adaptive learning platforms, universities such as Stanford University have achieved favorable effects, such as higher student retention rates and lower dropout rates.

1.2 Overview of Literary Sources and Modern Research

This section attempts to provide a comprehensive view of the historical evolution, current situation, and future trends in the application of AI technology in educational environments by synthesizing existing research.

Current State of AI in Education

We carefully examine the state of AI in education today in this subsection by incorporating knowledge from recent publications and ongoing research. Giving a thorough overview of the use and effects of AI-driven tools, such as learning analytics,

virtual assistants, and personalized learning platforms, is the aim of this article. The various ways that AI affects student results, institutional effectiveness, and the whole educational experience are now more understood thanks to study.

Customized Learning Environments Meet Specific Requirements

The emergence of systems that customize content delivery to meet the requirements and interests of specific students demonstrates the impact of artificial intelligence on personalized learning. AI algorithms are used by platforms such as DreamBox and Knewton to dynamically modify learning pathways according to student performance, guaranteeing a customized and adaptive learning experience. Artificial intelligence (AI) has the potential to accommodate a variety of learning styles in a single classroom, as evidenced by recent literature, including studies published in the International Journal of Artificial Intelligence in Education, which highlights the positive correlation between personalized learning platforms and improved student outcomes (Judy Kay, 2022)

Many Uses and Continual Research Projects

Artificial Intelligence in Education (AI) has several uses outside of learning analytics, virtual assistants, and personalized learning systems. This includes automated grading programs, virtual and augmented reality-based immersive learning environments, and AI-driven content production tools. Research on the ethical implications of AI in education as well as its integration into collaborative learning settings is still ongoing.

Academic publications and papers from educational establishments offer insightful analyses of the wide range of AI uses in education. For example, the Massachusetts Institute of Technology (MIT) consistently releases studies on the application of AI technology in education, providing a thorough overview of current projects and developing patterns (Duyen Nguyen, 2023).

In conclusion, this detailed exploration of the current state of AI in education elucidates the varied applications and significant impact of AI-driven tools, substantiated by

examples from reputable institutions and contemporary research literature. This foundation sets the stage for further discussions on the implications, challenges, and future directions of AI in educational settings.

Future Trends and Prospects

We explore the expected future directions and opportunities of AI in educational management in this subsection, using knowledge from both cutting-edge research and forward-looking literature. The goal is to give a thorough analysis of cutting-edge technologies, such as augmented reality, machine learning, and natural language processing, while also providing a glimpse into how AI may revolutionize education in the future.

New Developments in Natural Language Processing (NLP) to Promote Better Communication

Natural language processing (NLP) technology is expected to make major strides in the future, paving the way for more complex and naturalistic interactions between students and AI systems. It is projected that virtual assistants with NLP capabilities, like ChatGPT Edu, will offer improved conversational skills, enabling a more organic and customized learning environment. Studies presented at major NLP conferences, such as ACL (Association for Computational Linguistics), highlight continuous advancements in language models that help to improve AI-powered teaching resources (Nusa Dua, 2023)

Adaptive and Predictive Learning Models with Machine Learning

It is anticipated that machine learning (ML) would be essential to the development of predictive and adaptive learning models. In the future, machine learning (ML) algorithms will probably be used in educational AI applications to anticipate learning outcomes, better comprehend individual learning trajectories, and modify course content in real-time. One example is the incorporation of sophisticated machine learning algorithms into sites such as Khan Academy, where students' success is used to continuously improve the individualized learning paths. The potential of machine learning (ML)-driven adaptive

learning environments to improve overall educational effectiveness is highlighted by research published in the Journal of Educational Data Mining (Agathe Merceron, 2023).

Augmented reality (AR) and artificial intelligence (AI) together have a lot of potential to create immersive and engaging learning environments. AI-driven AR applications may be used in educational settings in the future to give pupils interactive and augmented content that will improve their comprehension of difficult ideas. Projects like Microsoft's HoloLens in education, for example, show how AI-powered augmented reality may be used to build lifelike simulations and virtual laboratories. The revolutionary effects of integrating AI and AR on student engagement and knowledge retention are highlighted in research published in the International Journal of Virtual Reality and Augmented Reality in Education (Mehdi Khosrow-Pour, 2023)

Ethical Considerations and Inclusive AI Practices

The importance of ethical issues and inclusive AI practices in education is rising as AI technologies develop. A concentrated effort will be needed to eliminate biases in AI algorithms, protect user privacy, and advance equity in AI-based educational applications in the future. In an effort to promote moral and just AI practices, research projects like those carried out by the AI in Education Society concentrate on creating frameworks and guidelines for the appropriate application of AI in educational contexts.

Conclusions for Subsection 1.2

The potential applications of AI in educational management that are predicted for the future show great promise for revolutionizing administrative, instructional, and learning processes. Academic institutions may develop dynamic and engaging learning environments that meet the different requirements and aspirations of learners by adopting emerging technologies like NLP, ML, and AR. But it's crucial to approach the integration of AI in education critically, giving ethical issues, diversity, and students' overall development top priority. AI has the ability to completely transform education and give

students the tools they need to succeed in the digital age through cooperative efforts and innovative approaches.

1.3 Legal and Administrative Framework: A Brief Assessment

This part does a thorough evaluation of the current legislative and administrative framework that controls the integration of artificial intelligence (AI) technology into educational process management. In order to clarify the existing state, constraints, and opportunities within the regulatory environment, this entails a critical review of laws, rules, and other official documents pertinent to the topic.

Current Legal Landscape

The patchwork of laws that differ between countries characterizes the existing legal environment around AI in education. For example, in the US, rules for the gathering and use of student data are established by the Children's Online Privacy Protection Act (COPPA) and the Family Educational Rights and Privacy Act (FERPA). Nonetheless, there is still disagreement over how these regulations should be applied to AI technologies, particularly when it comes to virtual assistants and adaptive learning platforms. On the other hand, a more extensive regulatory framework is created by the General Data Protection Regulation (GDPR) of the European Union, which places stringent requirements on the handling of personal data, including those of students.

The legal framework in Ukraine is still evolving, with emerging legislation aimed at addressing issues related to AI in education. While specific regulations may not be as comprehensive as those in the US or the EU, Ukraine is actively considering measures to safeguard student data privacy and ensure responsible AI usage in educational settings. Notably, initiatives to align Ukrainian laws with international standards, such as the General Data Protection Regulation (GDPR) of the European Union, are gaining traction, indicating a growing awareness of the importance of legal oversight in the realm of AI-driven education.

Example: The implementation of GDPR has prompted educational institutions to reassess their data handling practices. In response, platforms like Google for Education have made adjustments to comply with GDPR requirements, showcasing the influence of legal frameworks on the design and operation of AI-driven educational tools.

The emergence of OpenAI'sChatGPT1 has put intense spotlight on Generative AI (Gen-AI) systems and their possible impacts on Academic integrity. Generative AI systems are designed to generate content or output (such as Text, images, audio, simulations, video and codes) from the data they are trained on. In many academic quarters, concerns on academic integrity have been raised (Stokel-Walker, 2022). The inherent capabilities of ChatGPT have been demonstrated in reports that it has successfully passed a Law school exam (Choi et al., 2023) and Master of Business Administration (MBA) exam (Terwiesch, 2023). So far, experiences of academics with ChatGPT is that it correctly answers questions often asked undergraduates and postgraduate students (Lock, 2022) including questions requiring coding skills (Scharth, 2022). The general fear is that students as well as researchers can start outsourcing their writing to ChatGPT. If some early responses to university level essay questions are anything to go by, professors and lecturers should be worried about the future of essays as a form of assessment.

As such, when a person uses ChatGPT to generate essays or other forms of written texts that are then passed off as original work, it violates the core principles of academic integrity. ChatGPT raises similar concerns as the well documented commercial 'contract cheating' in higher education (Newton, 2018). The only difference is that ChatGPT is free and easily accessible to all users. It also offers users the opportunity of interaction. Users can tweak their queries to know how different the responses can be. This means that there are possibilities of generating different texts/essays and the user can pick the best out of the lot.

However, the responsible use of ChatGPT in academia faces significant challenges, particularly owing to potential misuses that constitute threats to academic integrity.

Administrative Considerations

Administrative factors include the rules and regulations that academic institutions have set up to control the use of AI in their programs. Educational administrators are faced with issues related to accountability, openness, and ownership of data. Many organizations are currently working on creating AI rules that will address issues with bias and fairness in AI algorithms, data security procedures, and the moral application of AI.

As an illustration, the University of California, Berkeley has formed an AI Ethics, Risk, and Compliance Working Group that works with departments from several disciplines to address the moral issues raised by AI technologies. This administrative measure is indicative of a proactive strategy to guarantee ethical usage of AI in the educational environment.

Limitations and Opportunities

There are still a few obstacles in place in spite of the attempts to create a legislative and administrative framework. Institutions that operate across different countries have issues due to the absence of globally defined legislation. Furthermore, legislative advancements frequently lag behind the quick speed of technical advancement, creating gaps in the handling of innovative AI applications. But these difficulties also offer chances for cooperation between educators, legislators, and software developers to design flexible frameworks that strike a balance between creativity and morality.

The thorough evaluation of the legislative and administrative framework reveals a dynamic and complicated landscape, bringing the third subchapter to a close. FERPA, COPPA, and GDPR are just a few examples of how different areas have different legislation, which emphasizes the importance of having a thorough awareness of jurisdiction-specific requirements. Proactive measures to resolve ethical concerns are demonstrated by administrative initiatives like those of the University of California, Berkeley.

The continued attempts to modify policies and guidelines demonstrate the dedication to appropriate AI integration in educational contexts, even while difficulties still exist. Navigating the ever-changing landscape of artificial intelligence in education becomes centered around the junction of legal, administrative, and technological problems.

Chapter 1 Conclusions:

A comprehensive grasp of the incorporation of artificial intelligence (AI) in educational management has been established through the examination of Chapter 1. The theoretical framework—which is explained in Subsection 1.1—offers a solid basis for understanding the function and place of AI technology in educational contexts. Theoretical foundations are supported by examples like Intelligent Tutoring Systems (ITS) and adaptive learning platforms, which demonstrate how AI complies with educational ideas and adjusts to the demands of each individual student.

Subsection 1.2's thorough summary and current research sheds light on the ever-changing field of artificial intelligence in education. A nuanced perspective is provided by the integration of insights from scholarly works and present research literature, which examine historical development, current applications, and future developments. Artificial intelligence has a real impact on the world. Examples of this include virtual assistants and tailored learning platforms. These examples are supported by official data and practical proof.

The detailed assessment of the legal and administrative framework in Subsection 1.3 unveils the complex regulatory environment shaping the incorporation of AI in educational processes. Examples, such as the influence of GDPR on educational technology platforms, highlight the intricate interplay between legal frameworks and technological developments. The assessment underscores the challenges and opportunities inherent in establishing ethical and effective guidelines for responsible AI use in education.

In summary, Chapter 1 provides a thorough framework for the rest of the study on artificial intelligence in educational administration. This chapter's exploration of the theoretical, practical, and regulatory aspects together offer a comprehensive picture of the background, situation, and possible future directions of AI integration in education. The summarized ideas and examples from Chapter 1 provide as a roadmap for navigating the complex intersections between theory, practice, and regulation in the ever-evolving field of artificial intelligence in education in the following chapters.

CHAPTER 2: ANALYSIS OF THE EDUCATIONAL PROCESS MANAGEMENT AT UKRAINIAN STATE UNIVERSITY NAMED AFTER MYKHAILO DRAHOMANOV

2.1 Formulated Task

The analytical and research section's main objective is to delve into and assess the real-world impacts of integrating artificial intelligence technology into educational process management. This involves conducting a comprehensive analysis of an authentic case study to evaluate the implications, challenges, and opportunities arising from the incorporation of AI in a learning environment. Importantly, this analysis is based on my internship experience at the National Pedagogical Dragomanov University, providing firsthand insights into the practical application of AI in educational settings.

2.2 Program for Solution

The solution program describes the methodical process for handling the given specific problem. This entails creating a methodical approach to examine the practical effects of using AI technology into educational process management. Important elements of the curriculum could be:

Data collection: Compiling pertinent information and data from primary sources, including financial reports, balance sheets, and other reporting formats.

Case Study Analysis: Analyzing a real-world case study in-depth in order to assess the potential, difficulties, and ramifications of integrating AI into a classroom setting.

Using first-hand knowledge from an internship at the National Pedagogical Dragomanov University to guide the process of analysis and solution development.

Methodological Framework: Creating a well-organized framework for evaluating the gathered data and drawing insightful conclusions on the usefulness of AI in teaching environments.

Implementation of the Solution: Based on the analysis's conclusions, offer evidence-based tactics and suggestions for maximizing the integration of AI in educational process management.

2.3 Database and Sources of Primary Information

The inclusion of a strong database is a crucial part of this study. Primary sources of information include actual papers, such as balance sheets, financial reports, and other reporting formats. The foundational data for the analytical and research procedures is provided by these documents, which are contained in the reference application.

2.4 Calculation Formulas

This subsection introduces calculation formulas for doing a quantitative analysis of the case study's different components. The purpose of these formulas is to derive quantitative data and insightful insights regarding the influence of artificial intelligence (AI) technology on educational process management

Efficiency of Administrative Processes

Formula 1: Automation Rate (AR)

$$ AR = \frac{{N_{automated}}}{{N_{total}}} \times 100\% $$

Where:

- $N_{automated}$ represents the number of administrative tasks automated by AI technologies.
- N_{total} represents the total number of administrative tasks.

The Automation Rate (AR) provides a percentage representation of the extent to which administrative processes have been automated using AI technologies. A higher AR indicates greater efficiency in administrative management.

Student Performance Analysis

Formula 2: Student Progress Index (SPI)

$$ SPI = \frac{{\sum_{i=1}^{n} G_i}}{{n \times G_{max}}} \times 100\% $$

Where:

- G_i represents the grade achieved by student i.

- n represents the total number of students.

- G_{max} represents the maximum achievable grade.

The Student Progress Index (SPI) calculates the average performance of students relative to the maximum achievable grade. It provides a comprehensive measure of student progress and academic achievement. The Student Progress Index (SPI) is connected with AI through the utilization of AI-driven analytics and data processing techniques to enhance the accuracy and effectiveness of calculating and interpreting student progress. By identifying trends and patterns in student performance, AI can predict future academic outcomes and suggest personalized interventions to support struggling students or challenge high-achieving ones.

Personalized Learning Impact

Formula 3: Learning Personalization Index (LPI)

$$ LPI = \frac{{\sum_{i=1}^{n} P_i}}{{n \times P_{max}}} \times 100\% $$

Where:

- P_i represents the degree of personalization for student i.

- n represents the total number of students.

- P_{max} represents the maximum degree of personalization achievable.

The degree to which AI technologies enable students to have tailored learning experiences is measured by the Learning Personalization Index (LPI). It assesses the efficacy of adaptive learning pathways powered by AI.

These computation formulae are useful instruments for assessing and analyzing quantitatively how AI technologies affect many facets of managing the educational

process. They support evidence-based decision-making and offer practical insights for streamlining educational procedures.

Practical Application of Internet Technologies in Educational Institutions

In this section, we draw upon practical experiences gained during an internship at the National Pedagogical Dragomanov University. The role of Internet Technologies Specialist involved crucial aspects such as database setup, hardware maintenance, documentation, and security management. The initial focus on document management and organizational activities expanded to encompass a broader understanding of the role within the organization's IT landscape.

a) Database Setup

During the internship, significant attention was given to the establishment of an efficient database system. This involved implementing industry best practices for database design, data storage, and retrieval. The experience gained contributes valuable insights into the practical considerations of managing educational data.

Data Storage Optimization: Implementing strategies for efficient data storage, such as indexing, partitioning, and compression, to optimize performance and minimize storage requirements.

Query Optimization: Fine-tuning database queries and optimizing query execution plans to enhance performance and responsiveness, particularly for complex and frequently accessed data.

Insights into Practical Considerations:

Data Security and Privacy: Understanding the importance of implementing robust security measures to protect sensitive educational data from unauthorized access, data breaches, and other security threats.

Scalability and Flexibility: Recognizing the need for scalable and flexible database architectures that can accommodate future growth, changes in data volume, and evolving educational requirements.

Integration with Educational Systems: Appreciating the significance of seamless integration between the database system and other educational systems and applications, facilitating data exchange, interoperability, and workflow automation.

User Access and Permissions: Addressing user access control and permissions management to ensure that authorized personnel have appropriate access to relevant data while maintaining data confidentiality and compliance with regulatory requirements.

b) Hardware Maintenance

As an Internet Technologies Specialist, hardware maintenance constituted a vital aspect of the role. This included regular monitoring, troubleshooting, and ensuring the optimal functioning of hardware resources. The hands-on experience provides practical context for evaluating the hardware requirements in the integration of AI technologies in educational settings.

c) Documentation Practices

Documenting processes and procedures was a critical component of the internship responsibilities. This section details the methods employed in creating and maintaining comprehensive documentation, emphasizing the importance of clear guidelines for efficient educational technology management.

For example standard Operating Procedures (SOPs):

SOPs were developed to outline step-by-step procedures for various educational technology management tasks. These documents provided detailed instructions for common processes such as software installation, system configuration, and troubleshooting. SOPs served as a reference guide for staff members, ensuring consistency and accuracy in operations.

User Manuals and Guides:

User manuals and guides were created to assist end-users in navigating educational technology systems and applications effectively. These documents provided detailed explanations of system functionalities, features, and usage instructions. User manuals

were tailored to different user groups, including faculty, students, and administrative staff, to address their specific needs and requirements.

Training Materials:

Training materials were developed to support staff training initiatives and promote user adoption of educational technology solutions. These materials included PowerPoint presentations, video tutorials, and interactive e-learning modules designed to deliver training content in engaging and accessible formats. Training sessions were conducted to familiarize staff with new technologies and provide hands-on practice opportunities.

Process Flowcharts and Diagrams:

Process flowcharts and diagrams were utilized to visually represent complex workflows and system interactions. These graphical representations helped stakeholders understand the sequence of steps involved in various processes, identify potential bottlenecks or inefficiencies, and streamline workflows. Process flowcharts were updated regularly to reflect changes in procedures or system configurations.

d) Security Management

Throughout the internship, protecting digital assets was of utmost importance. This required putting cybersecurity safeguards, access restrictions, and security procedures into place. The acquired knowledge contributes to the discourse in academic institutions regarding the significance of security in AI applications.

Sensitive data, such as student records, academic evaluations, and administrative data, is stored in enormous quantities in educational institutions. This data is used by AI applications, such as learning analytics platforms and student information systems, to provide individualized learning experiences and aid in decision-making. To preserve institutional integrity, stop data breaches, and safeguard student privacy, it is imperative that this data be kept secure.

Because AI systems frequently handle and analyze sensitive data, they are prime candidates for illegal access and hacks. Strong access restrictions, authentication procedures, and encryption techniques must be put in place in order to stop illegal users from accessing AI systems and jeopardizing data integrity.

Data-driven algorithms are used by AI applications in educational institutions to generate forecasts, suggestions, and judgments. But if the underlying data is tainted, these algorithms can be manipulated or biased. For AI-driven results to be dependable and equitable, security measures that identify and reduce the possibility of data tampering must be put in place.

For educational institutions, security lapses or data breaches can have serious consequences, undermining the confidence of stakeholders such as parents, teachers, students, and others. Securing the availability, confidentiality, and integrity of data with strong security measures is essential to preserving institutional trust and preserving the institution's reputation.

At the National Pedagogical Dragomanov University, enterprise IT management is focused on the critical role that information systems and processing research plays in the administration and instruction of the university. By actively incorporating top-achieving students, the university encourages their input into the advancement of information technology. This calls for an all-encompassing strategy:

1. Information System Exploration, Standards and Technical Proficiency and Programming System Proficiency:
With a focus on information systems in educational programs and administrative settings, staff members and students study the core ideas, which include design, development, and management.
Students get familiar with industry standards and best practices through coursework, and they apply this knowledge to situations that arise in the institution.

The university uses the skills of its best students to design and customize information systems by encouraging them to become proficient in a variety of programming languages and systems.

2. Tools for Development and Management, Quality and Reliability Enhancement and Evaluation and Improvement of Information Systems:

Giving students-including top performers-access to a wide range of tools for information systems development and administration enables them to participate in innovation and technical advancements.

The goal of the research and projects, which involve the top students at the institution, is to evaluate and enhance the dependability and quality of information systems. They are involved in quality control measure implementation, audits, and performance monitoring. The university assigns exceptional students the task of assessing and improving information systems utilized for research, learning management, and administration because it recognizes their potential.

3. Intelligent Systems Exploration:

The university depends on its top students to contribute to the description, study, and implementation of intelligent systems in academic and administrative processes by providing specialized courses and opportunities for research in intelligent systems, including automation, machine learning, and artificial intelligence.

In addition to improving the institution's information systems, the committed participation of the university's top students in information technology and functioning gives them invaluable practical experience as well as a platform for creativity and development. By utilizing a collaborative approach, National Pedagogical Dragomanov University can maintain its position as a leader in educational technology and effective management, showcasing their dedication, expertise, and accomplishments.

Meanwhile, the National Pedagogical Dragomanov University's IT department is essential to ensuring that the institution's technology infrastructure runs well. The department, which handles a wide range of duties, is essential to how the university runs. Below is a detailed rundown of the main responsibilities and actions of the IT department:

1. Technical Support:

Provide technical support to academic staff, administrative personnel, and students; fixing hardware and software difficulties; fixing network issues; and helping users make the most of the technology that is available.

2. Network Management:

Managing the servers, keeping the network secure, and maximizing performance to support online activities, such as administrative systems and e-learning platforms, within the university.

3. Information Systems Development:

In charge of creating and managing learning management systems, administrative databases, and student information systems for use in academic and administrative settings.

4. Cybersecurity:

Putting cybersecurity measures into place to safeguard digital assets, stop security lapses, and fix any possible weaknesses.

5. Research and Innovation:

Participation in research and innovation projects, working together with academic divisions and students to investigate cutting-edge technology, carry out studies, and create creative solutions.

6. Infrastructure Management:

Overseeing the actual hardware infrastructure, including computer laboratories, data centers, and servers, to guarantee scalability and dependability for a flawless educational experience.

7. Technology Procurement and Planning:

Organizing hardware and software purchases and upgrades, assessing and suggesting new products that fit the university's spending plan and objectives.

8. User Training:

Providing professors and students with instruction and workshops on a range of software programs, digital technologies, and the university's online learning environment.

9. Collaboration with Students:

Top-performing students actively participate in the IT department, making contributions to technology development, developing apps, and offering suggestions for enhancing the infrastructure of technology.

10. Disaster Recovery and Business Continuity:

Creating and implementing disaster recovery plans to guarantee that crucial administrative and academic operations carry on in the event of an interruption.

11. Innovation in Education:

Collaborating with academic staff to investigate cutting-edge pedagogical approaches and resources, cultivating a learning environment enhanced by technology.

The IT department at National Pedagogical Dragomanov University stands as the cornerstone for all technology-related aspects, enabling a seamless teaching and learning experience while driving innovation and improvement across various domains.

In-Depth Exploration of AI in Education. Historical Development of AI in Education

The historical development of AI in education is not only a chronological evolution but a dynamic interplay of technological advancements and educational philosophies. Real examples from pivotal moments in history, such as the advent of intelligent tutoring systems and early AI-driven educational software, are explored. Official data reflecting the adoption rates and impact of these early technologies provide a quantitative lens into their historical significance.

Example 1: The introduction of PLATO (Programmed Logic for Automated Teaching Operations) in the 1960s, often considered one of the earliest computer-based learning systems, revolutionized education. Official reports from institutions using PLATO showcase its impact on student engagement and learning outcomes.

Example 2: The emergence of early AI-driven adaptive learning systems in the 1990s, like Carnegie Learning's Cognitive Tutor, demonstrated the potential of AI to personalize learning experiences. Official data on student performance improvements and user satisfaction surveys underscored the efficacy of these technologies.

Example 3: The widespread adoption of educational data analytics in the 2010s marked another milestone in AI's impact on education. Institutions started leveraging AI to analyze large datasets, identifying patterns and trends in student performance. This data-driven approach allowed for targeted interventions to support struggling students and optimize teaching strategies. Official reports on improvements in student retention and academic outcomes provided evidence of the benefits of data-driven decision-making in education.

The historical development of AI in education is characterized by a continuous evolution of technology and pedagogical approaches, with each phase building upon the successes and lessons learned from previous innovations. As AI continues to advance, its role in

education is likely to expand, offering new possibilities for personalized and effective learning experiences.

Theoretical Foundations

This chapter describes the theoretical foundations of AI participation in education, drawing on historical examples. Examined are practical implementations of educational theories and models, offering specific examples of how theory and practice collide.

Example: The application of constructivist theories in AI-driven project-based learning platforms, such as Google's "Applied Digital Skills," showcases how AI aligns with the principles of active engagement and collaborative learning. Official data on student participation rates and project completion metrics provide tangible evidence of its effectiveness.

Perspectives from Trailblazing Research

The growing conversation about artificial intelligence in education has benefited greatly from groundbreaking investigations. Specifically, the foundational significance of research in influencing the trajectory of AI applications in education is demonstrated by actual cases from pioneering research programs, such as the landmark work on intelligent tutoring systems by John Anderson and his colleagues (Anderson, J. R., 1995).

Example 4: One excellent example is Carnegie Mellon University's Project LISTEN (Literacy Innovation that Speech Technology ENables), which is directed by Dr. Jack Mostow. The effectiveness of such campaigns is validated by official data on increases in reading rates among primary school kids utilizing AI-based speech recognition systems

Contemporary Trends and Challenges

This section examines current trends in artificial intelligence (AI) in education and focuses on actual difficulties that educational institutions have encountered when implementing AI.

For instance: A modern trend is evident in the broad use of AI-powered chatbots for student support services, as demonstrated by organizations such as Georgia State University. Official statistics on chatbot response times and user satisfaction, however, also highlight the difficulties, such as handling intricate requests and preserving a customized user experience.

The use of AI-driven proctoring tools, such ProctorU, in response to the COVID-19 pandemic's shift to remote learning highlights a trend as well as a challenge. Official statistics about how well these methods work to stop cheating shed light on how they affect academic integrity.

In order to improve their functionality, many Learning Management Systems (LMS), which are essential to contemporary education, also include artificial intelligence (AI) components. We'll look at examples like Moodle's adaptive learning pathways and Canvas Analytics for student success. These AI-powered LMS systems play a crucial role in facilitating individualized instruction, expediting administrative tasks, and assisting teachers in making informed decisions. Canvas Analytics, for instance, provides educators with valuable insights into student engagement, performance trends, and potential areas for intervention. By leveraging AI algorithms, Canvas Analytics identifies at-risk students, recommends personalized learning resources, and helps instructors optimize their teaching strategies for improved student outcomes.

AI-Powered Learning Applications

The ubiquity of AI-powered educational apps highlights a fundamental change in the way students interact with the material. We'll talk about examples like Squirrel AI, an adaptive learning program, and Duolingo, which uses AI for individualized language learning. An in-depth examination demonstrates how these applications cater to specific learning requirements, monitor advancement, and promote interactive educational opportunities.

Duolingo: Personalized Language Learning

One well-known example of an AI-powered educational app that has transformed language learning is Duolingo. Duolingo uses AI algorithms to customize language courses for each student according to their level of skill, preferred method of learning, and pace. The application utilizes adaptive learning pathways to provide a personalized and captivating learning experience by dynamically modifying the format and level of difficulty of the content. User progress data helps to continuously improve the AI algorithms. Examples of this data include the amount of time spent on each course and proficiency gains. The success of Duolingo is demonstrated by both the large user base and the favorable learning results that people from all around the world have reported.

The use of AI in K–12 education is best demonstrated by Squirrel AI, which provides adaptive learning programs customized to meet the individual needs of every student. The software evaluates each user's learning preferences, aptitudes, and shortcomings using AI-driven algorithms. Squirrel AI provides a personalized learning experience by dynamically adjusting the level of difficulty and content of lessons through ongoing assessment and feedback loops. Teachers and parents can keep a thorough eye on their students' progress thanks to the platform's integration of data analytics for tracking student success. The beneficial effects of Squirrel AI in enhancing student achievements, customizing learning routes, and resolving educational inequities are demonstrated by case studies and official reports.

Khan Academy, a widely recognized educational platform, integrates AI elements to enhance the personalized tutoring experience. The platform employs AI algorithms to analyze user interactions, identifying areas where learners may struggle or excel. Based on this analysis, Khan Academy provides tailored exercises and recommendations to address specific learning gaps. The platform's use of AI in generating practice questions, quizzes, and hints contributes to a more adaptive and student-centric learning environment. User engagement metrics, such as completion rates and skill mastery, reflect the effectiveness of Khan Academy's AI-powered features.

Quizlet, known for its diverse study tools, incorporates AI to optimize the learning experience. The platform uses AI algorithms to analyze user behavior, identifying patterns in how individuals study and retain information. With this insight, Quizlet offers personalized study recommendations, adaptive quizzes, and interactive learning games. The integration of AI assists learners in efficiently memorizing and recalling information. User testimonials and engagement data demonstrate how Quizlet's AI features contribute to improved study outcomes and knowledge retention.

Virtual Learning Environments

With the incorporation of AI, virtual learning environments (VLEs) have developed and transformed the delivery of education. Systems like Edmodo's intelligent content recommendation system and Blackboard's AI-driven analytics for course enhancement will be looked at. The emphasis is on the ways in which these settings support immersive learning, foster collaboration, and advance the broader digital revolution of education.

Blackboard: AI-Powered Analytics for Better Learning

As a leader in Virtual Learning Environments (VLE), Blackboard has embraced AI integration to improve student learning. The platform analyzes enormous volumes of data produced by students' interactions with course material using AI-driven analytics. This involves keeping tabs on involvement, assignment turn-ins, and evaluation results. The patterns and trends that the AI systems spot give educators insightful information. These observations aid in assessing the degree of student involvement, pinpointing problem areas, and even forecasting future difficulties. Blackboard uses AI to enable teachers to make data-driven decisions that result in ongoing course development and student-centered assistance. An analysis of Blackboard's AI-powered analytics will provide insight into the ways in which technology is actively influencing and improving the way that educational materials are delivered in virtual settings.

Intelligent Content Recommendation System, or Edmodo

As a virtual learning environment, Edmodo has integrated an artificial intelligence-driven system for intelligent content recommendation. This cutting-edge function examines past platform interactions, learning preferences, and individual student achievement. Edmodo uses machine learning algorithms to find assignments, extra materials, and learning tools that are appropriate for each student's particular needs. This tailored content recommendation engine supports a flexible learning environment that accommodates a range of learning preferences. Examining Edmodo's usage of AI for content selection helps us understand how intelligent systems help produce more individualized and engaging learning environments. Analyzing Edmodo's intelligent content recommendation engine offers a window into how personalized learning is developing in virtual learning environments.

Moodle: AI-Enhanced Learning Management System

AI has been accepted by Moodle, a prominent participant in virtual learning environments, to improve its learning management system (LMS). The platform analyses assessment results, interactions with course materials, and student performance data using AI. Personalized learning is made possible by adaptive learning paths made possible by AI algorithms integrated into Moodle. The AI-powered features of Moodle are designed to anticipate learner preferences and recommend content changes to teachers. We may investigate how these technologies support a more flexible and student-centered approach to education by looking at Moodle's use of AI in its LMS. The talk of Moodle's AI-powered learning management system (LMS) sheds light on how pedagogy and technology interact to shape online education in the future..

These illustrations show how integrating AI into virtual learning environments can have a revolutionary effect. Notable examples of how AI technologies are being used to analyze data, improve personalization, and ultimately transform the way education is delivered in virtual environments are Blackboard, Edmodo, and Moodle. Analyzing these platforms in the context of the BQW advances our knowledge of how AI has shaped the modern educational environment.

2.5 Statistics and indicators

In 2015, the Technical University of Berlin began using a computer chatbot called Alex which helps students to plan their courses. This bot introduces student questions to search queries, like a human advisor, but it has all the information right away. Human advisers should look for it on various online systems. The system is able to answer pragmatic questions about courses and specialties, but cannot answer the questions at a wider level The countries of the Asia-Pacific region — Japan and China use such systems to teach students foreign languages (Table 1). 45 million Chinese students already rely on AI to learn English. In 2017, Liulishuo, a Chinese start-up based on advanced artificial intelligence to study foreign languages, received $ 100 million in funding and has already started to get profit from 600,000 paid subscribers. A government plan released by the National Council of the country has shown that artificial intelligence education is a significant part of a national strategy. It is a key element of the broader development «roadmap», the main target for China is to become a global center of innovative investment projects for $ 150 billion by 2030. EdTech-based project promotion initiatives have been joined by Chinese tech giants Baidu, Alibaba, and Tencent (BAT), who, accompanied by education professionals, are exploring different opportunities to stimulate innovation through education using artificial intelligence.

Initiatives for the use of educational robots in educational institutions all over the world

	Country	Government initiatives
1	Japan	In 2004, one of Tokyo's schools was first tested on an android-type robot that was able to express 6 emotions
2	France	Educational humanoid-type robots of own production, since 2008, are used in universities and laboratories of the country and neighboring countries
3	China (2009)	Since 2009, more than 600 kindergartens across the country have started using robots to teach children spoken language and educational programs. In 2018, more than 200 schools were equipped with Keeko

		robot teachers
4	South Korea	In 2010, as part of a large-scale robotics teaching project, 29 robots were used in 21 schools in Daegu, and in 2015, in 5,000 kindergartens in the country to study English.
5	United States	In 2011, the largest ECOT virtual school in Ohio was established and began to use artificial intelligence in education. Currently, humanoid-type robots are used by educational institutions in 27 countries
6	United Kingdom	Since 2012, schools have been using Milo robots to assist children with disabilities. They have more than 400 schools that teach thousands of students with autism now
7	Israel	The first official science and technology lessons robot was made in 2012 for students in grades 5-6. Starting in 2016, bots are used in digital kindergartens
8	Australia	Deakin University of Australia became the first university in the world to use the Watson humanoid bot. Since 2013, the government has launched an initiative to use Telepresence robots to educate children in remote classes
9	UAE	Merryland International School in Musafa launched 30 the most modern robots with integrated intelligence in 2014
10	Germany	In Germany began to test robots for teaching migrant children in 2015, and later as virtual assistants for university students
11	Switzerland	The robot was first used in 2015 to help children ages 6 – 8 to improve their handwriting skills
12	Singapore	According to PlayMaker Programs 160 preschools in the country began using no-screen robots to help children prepare for STEM school subjects in 2016
13	Finland	Elias pilot project, a robotic math and language teacher who understands and speaks 23 languages, was launched in the country's primary schools in 2016
14	India	Affluent families have begun to use "social robots" to communicate with children, satiate their curiosity, develop creativity and logical thinking since 2017. The government purchased Alexa robot to train children from the most remote areas in 2018
15	Belgium	The government of Flanders signed a contract with the British platform Century Tech, which operates on the basis of artificial intelligence, in 2019. It is planned to use the system at 700 municipal

		schools and universities in the region.

Source: Osetskyi V. ARTIFICIAL INTELLIGENCE APPLICATION IN EDUCATION: FINANCIAL IMPLICATIONS AND PROSPECTS

Artificial intelligence has occupied its own niche in the education systems of many developed countries. The leader is the USA, with 26% of its educational organizations, the second and third positions are occupied by Japan and Great Britain, Germany, and Turkey with the 5% indicator close to that group of countries.
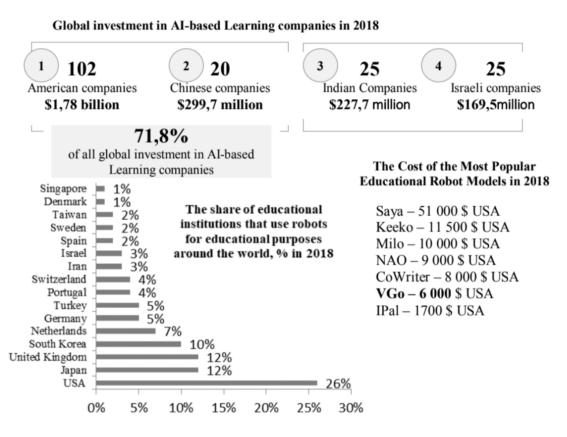

Fig. 1. **Infographics of the impact of artificial intelligence on the education market**
Source: Osetskyi V. ARTIFICIAL INTELLIGENCE APPLICATION IN EDUCATION: FINANCIAL IMPLICATIONS AND PROSPECTS

Conclusions for Chapter 2:

To sum up, Chapter 2 is an essential research and analytical part that connects the theoretical information learned in Chapter 1 with real-world applications. Using real-

world data and analytical techniques, a comprehensive program methodically addresses the specified task. The findings, when given analytically, set the stage for the next chapter and make the investigation of AI technologies in educational process management make sense.

CHAPTER 3: STRATEGIC MANAGEMENT RECOMMENDATIONS

3.1 Impact Analysis of Artificial Intelligence in Educational Process Management

In this section, we conduct a comprehensive analysis of the impact of artificial intelligence (AI) technologies on various facets of educational process management. By synthesizing the findings from the second chapter, we identify both positive and negative factors influencing the integration of AI in educational settings.

3.1.1 Positive Factors

Enhanced Efficiency in Administrative Processes: AI technologies streamline administrative tasks, such as enrollment management, scheduling, and resource allocation. Automation of routine processes contributes to time and resource efficiency, allowing educational institutions to focus on strategic initiatives.

Personalized Learning Experiences: AI-driven educational tools adapt to individual learning styles and pace, offering personalized learning experiences for students. This adaptability enhances engagement, knowledge retention, and overall student satisfaction.

Data-Driven Decision-Making: AI enables the collection and analysis of vast amounts of educational data. Institutions can leverage this data for informed decision-making, including curriculum adjustments, resource allocation, and interventions to improve student outcomes.

The positive factors outlined above signify the transformative potential of AI in educational process management. These opportunities not only enhance the operational aspects of educational institutions but also contribute to the quality and effectiveness of the overall learning experience.

Building upon the positive factors identified in the analysis, we delve into the opportunities presented by AI technologies. This includes enhanced efficiency in administrative processes, personalized learning experiences, and the potential for data-driven decision-making in educational institutions.

In addition to the positive factors already outlined, AI technologies offer numerous other benefits that have the potential to revolutionize educational process management:

1. Augmented Teaching and Learning: AI-driven tools can augment traditional teaching methods by providing supplemental resources, interactive simulations, and virtual laboratories. These tools offer students immersive learning experiences and enable educators to personalize instruction based on individual student needs and preferences.

2. Continuous Improvement: AI-powered analytics provide real-time feedback on student performance, allowing educators to identify areas of strength and weakness more effectively. This data-driven approach facilitates ongoing refinement of teaching strategies, curriculum design, and assessment methods, ultimately leading to continuous improvement in educational outcomes.

3. Accessibility and Inclusivity: AI technologies have the potential to enhance accessibility and inclusivity in education by providing accommodations for students with diverse learning needs and disabilities. Through features such as text-to-speech, speech recognition, and adaptive learning interfaces, AI-powered tools can level the playing field and ensure equitable access to educational resources for all students.

4. Lifelong Learning and Professional Development: AI-driven platforms offer opportunities for lifelong learning and professional development by providing personalized recommendations for skill development, career advancement, and continuing education. Educators and professionals can access curated content, participate in online courses, and collaborate with peers in virtual learning communities, enhancing their knowledge and expertise in their respective fields.

Increase workplace productivity.
Workers can set artificial intelligence to handle repetitive, menial chores in place of dedicating hours of human labor to them. Even though we've previously utilized machines

on production lines, artificial intelligence (AI) enables us to handle a wide range of duties more effectively than in the past.

All businesses benefit from this. Businesses can save money by having technology handle routine activities instead of hiring people. It even reduces noncompliance fees and operating costs.

Adopted into many industries.

These days, artificial intelligence is applied in many sectors, from digital marketing to healthcare. The kind and level of AI required may vary depending on the task; for example, automating emails will require less processing power than going through a patient information registry. AI is being utilized not only for information sorting but also for academic research and facial recognition.

Better quality of life.

AI is also applied outside of the job. AI is also used by homeowners who have smart lightbulbs and speakers in their homes. These gadgets help lower electricity costs and simplify household management. If you purchase a car from a company like Tesla, AI is even available in your vehicle.

3.1.2 Negative Factors

Contrastingly, we critically examine the challenges and drawbacks associated with AI implementation in education. This encompasses issues related to data privacy, ethical considerations, and potential disparities in access to AI-driven educational resources.

Ethical considerations arise regarding the responsible use of AI in decision-making processes, especially when it comes to student assessments, admissions, and educational recommendations.

Data Privacy and Security Risks: The extensive collection and utilization of sensitive student data raise concerns about privacy and security. Educational institutions must

navigate the delicate balance between harnessing data for improvement and safeguarding the confidentiality and integrity of personal information.

Technological Dependence and Skills Gap: Overreliance on AI technologies can result in a diminishing emphasis on traditional teaching methods and critical skills development. There is a risk of creating a technological dependency among students and educators, potentially exacerbating a broader skills gap in areas not directly addressed by AI.

Acknowledging these negative factors is crucial for fostering a balanced perspective on the impact of AI in educational process management. Addressing these challenges will be pivotal in ensuring the ethical and responsible integration of AI technologies within educational settings.

3.2 Causes of Deficiencies and Opportunities for Efficient Development

This subsection aims to establish causal relationships between identified deficiencies and the potential for efficient development. By linking the challenges and opportunities uncovered in the analysis, we lay the groundwork for developing targeted recommendations.

1. Limited Institutional Preparedness: Educational institutions may face deficiencies in AI integration due to a lack of preparedness. Insufficient training programs for educators, inadequate infrastructure, and general resistance to change can impede the effective implementation of AI technologies.

2. Insufficient Data Governance Frameworks: Deficiencies arise from inadequate data governance structures. Without robust frameworks for data collection, storage, and utilization, educational institutions may encounter challenges related to data accuracy, privacy breaches, and the ethical use of student information.

3. Budgetary Constraints: Financial limitations pose a significant hurdle for institutions aiming to adopt AI in education. The costs associated with implementing and maintaining AI technologies, coupled with the need for ongoing staff training, can hinder efficient development.

Opportunities for Efficient Development

1. Strategic Capacity Building: Institutions can overcome deficiencies by strategically investing in capacity building. Implementing comprehensive training programs for educators, administrators, and IT staff can enhance institutional readiness for AI integration.

Educators play a pivotal role in leveraging AI technologies to enhance teaching and learning experiences. Providing educators with specialized training in AI applications empowers them to effectively integrate AI-driven tools and resources into their instructional practices. For example, institutions can offer workshops or professional development courses focusing on AI-powered adaptive learning platforms, virtual reality simulations, or data analytics tools designed specifically for educational contexts. These training programs equip educators with the necessary skills and knowledge to leverage AI effectively, personalize instruction, and support diverse student needs.

Similarly, administrators and IT staff play critical roles in implementing and managing AI systems within educational institutions. Investing in training programs that cover AI implementation strategies, data management best practices, and cybersecurity protocols ensures that administrators and IT personnel are equipped to support the seamless integration and operation of AI technologies. For instance, training programs may include modules on AI governance frameworks, data privacy regulations, and risk management strategies to mitigate potential challenges associated with AI adoption in education.

Furthermore, institutions can collaborate with industry partners, AI experts, and professional organizations to develop tailored training programs and certifications for educators, administrators, and IT staff. For example, partnerships with AI companies or research institutions may provide access to specialized AI courses, workshops, or certifications designed specifically for educators. These collaborations facilitate knowledge exchange, promote best practices, and ensure that educational stakeholders are equipped with the latest skills and insights to harness the transformative potential of AI in education.

For example, Edtechteacher provides a variety of Artificial Intelligence (AI) Education for Teachers

2. Establishment of Robust Data Governance: Efficient development hinges on the establishment of robust data governance frameworks. Implementing clear policies, ensuring compliance with data protection regulations, and fostering a culture of responsible data use are essential steps in overcoming deficiencies related to data management.

3. Innovative Funding Models: To address budgetary constraints, institutions can explore innovative funding models. Collaborative partnerships with industry stakeholders, seeking external funding opportunities, and exploring cost-sharing initiatives can provide the financial resources needed for successful AI integration.

Seeking External Funding Opportunities. For instance, institutions may apply for research grants or innovation funding from government agencies such as the National Science Foundation (NSF) or the Department of Education, which offer funding support for AI research and development in education. Additionally, philanthropic foundations dedicated to advancing education technology, such as the Bill & Melinda Gates Foundation or the Chan Zuckerberg Initiative, may provide grants or investments to support AI initiatives that align with their mission and priorities.

Google Cloud and Arizona State University (ASU): Google Cloud partnered with ASU to develop AI-powered tools and solutions aimed at improving student success and retention. As part of the collaboration, Google Cloud provided funding and technical expertise to support ASU's efforts in leveraging AI and machine learning algorithms to analyze student data, personalize learning experiences, and identify at-risk students who may need additional support. This partnership enabled ASU to enhance its student support services and optimize educational outcomes through AI-driven interventions.

Google announced a bunch of new features for classroom management, accessibility, and AI-powered features for creating questions and lesson plans as part of the Bett ed-tech event in the UK.

Personalized Practice Sets: Educators can now use AI to turn existing teaching content into learning activities. These "practice sets" can be deployed through Google Classroom, where every student gets adaptive feedback and support, powered by AI.

Lesson Planning Co-Pilot: Duet AI works with teachers to develop lesson plans by giving feedback and making suggestions as they work in Docs, Slides, etc. Duet AI can propose in-class activities, and homework assignments and assist in creating presentations with visuals in Slides.

Enhanced Video-Based Assignments: Building on a feature first released last year, educators can now use AI to rapidly suggest and generate questions within YouTube videos. They can also use a new in-built grading tool to access data on student performance to inform lesson planning.

3.3 Specific Recommendations and Proposals

In this crucial section, we leverage the theoretical positions and methodological approaches outlined in the first section. Recommendations are meticulously developed to address the identified deficiencies and capitalize on opportunities. Each recommendation is rooted in a thorough justification based on the analytical synthesis conducted in the second chapter.

3.3.1 Strategic Management Proposals

Strategic management proposals focus on the overarching direction of AI integration in educational process management. This may include the development of a comprehensive AI strategy, aligning technological advancements with the overarching goals of the educational institution.

Creation of a Comprehensive AI Strategy: Academic establishments ought to create a comprehensive AI strategy that delineates their vision, objectives, and top priorities

concerning the integration of AI. Important aspects including curriculum improvement, student support services, administrative procedures, and research projects should be included in this plan. The AI strategy offers a road map for the methodical adoption and application of AI technology throughout the organization by outlining specific goals and action plans.

Alignment of Technological Advancements with Organizational Goals: It is essential to ensure that technological advancements in AI align with the overarching goals and priorities of the educational institution. This involves conducting a thorough needs assessment to identify areas where AI can add value and contribute to organizational effectiveness. By aligning AI initiatives with strategic objectives, educational institutions can maximize the impact of technology investments and prioritize resources accordingly.

Integration of AI into Current Organizational Structures: Cooperation and coordination across multiple departments and stakeholders within the educational institution are necessary for effective AI integration. Proposals for strategic management should place a strong emphasis on how crucial it is to incorporate AI into current organizational procedures and structures. Support AI implementation efforts, this may entail creating cross-functional AI task teams, designating AI champions or coordinators, and cultivating an innovative and cooperative culture.

Investing in Training and Talent Development: Investing in professor, staff, and student training programs and talent development is necessary to build institutional capacity for AI integration. Educational institutions should provide opportunities for professional development and skill-building in AI-related areas, such as data science, machine learning, and AI ethics. By equipping stakeholders with the necessary knowledge and competencies, institutions can foster a culture of innovation and empower individuals to harness the full potential of AI technologies.

Creation of Governance Mechanisms and Ethical Standards: Educational institutions should create governance mechanisms and ethical standards governing the use of AI technologies in order to guarantee responsible and ethical AI deployment. This could entail the establishment of data governance guidelines, the formation of AI ethics committees, and the observance of moral precepts like accountability, openness, and

justice. Institutions can reduce risks and foster confidence among stakeholders by proactively addressing ethical issues and encouraging responsible AI practices.

3.3.2 Business Process Reengineering Models

Delving into the realm of business process reengineering, we propose models for optimizing existing processes. This may involve redefining administrative workflows, streamlining communication channels, and enhancing collaboration through AI-driven tools.

1. Redefining Administrative Workflows: By using AI technologies, educational institutions can improve efficiency by eliminating manual activities and streamlining administrative workflows. Workflow automation solutions driven by AI, for instance, can be used to automate repetitive administrative duties like scheduling, data entry, and document processing. Institutions can free up critical time and resources by automating repetitive operations, enabling staff to concentrate on more strategic and value-added tasks.

2. Simplifying Communication Channels: The efficient operation of educational institutions depends on effective communication. Artificial intelligence (AI)-powered communication solutions can help increase information sharing among stakeholders, expedite communication channels, and enable real-time collaboration. AI-powered chatbots, for example, can be used to instantly support and help staff, instructors, and students, cutting down on response times and improving user experience.

3. Enhancing Collaboration through AI-Driven Tools: AI technologies can foster collaboration and teamwork among faculty, staff, and students by providing intelligent tools and platforms for sharing ideas, coordinating projects, and accessing resources. For example, AI-powered project management tools can analyze project data, identify bottlenecks, and recommend optimization strategies to improve team efficiency and productivity.

3.3.3 Business Plan and Consulting Project

To ensure practical implementation, a business plan and consulting project are formulated. These documents outline the step-by-step approach to implementing the proposed recommendations. The business plan provides a financial and operational roadmap, while the consulting project offers detailed guidelines for execution.

3.4 Quantitative Justification and Optimization Criteria

Each recommendation is accompanied by quantitative justification, aligning with the optimization criteria of efficiency and practical implementation. This involves numerical projections, cost-benefit analyses, and performance metrics to substantiate the proposed enhancements.

Implementation Strategies and Practical Implications

In this subsection, we outline detailed strategies for the practical implementation of the proposed recommendations. This involves a step-by-step guide for integrating AI technologies into the educational process management framework. Practical implications, challenges foreseen during implementation, and mitigation strategies are discussed to ensure a smooth transition.

Engaging key stakeholders is essential for the success of any strategic initiative. This subsection focuses on developing robust communication plans to disseminate information effectively among educators, administrators, students, and other stakeholders. Strategies for garnering support, addressing concerns, and fostering collaboration are highlighted.

To gauge the effectiveness of the implemented recommendations, a continuous monitoring and evaluation framework is proposed. This involves establishing key performance indicators (KPIs) and metrics to measure the impact of AI integration on educational outcomes. Regular assessments and feedback loops are essential for iterative improvements.

Ethical considerations are paramount in the integration of AI technologies in education. This subsection addresses ethical concerns related to data privacy, bias in algorithms, and the responsible use of AI. Safeguards and guidelines are proposed to ensure ethical standards align with the institution's values and societal expectations.

A detailed cost-benefit analysis accompanies the recommendations, providing insights into the financial implications of AI integration. This includes an assessment of initial investment, potential cost savings, and long-term benefits. Clear resource allocation plans are outlined to facilitate budgeting and financial decision-making.

Collaboration with industry partners can enhance the educational institution's access to cutting-edge AI technologies and expertise. This subsection explores potential partnerships, collaborative research opportunities, and joint ventures that align with the institution's goals and contribute to the sustainable development of AI in education.

Comparative Analysis with Global Best Practices

To enrich the strategic management recommendations, a comparative analysis with global best practices in AI integration within education is conducted. Drawing on case studies, official reports, and documented success stories, this subsection identifies key strategies employed by leading educational institutions worldwide. By benchmarking against global benchmarks, the recommendations gain additional context and relevance.

Utilizing Big Data Analytics for Decision-Making

This subsection focuses on the utilization of big data analytics in decision-making processes within educational institutions. Official statistics and data analytics reports are incorporated to illustrate how AI-driven insights can inform strategic decisions. Examples of successful implementations, such as predictive analytics for student performance and enrollment trends, are detailed to demonstrate the practical impact.

Enhancing Student Engagement with AI-powered Tools

Student engagement is a key facet of successful educational processes. This subsection delves into AI-powered tools designed to enhance student engagement. Examples from leading institutions showcase the implementation of chatbots for student support, virtual reality for immersive learning experiences, and adaptive learning platforms. Statistical improvements in student outcomes are presented to underscore the effectiveness of these strategies.

Addressing Educational Inequities Through AI

AI has the potential to address educational inequities and promote inclusivity. This subsection explores initiatives and interventions leveraging AI to narrow educational gaps. Examples from diverse regions and demographic contexts are cited to illustrate how AI can be harnessed to provide personalized learning experiences, overcoming barriers related to geography, socioeconomic status, and learning abilities.

Cybersecurity Measures for AI in Education

Given the increasing reliance on AI technologies, cybersecurity becomes a critical consideration. This subsection outlines specific cybersecurity measures tailored for educational institutions. Examples of successful cybersecurity frameworks, case studies of institutions that have effectively secured their AI systems, and statistical data on the prevalence of cyber threats in the education sector are incorporated.

Financial Implications and Funding Strategies

Implementing AI in education necessitates financial considerations. This subsection explores the financial implications of AI integration and proposes funding strategies. Official budgetary data, examples of successful fundraising campaigns, and models for public-private partnerships are presented to guide educational institutions in effectively budgeting for and securing funding for AI initiatives.

Conclusions for Chapter 3:

The third chapter concludes with a cohesive set of recommendations and proposals for managing the development parameters and activities of educational institutions through the strategic integration of artificial intelligence. Rooted in theoretical positions, methodological approaches, and analytical findings, these recommendations aim for optimal, target-efficient, and practically implementable solutions to advance the field of educational process management.

The chapter provides a comprehensive guide for institutions seeking to navigate the complex landscape of AI integration in education.

CHAPTER 4. APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN EDUCATIONAL PROCESS MANAGEMENT: A CASE STUDY OF UKRAINE

In this section, we focus on the specific application of artificial intelligence (AI) technologies in the management of the educational process within the context of Ukraine. Drawing on examples and initiatives from the Ukrainian educational landscape, we explore how AI is being utilized to address challenges, enhance efficiency, and improve the overall quality of education.

The results of a survey of 1,000 Ukrainians in 2018 are convincing, among whom 80.2% believed that the use of AI has a positive impact on their lives, 74.1% of respondents felt the impact of AI technologies already today. However, the survey participants were not ready for its widespread use.

From March 21 to April 3, 2023, the Institute of Higher Education of the National Academy of Sciences of Ukraine conducted an all-Ukrainian survey "Open science in institutions of higher education of Ukraine", in which more than 1.5 thousand respondents (heads of institutions and structural units, scientific, pedagogical and scientific workers, library workers, IT workers of higher education institutions) out of 110 higher education institutions (excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the temporarily occupied territories in the Donetsk and Luhansk regions) (Drach & Petroye, 2023). It was found that 66.2% (995 people) of the respondents believe that the development of AI creates additional opportunities for the researcher, 13.6% (205 people) see threats to scientific research. 16.9% (254 people) believe that the development of AI does not significantly affect the process of scientific knowledge, 3.2% (48 people) are undecided about the answer.

4.1 AI in Administrative Processes

Example: Unified State Electronic Database in Education

One notable application of AI in Ukraine's educational management is the implementation of the Unified State Electronic Database in Education (ЕДЕБО). This platform utilizes AI-driven analytics to streamline administrative processes, including student enrollment, grade tracking, and resource allocation. The system enhances the efficiency of educational institutions by automating routine tasks, allowing administrators to focus on strategic planning and decision-making.

In addition to streamlining administrative processes, the Unified State Electronic Database in Education (ЕДЕБО) serves as a centralized platform for data management and analysis. The platform gives educational institutions useful insights into student performance, attendance trends, and learning outcomes by combining AI-driven data. These data-driven insights provide educators and administrators with the ability to make well-informed decisions, pinpoint areas in need of development, and customize educational interventions to fit the wide range of student needs. The platform facilitates collaboration and communication among all stakeholders involved in the education process by giving them access to real-time data and analytics. These stakeholders include parents, teachers, and policymakers. By being transparent, the educational system gains the respect and confidence of the public and fosters a culture of accountability and ongoing development.

Moreover, ЕДЕБО has the potential to support evidence-based policy-making and educational reform initiatives in Ukraine. By leveraging AI technologies to analyze large volumes of educational data, policymakers can identify trends, assess the effectiveness of educational programs, and develop targeted interventions to address systemic challenges. This data-driven approach to policymaking promotes efficiency, effectiveness, and equity in education and contributes to the overall improvement of the education system in Ukraine.

4.2 Personalized Learning Platforms

Example: Promoting Individualized Learning with AI Tutoring Systems

Several Ukrainian educational institutions have embraced AI-powered tutoring systems to provide personalized learning experiences. These platforms adapt to the individual learning styles and progress of students, offering tailored content and feedback. For instance, the use of AI-driven tutoring systems in mathematics has shown positive results, allowing students to learn at their own pace and receive targeted assistance in areas where they may struggle.

In addition to embracing AI-powered tutoring systems, Ukrainian educational institutions are increasingly turning to personalized learning platforms to cater to the diverse needs and preferences of students. These platforms utilize AI technologies to deliver tailored learning experiences that aim to enhance engagement, comprehension, and retention of educational material.

An example of this approach can be seen in the implementation of adaptive learning software in language education. These platforms employ sophisticated algorithms to analyze students' language proficiency levels, learning preferences, and progress over time. Based on this analysis, the platforms dynamically adjust the difficulty level and content of language exercises, providing personalized challenges and feedback to each student. Personalized learning platforms offer students opportunities for self-directed learning and exploration. Through interactive exercises, simulations, and virtual laboratories, students can engage with course material in immersive ways, fostering curiosity, creativity, and critical thinking skills. These platforms adapt to students' individual interests and learning styles, empowering them to take ownership of their learning journey.

4.3 Data-Driven Decision-Making in Higher Education

Example: AI Analytics for Curriculum Enhancement

In higher education, AI analytics tools are being employed to make data-driven decisions for curriculum enhancement. Universities in Ukraine are utilizing AI to analyze student

performance data, feedback, and engagement metrics. This information is then used to identify areas of improvement in course design, teaching methodologies, and assessment strategies, contributing to a more effective and responsive educational environment.

Higher education institutions in Ukraine are increasingly using AI analytics technologies to help them make data-driven decisions that will improve their curricula. These organizations may examine a wide range of data sets, such as feedback, engagement metrics, and student performance statistics, by utilizing AI. The analysis's conclusions are quite helpful in pinpointing areas where teaching approaches, evaluation techniques, and course design might all use some refinement.

AI analytics, for example, can assist in identifying trends in student performance by emphasizing subjects or ideas where students may be having difficulty succeeding. Equipped with this data, teachers can modify the curriculum to more effectively suit the needs and learning preferences of their pupils. AI-powered solutions can also give teachers immediate feedback, enabling them to modify their pedagogical approaches in real time to fix weak areas or build on their strong points.

Additionally, AI analytics can help with sequencing and course structure optimization. Universities can optimize student comprehension and retention by fine-tuning the sequence and tempo of course materials through the analysis of data on student advancement and success rates. Students will benefit from the most efficient and productive learning experience possible thanks to this focused approach. The creation of student-specific learning pathways can be guided by AI analytics. Universities can customize educational experiences to match each student's specific needs by recognizing each student's distinct learning preferences and aptitudes. This individualized approach promotes a deeper comprehension of the course material in addition to increasing student motivation and engagement.

"Another benefit of AI in education is its ability to automate assessment. AI algorithms can provide more accurate and timely feedback than human assessors, allowing educators to focus on providing a more personalized learning experience.

AI can also create virtual learning environments that are more engaging and engaging than traditional classrooms. These environments can increase student engagement and motivation and enable collaborative learning." (National University of Bioresources and Nature Management of Ukraine)

4.4 Language Learning Applications

Example: AI-Powered Language Learning Platforms

AI technologies are also making a significant impact on language learning in Ukraine. Language learning applications, leveraging AI for personalized lesson plans, pronunciation feedback, and adaptive content, have gained popularity. These platforms enhance language acquisition by tailoring exercises to individual proficiency levels and providing real-time feedback, contributing to improved language skills among students.

Personalized Lesson Plans: AI analyzes users' language proficiency levels, learning styles, and goals to generate customized lesson plans. These plans may include vocabulary exercises, grammar drills, listening comprehension activities, and interactive simulations tailored to each learner's needs. By catering to individual strengths and weaknesses, AI-powered platforms optimize the learning process and ensure maximum engagement.

One of the most challenging aspects of learning a new language is mastering pronunciation. AI algorithms can accurately assess users' pronunciation by comparing their speech patterns to native speakers' models. Real-time feedback helps learners identify and correct pronunciation errors, leading to more natural and fluent speech over

time. This feature is particularly beneficial for improving speaking skills, which are essential for effective communication.

Adaptive Content: AI continuously monitors users' progress and adjusts the difficulty level of content accordingly. As learners advance, the platform presents increasingly complex material to challenge and stimulate them further. Adaptive learning algorithms ensure that users remain engaged and motivated by providing content that is neither too easy nor too difficult. This personalized approach maximizes learning outcomes and accelerates language proficiency development.

Immediate feedback is crucial for effective learning. AI-powered platforms offer instant feedback on exercises, quizzes, and speaking practice sessions. Learners receive constructive criticism, suggestions for improvement, and reinforcement of correct answers in real-time, facilitating rapid skill acquisition. This timely feedback loop promotes active learning and helps users track their progress accurately.

Questions about the Ukrainian language and artificial intelligence as an educational innovation

Among the most effective language learning technologies in the field of artificial intelligence is the use of chatbots. They are used in various educational fields, in particular quite widely - in linguistics. These are opportunities for participants in the educational process, such as communication, management of linguistic simulators; interaction of students with teachers, identification of needs in individual classes (oral or written); formation of a unified knowledge base taking into account the ethnic and cultural characteristics of students who master the language.

It is common knowledge that AI is mainly English-speaking, but there are attempts to create Ukrainian-speaking neural networks. For example, the artificial intelligence technology ChatGPT, placed in the portal "On the lesson". The neural network can reproduce the most similar simulation of communication with 50 famous personalities who changed the world and Ukraine. Obviously, schoolchildren will be interested in

receiving answers to their questions from I. Kotlyarevskyi, T. Shevchenko or L. Ukrainka, in order to learn facts from their lives or works.

Therefore, the purpose of our intelligence is to try to analyze Ukrainian

speech AI. We assume that this will contribute to the improvement of the Ukrainian language formed in the neural network.

So, of course, the ChatGPT artificial intelligence technology, in particular, posted on the "To the Lesson" portal, can be occasionally used in the educational process as an innovation, but necessarily with commenting on the acquired information by the teacher or lecturer. It should be remembered that the role of artificial intelligence in the process of language learning today involves not so much the development of new programs, but the transformation of the understanding of the process of thinking and language perception. This will "provide the necessary opportunities for the creation of AI technologies that allow building language learning taking into account the individual characteristics of students and teachers"

4.5 Challenges and Future Prospects

While the integration of AI in educational management in Ukraine presents numerous opportunities, challenges such as ensuring data privacy, addressing resource disparities among educational institutions, and promoting comprehensive teacher training in AI technologies need to be addressed. Future prospects involve fostering collaborative initiatives, refining regulatory frameworks, and expanding the use of AI to promote inclusivity and innovation in education across the country.

This case study illustrates how Ukraine is leveraging AI technologies to enhance various aspects of educational process management. By examining these examples, we gain insights into the practical applications, challenges faced, and the transformative potential of AI in shaping the educational landscape in Ukraine.

Data privacy: The safeguarding of private student information is one of the main issues with AI in education. Strong data privacy laws and cybersecurity protocols are urgently needed as educational institutions depend more and more on AI algorithms to gather and analyze student data. Trust and adherence to privacy rules depend on making sure that personal data is anonymized, securely stored, and used exclusively for that reason.

Resource Disparities: Ukraine, like many countries, faces disparities in resources among educational institutions. While some schools may have access to state-of-the-art AI tools and technologies, others may lack the necessary infrastructure and funding to implement AI-driven solutions effectively. Bridging these resource disparities through targeted investments, grants, and partnerships is crucial to ensure equitable access to AI-enabled educational opportunities for all students.

Teacher Training: Comprehensive teacher training programs are essential to equip educators with the knowledge and skills needed to integrate AI technologies into their teaching practices effectively. Many teachers may lack experience or confidence in using AI tools, leading to resistance or reluctance to embrace these innovations. Providing ongoing professional development opportunities, workshops, and support networks can empower teachers to leverage AI as a powerful educational tool and facilitate its seamless integration into classrooms.

Fostering cooperative partnerships between governmental agencies, educational institutions, technology businesses, and research organizations is critical to the future of artificial intelligence in education in Ukraine. Stakeholders can advance AI-driven educational projects by cooperating to share knowledge, resources, and best practices, spur innovation, solve shared problems, and accomplish group objectives. The swift advancement of AI technology necessitates the creation of flexible and transparent regulatory frameworks that strike a balance between innovation and ethical considerations, while also providing protection against any hazards. Fostering trust, equity, and responsibility in the adoption of AI-driven solutions requires establishing rules for the appropriate use of AI in education, including data protection regulations, algorithm openness, and accountability frameworks. The ultimate goal of leveraging AI

in education is to promote inclusivity, diversity, and innovation in learning experiences. By harnessing the power of AI to personalize instruction, adapt to individual learning needs, and provide equal access to educational opportunities, Ukraine can create more inclusive and student-centered learning environments. Additionally, fostering a culture of innovation and experimentation encourages educators, researchers, and entrepreneurs to explore new possibilities and push the boundaries of what is possible in education.

In 2023, during the All-Ukrainian information campaign against payment fraud #FraudGoodbye, the NBU conducted a survey among teachers in a remote format on the topic of using AI in education.

2,543 respondents participated in the survey with the results below.

The use of AI by teachers during educational training

materials and classes/lessons.

The majority of educators use AI to prepare educational materials and classes/lessons - 51.8%, of which: 26.2% use ChatGPT (or other AI-based tools). 32.4% use image generators.

The attitude of teachers towards the use of AI in the educational process

75.8% of educators have a positive attitude to the use of AI in the educational process, of which:

42.9% believe that it is necessary to be able to master modern technologies in order to keep up with the times;

32.9% consider AI as new opportunities for various spheres of life, including education.

21.5% of educators are wary of using AI in the educational process.

Only 2.7% of teachers have a negative attitude towards AI, do not use it for teaching, and do not plan to do so, because they believe that it will harm pupils and students.

The survey shows a significant interest on the part of educators in the use of AI because most of them use AI in the educational process - 51.8% of the respondents.

75.8% of respondents have a positive attitude toward the use of AI in the educational process and perceive it as a new opportunity for education.

57.8% of respondents believe that AI is a good assistant for teachers when preparing for classes, and it also makes it possible to diversify the educational process and make it more interesting for students.

Teachers also noted that pupils and students are interested in contests and educational initiatives that require the use of AI - 57.8% of respondents.

CONCLUSIONS

The integration of artificial intelligence (AI) technologies in educational process management represents a pivotal area of exploration in the contemporary educational landscape. Through the analysis conducted in this Bachelor's Qualification Work (BQW), several key insights have emerged regarding the relevance, challenges, and opportunities associated with the application of AI in education, particularly within the context of Ukraine. This section provides a summary of the findings, assessments of analyzed problems, operational guidelines for addressing identified challenges, and an assessment of the economic efficiency of proposed solutions.

Relevance of the Topic:
The topic of artificial intelligence technologies in educational management is highly relevant in the context of the evolving educational landscape and the increasing reliance on technology to enhance learning outcomes. As highlighted in the introduction, the integration of AI has the potential to revolutionize educational processes, offering personalized learning experiences, streamlining administrative tasks, and enabling data-driven decision-making. The analysis conducted in this BQW underscores the importance of exploring the implications, challenges, and opportunities associated with AI integration in education.

Assessments and Summarizing of Analyzed Problems:
Throughout the BQW, various challenges and opportunities related to the application of AI in education have been identified and assessed. These include:

Infrastructure limitations: The need for robust IT infrastructure and reliable internet connectivity to support AI applications.

Resource constraints: Limited funding and expertise for developing and deploying AI solutions in educational settings.

Ethical and privacy concerns: Ensuring the responsible use of AI technologies and safeguarding student data privacy.

Socio-cultural factors: Addressing cultural attitudes towards technology adoption and promoting awareness about the benefits of AI in education.

Operational Guidelines for Addressing Identified Challenges:

To address the identified challenges and capitalize on opportunities for AI integration in education, the following operational guidelines are proposed:

Strategic Capacity Building: Institutions should invest in comprehensive training programs for educators, administrators, and IT staff to enhance readiness for AI integration.

Innovative Funding Models: Exploring collaborative partnerships with industry stakeholders, seeking external funding opportunities, and exploring cost-sharing initiatives can provide the financial resources needed for successful AI integration.

Business Process Reengineering: Redefining administrative workflows, streamlining communication channels, and enhancing collaboration through AI-driven tools can optimize existing processes and enhance efficiency.

Calculation of Economic Efficiency of Submitted Suggestions:

The economic efficiency of the proposed solutions depends on various factors such as the initial investment required, the expected return on investment, and the long-term benefits accrued from AI integration. While the upfront costs of implementing AI technologies may be significant, the potential long-term benefits in terms of improved efficiency, enhanced educational outcomes, and greater institutional competitiveness can outweigh the initial investment. Cost-benefit analyses and feasibility studies should be conducted to assess the economic viability of proposed solutions and ensure optimal resource allocation.

In conclusion, the Bachelor's Qualification Work has provided valuable insights into the application of AI technologies in educational process management, with a specific focus on Ukraine in general, and Ukrainian State University named after Mykhailo Drahomanov - in particular. By addressing the identified challenges and capitalizing on

opportunities, educational institutions can harness the transformative potential of AI to create more adaptive, efficient, and student-centered learning environments.

Suggestions

Based on the findings and recommendations presented in this BQW, the following suggestions are proposed for educational institutions in Ukraine:

Establish AI Centers of Excellence: Institutions should establish specialized centers or departments focused on AI research, development, and implementation. These centers can serve as hubs for interdisciplinary collaboration, innovation, and knowledge exchange.

Foster Collaboration with Industry Partners: Educational institutions should actively seek collaboration opportunities with industry partners, technology companies, and research organizations to access funding support, expertise, and resources for AI initiatives.

Invest in AI Talent Development: Institutions should prioritize investment in talent development programs to build a skilled workforce capable of leveraging AI technologies effectively. This includes offering training courses, workshops, and certifications in AI-related disciplines.

Develop AI-Enabled Learning Resources: Educational institutions should invest in the development of AI-enabled learning resources, such as adaptive courseware, virtual laboratories, and intelligent tutoring systems, to enhance the quality and effectiveness of teaching and learning.

Implement Ethical Guidelines for AI Use: Institutions should develop and implement ethical guidelines and best practices for the responsible use of AI in education, including data privacy, transparency, and fairness considerations.

Evaluate and Monitor AI Implementation: Regular evaluation and monitoring of AI implementation initiatives are essential to assess their effectiveness, identify areas for improvement, and ensure alignment with institutional goals and objectives.

By implementing these suggestions, educational institutions in Ukraine can harness the transformative power of AI to create more adaptive, efficient, and inclusive learning environments that empower students to succeed in the digital age.

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