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### **GLOBALIZATION OF SCIENTIFIC KNOWLEDGE: INTERNATIONAL COOPERATION AND INTEGRATION OF SCIENCES**

held on March 17<sup>th</sup>, 2023 by

NGO European Scientific Platform (Vinnytsia, Ukraine)  
LLC International Centre Corporate Management (Vienna, Austria)

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# GRAIL OF SCIENCE

№ **25**  March, 2023  
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**EUROPEAN  
SCIENTIFIC  
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concepts, and problematic issues related to the topic using methodological recommendations for students, tasks with slides, tables, and diagrams (group frontal, individual), checking and assessing completed tasks), **a list of control questions, the most important terminological concepts and theoretical questions related to the topic, tasks for independent work** (with examples of solving typical problems), **final knowledge control** (final test on the topic, assessment of each student), **homework, methodological support for the session, recommended literature** (basic and auxiliary).

At the Department of Medical Physics, Biophysics, and Higher Mathematics, the instructors have developed methodological guidelines for each topic of the discipline intended to standardize the requirements for mandatory knowledge, skills, and abilities that students must master during classes. This publication also aims to assist the pedagogical team, particularly young instructors, in using effective forms, methods, and teaching tools. It offers guidance on the order, sequence, and technology of preparing for instructional sessions, describes goals, tasks, teaching methods, and techniques, and provides advice on organizing the learning process and adapting the instructional material to the students' level of preparedness.

#### Summary.

1. In order to ensure the quality organization of the educational process, each department must create a certain complex of informational support for each discipline.

2. The creation and use of teaching recommendations by instructors allow for the systematization and standardization of requirements for the volume of knowledge, skills, and abilities that students must master.

#### References:

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- [2] Higher education standard for the speciality "Medicine" for the second (master's) level of higher education. Access mode: <https://osvita.ua/master/spec-master/85054/>.
- [3] Educational and methodological support of educational components: a handbook for pedagogical and scientific-pedagogical workers / compiled by N.M. Savelieva. - Poltava: V.H. Korolenko Poltava National Pedagogical University, 2017. - 80 p.

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## PROMISES AND PERILS OF AI USE ON THE TERTIARY EDUCATIONAL LEVEL

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**Summary.** *This article describes possible practical applications of Artificial Intelligence on the tertiary educational level both from the staff and students' perspectives on the basis of experience gained by universities worldwide. AI usage in higher education field is analyzed on the basis of correlation between participants of educational process and the areas of innovative software application. Advantages of AI use are outlined on institutional, social and instructional levels. AI proves to be a growing and promising tool for facilitating educational processes, having obvious benefits for the education-givers and seekers, including the institutional possibilities of streamline enrollment and improved retention, organizational guidance and support of students on campus as well as educational opportunities such as better recourses management and successful online training process. Additionally, ethical considerations are raised, regarding use of AI, data management and privacy.*

**Keywords:** *AI, institutional level, machine-learning, pedagogical guidance, personalized learning, social interaction*

**Introduction.** Computer-based training systems, followed by online-streaming and sharing training platforms as well as mobile learning applications, have been used in the educational field for over two decades now, providing multiple advantages for participants involved. Urgent necessity to develop intelligent tutorial systems capable of working distantly and giving remote access to training materials became evident during a few recent pandemic years, when distant online studying was the one and only possibility for many. **Literature review.** Numerous educational and training solutions were created, including those based on application of AI, namely software designed for classification of educational texts styles [3], effective classroom assistance [1], smart learning environment [5], etc. These data as well as personal practical experience of online teaching at the higher educational establishment provides suitable **material** for analyses aimed at revealing benefits and downsides of AI usage in the field of higher education.

This article **aims** at disclosing possible applications of AI on the tertiary level of education as well as exploring potential trends and challenges of AI in education. In addition, ethical considerations are to be presented regarding use of AI and data management in organization, teaching and learning.

**Background.** Initially, artificial intelligence was designed as an attempt to create machines that can do things possible only through human cognition [8], though faster, more efficiently, avoiding time loss, waste of resources and minimizing mistakes. Since then, computer-based machines were intensively developed as *expert systems*, i.e., on the basis of great input of various scientific data and accurate operational algorithms, as well as *machine learning*, they could calculate singularities and identify differences, thus suggesting possible or likely patterns of behavior in the form of predictive analytics. No matter how grandiose or scary that might have sounded at first, today AI is already easily accepted in the routine way in the form of numerous wide-spread gadgets, such as GPS-navigators, online translators and voice-recognizing systems, which were created using machine learning.

Being a highly debated issue, at first artificial intelligence used in higher education sector was often associated with numerous misconceptions and myths, starting from fear of mega-brain, a machine capable of performing multiple tasks simultaneously in the matter of seconds, to a robotic monster having the ability to take control over all educational system, thus in both mentioned cases, leaving crowds of experienced and highly-skilled human professionals jobless. However, nowadays it has become clear that using AI on the level of tertiary education brings numerous advantages to the education-givers and seekers, including the institutional possibilities of streamline enrollment and improved retention [8], organizational guidance and support of students on campus as well as educational opportunities such as better recourses management and successful online training process.

In line with Digital Education Action Plan (2021-2027) adopted by European Union as renewed policy that outlines a common vision on high-quality, inclusive and accessible digital education [2], many higher educational establishments worldwide [7] have introduced their initiatives on adapting existing traditional training systems to modern online digital format, ranging from top-of-the-rank AI-soft, e.g. at Stanford University [<https://learn.stanford.edu>], to MOODLE-based platforms. For instance, faculties of National University of Food Technologies, based in Kyiv, Ukraine [<https://nuft.edu.ua/>], as well as National University of Physical Education and Sports of Ukraine [<https://uni-sport.edu.ua/>] have developed specialized distance education courses based on MOODLE Learning Platform, made use of numerous Google learning applications and Zoom-tools for keeping constant verbal and visual contact with students both locally present and those staying abroad. Much has already been done; however, even more is waiting ahead.

**Application.** When analyzing AI usage in higher education field, it is important to take into consideration the correlation between participants of educational process and the areas of innovative software application (See Table 1), which result in various practical benefits and shortcomings of AI usage.

Table 1.

**Correlation between participants of educational process and the areas of software application**

		Areas of Software Application		
		Institutional	Social	Instructional
Participants of Educational Process	Staff (administrative and teaching)	Marketing Admissions Resource planning	Guidance Early Warning	Pedagogical improvement Training content development
	Student	Recruitment Enrollment Curricula choice	Student-Student Student-Staff interaction	Self-Paced Progress Personalized Learning

To start with, it is important to clarify an answer to two questions of “who?” (i.e. a participant) and “why?” (i.e. role, function and area of application) uses AI in educational field, as knowing both a recipient of a service and the purpose of using it helps to outline current situation and visualize further perspectives.

From the narrow perspective (not taking into account broader society, governmental and employment levels), an educational process on the tertiary level is a two-vector process including bilateral interaction between university staff and students, whose communication is mutually dependent and the priority role of any participant is rather disputable. For the sake of convenience, we will follow conventional interaction pattern (i.e. Staff-Student), starting with the description of staff, followed by a student. In this paper, by a *staff* or a *staff member* we mean both faculty (professors, associate professors, lecturers, lab assistants, librarians and the other of this kind, who are directly involved in the training process itself) and staff simply (administrative staff, counsellors, tutors, secretary, admission board, accountants, etc., who perform administration and support functions). A term *student* or *students* stands for a person or a group of people who are enrolled at university, registered for a certain educational program, take academic courses, designed to get professional knowledge and skills.

Having defined the participants of educational process, it is high time to describe how AI is used by them in different areas of interaction, namely institutional, social and instructional, for optimizing performance.

*Institutional* application of AI at universities is mainly associated with automation of time-consuming routing tasks, connected with student’s enrollment, registration and retention; financial issues, including those dealing with procurement processes for materials and supplies used at the establishment, in-time payment and early payment notice; staff recruitment and training processes. In many ways AI helps to reduce bureaucracy to a certain extend [6], consequently, in this field it raises the smallest number of ethical concerns. Not only AI algorithm proves to be efficient as it streamlines many administrative tasks, but also dramatically transformative, as it can lead to the decrease of staff involvement in manually performed tasks, leaving possibility for being involved in more creative issues.

Recently, one additional advantage of using AI on institutional level has appeared, namely its application for marketing purposes. As far as AI is already heavily integrated in online services such as social media, search engines and contextual advertising, it facilitates university staff in targeting promotion materials



by analyzing data about student's demographics, interests, online behavioral patterns, as well as identifies the most effective advertising and promotion tools for each major.

*Social* application of AI assists in caring out in-time guidance of freshman, explaining apprenticeship schemes, just-in-time financial aid for those in need, including involvement of charitable organization, as well as early warning about forthcoming projects, events, late papers hand in or payment. The way AI works in this field goes beyond just seeing the red, green and yellow light about the student's progress [8] in either studying or socializing activities or payment procedures. Machine learning technology helps to process, categorize and visualize data – identifying activity and involvement of students in the projects, based on set criteria. In addition, having no need to control or monitor if studying process flows smoothly and the tasks are done in time, teachers gain time and freedom to fulfil humane approach and pay individual attention to a student, by showing understanding and adaptability [6], resulting in better staff-student interaction. Such an opportunity has proven to be especially useful during the time of world-wide pandemic, when the only way of keeping in touch with students and tracking their academic activity was a digital one.

Additionally, universities around the world make use of chatbots for conducting social interactions among various participants of educational process. Chatbots, which imitate human conversation, allow students to interact with digital devices as if they were talking to university staff, the same pattern works for staff interaction. In such a way the students and the staff members can get answers to the routine or frequently asked questions such as class scheduling, books reservation in the library, registration procedure to an interest club, parking issues, etc. both using messenger's interface or voice messaging.

*Instructional* application of AI in education sector includes assistance in pedagogical guidance, personalized learning and self-paced progress in pursuing academic goals and scientific research, thus can be applicable both for teachers and students. It is generally understood that automation of studying process and its tailoring for every particular participant's need has become a possibility due to switch to digital education, i.e., since students no longer gather in lecture halls and classes, being obliged to listen to the same educational material.

On the one hand, professors digitalize information flow for each academic course, depending on student's competence level, interests, relation to the perspective career and time set for completing an assignment; conduct automatic daily, weekly, monthly or annual checks of tasks and give feedback to students, resulting in objective assessment and precise analysis of student's academic achievements. Having this data, professors gain the opportunity to adjust studying process to an individual student's particular needs, which has been a priority for educators worldwide for years. Teachers identify gaps in knowledge and redirect students to the appropriate topics, or modify lectures and lab tasks to respond to learner's needs. Thus, the idea of customizing curriculum for every student's need which once was considered impossible to implement may become viable in short perspective.

On the other hand, students gain access for different tools for developing and training skills. Many advanced tutoring and studying programs are available and affordable today, facilitating time-management, scheduling, skill development and entertainment processes. For instance, having an app designed for learning foreign languages, students no longer should struggle with remembering new words or memorizing grammar constructions, but have to follow simple game-like algorithm for practicing educational material.

Moreover, these days universities use AI for facilitating intelligence-intensive activities, especially for conducting scientific research and analyzing big scope of data, compiling complex databases and creating advanced dashboards [4] to improve data analytics.

**Discussion.** All things considered, AI as a growing and promising tool for facilitating educational processes has obvious benefits for staff and students, described above; however, it raises certain concerns.

On the positive side, AI increases efficiency of institutional and managerial processes, saving time and lowering costs. It provides an opportunity for customizing education for every student's interest and needs, introducing personalized approach to studying; identifies student's field of interest, their strengths and weaknesses. It also shows growing potential to equality as students from different geographical location gain access to better-quality education; improves networking among staff and students, facilitates peers' interaction on campus; makes gains in pedagogy, showing the most effective teaching practices, and science, processing of big array of data. The last but not the least, introduction of AI tools on the tertiary level of education has benefit for students' career development and employability of graduates. In other words, universities make students accustomed to the usage of AI which is now becoming a reality at the workplace.

The challenging side of using AI at universities is now connected with both practical and ethical issues. The regulatory base on the country and institution levels is still quite poor, as in many cases it is only under development. Participants of educational process have numerous concerns, such as need for growing investment in educational sector, necessity of improving staff and students' digital competence, changing roles of teachers and students [6], increasing screen time, access to information and data security, etc. The number of raised questions need to be answered, in particular, who controls the content; what functions does the data perform; how do we check results in terms of positive and negative outcomes [4]; who has access to personal data; how to avoid disclose of personally identifiable information [8]; how to ensure privacy and compliance with data-protection law; how to avoid information overflow.

**Conclusion.** All in all, taking into account numerous promises and perils of AI usage on the tertiary level of education, it seems to us that adjusting the best attributes and uses of AI to traditional institutional and teaching practices and developing strong ethical regulations can create the best outcomes of AI usage both for students and staff. By studying and analyzing the experience of pioneering educational institutions, which have already got practical experience of AI usage for educational purposes, we might avoid shortcomings and take advantage of best AI

applications.

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