

# Integration of Artificial Intelligence into the Formative Assessment Process for Students

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## ABSTRACT:

Artificial intelligence (AI) is gradually permeating into higher education, reshaping the way students learn and are assessed. Yet, the concepts of formative assessment as a contemporary model for assessing students are still relatively often neglected. That's why we sought to know the reasons for under-effective application of AI in education, and also possibilities for AI application in optimized formative assessment. Methods of induction, deduction, synthesis, mathematical modeling as well as comparative and bibliographical analyses were employed in the study. The study findings identified the good and the bad impact of AI on education and gave recommendations for eliminating negative outcomes imposed in education as a result of AI integration. We categorized a list of popular AI systems in the market by their characteristics, and educational functions. Potential of AI in formative assessment was highlighted and optimization for formative assessment with AI were discussed. Concerning threats, the low level of professionalization of teachers to work with AI, the raising of risks about academic dishonesty and possible unfair student evaluation were mentioned. To minimize AI-negative consequences, we suggested expanding the training of teachers in working with AIs, creating high-quality programs based on AI technology, personalized teacher training in working with AIs at universities, and ensuring access to test programs for detecting AI abuse. As far as potential uses of AI for the improvement of formative assessment, they suggested auto generated testing, trend analysis and recommendation for customized learning/anti-cheating using them. The authors have put forward a mathematical model for evaluating efficiency of the AI tools used in formative assessment that would enable authorities within higher education institutions to adopt AI tools considering the influence of AI on

PSD as; diminishing teachers' labor intensity raised by their quality, academic tasks produced per AI and financial availability of introducing.

Keywords: higher education, digitalization, academic performance, adaptability of educational programs, personalization of learning

## 1. Introduction

AI is a new vector of development for digitalization in science, which brings digital processes to such level where they replace human professional capabilities at least partially (Tlili et al., 2023). Considering the merits of AI, it is widely practised in many domains of human endeavour with its fair share of limitations. The education field cannot stay out on the digital tools for teaching and evaluation, and AI has been one of the fundamental factors behind the formation of educational digitization in last few years. However, educators also can harbor suspicious attitudes toward AI because they are concerned that students could cheat when performance is being assessed and about detrimental effects of AI in learning process such as decreasing motivation (Chang et al., 2024). This is a barrier to the dissemination of educational innovations based on AI tools, which has a negative impact on the opportunities of higher education institutions to form students' digital competence as an important criterion for the professionalism of future specialists.

Formative assessment now has an upgraded definition. There is a better way of monitoring student performance that retains the core values of individuality and continuity. That is why, in contrast with the obsolete way of evaluating success at the end of a course topic, formative assessment is about a constant and gradual evaluation of students' learning outcomes and achievements, bearing in mind both conditions when they perceive their learning material. The learning strategy can be tailored to that achievement and the revealed gaps in the material assimilation, which are obtained more or less throughout but not after the learning process (i.e., formative assessment). However, this evaluation is a highly laborious process, and the teacher may not undertake it without support from information technology. That is why digital tools, especially AI, are used for formative assessment. Yet in practice, the formative assessment policy of colleges and universities is generally only partially implemented because of

AI's inappropriate or biased application and teachers lacking relatively professional personal capabilities while evading adopting AI (Morris et al., 2021; Makarenko et al., 2024).

Therefore, the aim of our study is to identify the reasons for the ineffective implementation of AI in higher education and to determine the possibilities of AI for optimizing formative assessment of students.

## 2. Literature Review

Literature shows a growing deployment of artificial intelligence in post-secondary education, a massive tech-savvy collective of students (as shown by a survey of 4,497 undergrads at Stafford University where >17% use ChatGPT to finish homework assignments), be not overlooked (Cu & Hochman, 2023). Another survey conducted with students at Swedish universities (n 5,894) reported high awareness among the students regarding ChatGPT's capabilities (the ability to understand and respond to inquiries/questions); however active usage of ChatGPT has been restricted to only about 50% of the students that were included in the interviews and attitudes towards AI varied among students with different majors. Specifically, medical/health and humanities students were more sceptical concerning the potential of AI implemented in educational programs, while technical students used AI more often and had a favourable attitude towards learning facilitated with AI (Stöhr et al., 2024).

Studies that reviewed AI research papers have found geography-based variations in the examination of this issue. It should be taken into account that more research has been carried out by both American and Asian investigators in comparison with European countries, South America or Africa (Schei et al., 2024; Lo, 2023). There are fewer studies on AI in higher education among European scientists than the Chinese and US counterparts, but some large surveys have found that, especially when it comes

to chatGPT, AI is indeed popular with students in European universities. Especially, two thirds of the 6.300 German students investigated applied AI for explanation of information and concepts in their study (Von Garrel & Mayer, 2023). Another perspective is that Europeans have a somewhat favourable attitude toward AI, but they place great importance on preserving privacy, the security and reliability of AI generated data. (Scantamburlo et al., 2024).

There were also variations in the discipline area in higher education that examined the extent of AI for students ranging from STEM, which was most prominent among the studies, to less frequently explored areas such as medicine and social sciences (Joseph & Uzundu, 2024; Ouyang et al., 2023). The effectiveness of AI-based implementation in education on programming and economics was rated positively whereas that for mathematics was rated negatively (Lo, 2023). Medical students had adequate knowledge of AI, though they were worried about the ethical implications of using it in the health system, including the privacy of medical data. However, students perceived the necessity to enhance their competence in using AI-driven applications and were curious about its potential for minimising medical errors when practising with AI (Civaner et al., 2022). In the students' view, the positive impact of AI on learning and professional growth may suggest that digital skills might be needed in the implementation of AI in education (Chou et al., 2022).

Although students express a favorable view of AI for their learning experience, teachers are more sceptic about integrating AI on teaching compared to their students, that's is the reasons why most of them remain at first stage: "teacher as passive recipient of ai". Whereas the next stages of "teacher – active AI user" and "teacher – AI partner" demand more than IT skills from teachers, but motivation for using AI in education (Kim, 2024). A motivational obstacle is teachers' anxiety of being replaced by AI to the role of mentor in learning (Zhai, 2022). In contrast, according to student surveys - students prefer teachers and offline courses since AI cannot replace the emotions, creativity and pedagogical skills of a teacher in resolving conflicts and contacting with students (Chan et al., 2024). Another issue is the limited application of AI's multimodal features by teachers who prefer to use its basic tools that do not greatly ease their workload (Celik et al (2022). This

could also be because teachers generally receive little training on how to use AI programs. With the growing instance of academic fraud (mainly plagiarism) educator trust in AI is deteriorating, and although IT developers were adapting their system to detect AIG work and search for plagiarism, they fail when it comes to such content from advanced versions of AI (Yavich & Davidovitch 2024; Kruhlov et al., 2024). Gaps were also evident in the literature on AI impact in teachers' professional development, specifically the context of more responsive assessment (Tan et al., 2025).

The survey of the extent to which AI is used in teaching from around the world reveals that it cannot be said that it was effectively implemented into education processes as teachers' bias and low digitization competences and motivation, little developed digital infrastructure at universities (Farrell et al., 2024). However, some countries have showed that it is possible to make good use of AI in schools, so their approaches are worthy to be followed by others. Hence, the purpose of our study was to explore pros and cons of AI in education and validate that the use of AI in educational scenarios aligned with the tenets of formative assessment is viable.

### 3. Methods

The study used bibliographic and analytical methods, induction, deduction, synthesis, comparative analysis, and mathematical modeling. To achieve the research objectives, the following tasks were performed: identification of obstacles to AI implementation in higher education and positive aspects of AI implementation using the example of countries with advanced digitalization in education; analysis of the main characteristics of the most popular AI-based programs; justification of the feasibility of using AI to optimize formative assessment and creation of recommendations for the popularization of AI in education, in particular in the process of formative assessment. A mathematical model was created to determine the effectiveness of formative assessment. To accomplish the above tasks, we analyzed literature reviews from 2020-2025 related to research on AI in higher education. The results of the analysis were summarized and presented in tables. Recommendations were made on the effective use of AI in education, mitigating the risks of introducing AI into higher education, and

the effective implementation of AI to comply with the principles of formative assessment.

**4. Results**

To determine the algorithm of actions for promoting AI in education, an analysis of the advantages and disadvantages of existing AI programs in the educational process was conducted. This analysis is important in terms of studying the obstacles to the development of AI in education and can be a strong argument for

convincing teachers, university administrators, and educational reformers to promote the development of AI in higher education institutions. Understanding the pros and cons of AI for the industry allows us to predict the likely consequences of AI implementation through the prism of justifying its feasibility, compliance with current trends, and countering possible risks and future challenges. Table 1 presents the advantages of AI in education and the disadvantages that cause educators to doubt the effectiveness of AI for the learning process.

**Table 1.** Advantages and disadvantages of AI in education

Advantages	Disadvantages
Personalized learning through the creation of a learning plan, selection of learning materials based on the student's results and abilities and in accordance with their interests, personal AI assistant in learning.	Depends on good feedback from the student and ability to tailor questions to what they need.
Adaptive learning is based on increasing the workload on the student according to the skills acquired.	Needs student honesty to self evaluate success and constant student interaction with AI. Conversely, repeating unmastered material too often negatively impacts motivation to continue learning.
Automation of administrative processes in education by creating schedules, entering data, maintaining financial reports and forecasting financial expenses, registering students, and creating training courses. This reduces the workload on faculty members and allows them to devote more time to quality student education and self-improvement of teaching skills. It reduces the time spent on administrative tasks and ensures accuracy and fewer errors.	The era of 'teacher-free' learning processes has yet to come, as automatic processing will not take over teachers' activities; however, therefore it should be adapted and regulated. Dependent on high level of digital literacy amongst teachers to generate sufficient requests and recommendations. In programs where an AI is baked in, there's a whole lot of personal data, thanks to which we have to be concerned about cybersecurity.
Automating student assessment by creating tests and projects allows for faster and more accurate analysis of test results, avoiding subjective assessment factors. Automatic analysis of results allows to identify trends in students' well- and poorly-learned material and adapt teaching programs.	The quality of the software support for AI-based programs is an important factor to minimize errors in the student assessments. We need costly, cutting-edge AI programs to accurately evaluate texts and projects. The answer will be scored higher, and students will be less motivated to show their own creativity.
It reduces the workload on education workers by replacing certain duties related to process automation.	Entails the possibility of a downsizing of employees in the educational field, and thereby unemployment.

Source: Created by the author based on (Zhai, 2022; Adeshola & Adepoju, 2024; Lysenko et al., 2024)

As shown in the table, even when AI paves a new way for automated operations, it will bring with

it some new problems. Therefore, the automation of processes in education relieves teachers'

burden, but only if a teacher possesses enough competencies to adapt the work of AI. And besides, if the teachers and educators (as well as the other stakeholders in education) don't have a good knowledge of digital skills, setting parameters for AI programs, reviewing and amending AI outputs actually ends up adding to the workload of the educator/teacher. This realization combined with the high percentage of mistakes made by AI in unprofessional hands has put off educators using these kinds of AI tools.

Given that AI as a digital tool is relatively new, not many teachers have had the chance to develop skills for working with AI during their teacher education (Tan et al., 2025). This is also why teacher training within the professional development of teachers and the use of specialist programmers in universities' own introduction to new AI tools was found important to facilitate personal training for university staff in handling new technologies. Such training aid would prevent errors and stereotypes from being inherited by teachers in relation to AI. Simultaneously, a collaboration with the developer community can also enable AI developers to enhance program codes based on negative aspects identified from an implementation point of view.

On the other hand, AI offers students everything from new pathways to personalized and adaptive learning, while doing little to reduce risk. After all, that requires high student motivation as well as self regulation. The second one — that of academic dishonesty risks being harder to identify now that AIs are more advanced. Teachers have concerns about how to keep the basics of study intact in light of AI's ability to paraphrase content, which is essentially just plagiarism. It would also be interesting to examine the direction of these relationships and how such factors actually explain students' cheating behaviour in relation to similar studies (Yavich & Davidovitch, 2024) which showed that larger percentage of students who skipped classes and had a tendency for preference for learning online were more likely to plagiarize. This is supported by the role played by student motivation in the quality and ethical use of AI for learning.

While academic fraud risks will rise by applying AI, learning leverage cannot be restricted because

society widely spreads the use of AI tools. This poses new challenges for higher education, which needs to invest in both digital infrastructure and teacher training for the prevention of AI abuse by students. The issue of errors while working with AI must also be considered, therefore it is necessary that students should not only develop a critical attitude towards information processed with the aid of AI but learn how to work efficiently when applying their skills through AI. How to navigate AI irrespective of their origin in this case would include making search queries resonate, tweaking how AI works for them and verifying the original source of the information that they have as well because it is an increasingly significant part of society.

So, although teachers are positive biased towards AI; its integration into education is essential. Additionally, to reduce the risks posed by AI, teachers have to be professional in using digital tools. In return, university administrations must provide quality training for staff and secure software and cyberinfrastructure. These shifts need additional financing, which should be considered in budget revenues distribution and development strategies of HEIs. In recognition of ethical hazards related to privacy breaches of personal data and academic integrity, policymakers can offer legal support and guidance to higher education administrators in dealing with AI-related challenges.

The literature review results established that the integration of AI into education is at a quite rapidly pace, particularly by students as they engage several concerning instances for both self- and classroom performances. Yet to alleviate the bad influence of AI on HE, teachers should be ahead in this development and promote a 'teacher artificial intelligence (AI)' partnership. But one of the major obstacles is the fact that it is not well-known which AI approaches exist and what they are actually good for, and in which cases teachers should cooperate with software agents rather than request human support based on our analysis of popular AI-based programs (Table 2). This analysis is potentially relevant not only for educational professionals but also university management to guide choice in regards to which AI program is most effective from the perspective of what technology can do for them.

Table 2. Types of AI and their characteristics

Type of AI, developer, year of release	Characteristics	Application in education
ChatGPT Open AI 2022	It uses natural language processing and it is grounded in deep machine learning. They also have larger versions like GPT3 which had 175 billion units as opposed to the 1.5B of GPT2. Features: imitates human speech, writes texts as if written by a person, includes training data to respond to the user's query, has parameters allowing the edit and summary of information input to it and responds in different ways due to its settings, which is adjustable according with some parameters.	Generates texts (answers) from question and questions lists, makes searches. Parses and abstracts text, rephrases text, and does Machine translation. Saves past queries and predicts the next move. Automatically modifies results by adding instruction to them. Generates reports based on website research with the Deep Research function.
Copilot Microsoft 2023	From machine learning and natural language processes. Per, it integrates with Word, Excel, PowerPoint and Teams to help create texts, analyze data, highlight using a text and generate plans or summarize information. It produces formulas and graphics that make an analysis easier to perform in Excel. It creates presentations from text in PowerPoint, gives design suggestions and schedules the creation of summaries. In Teams, it provides instant meeting notes that provide a short description of the meeting and summarise the conversation while also managing your project.	Text generation, information analysis, project creation and drafting of any types of document, administrative processes automation; business project optimization; aid for financial support assistance; educational trends forecasting; marketing projects development; training course and schedule optimization; communication optimization – imagine answering the application automatically or collecting responses of your electronic correspondence.
Codex Open AI 2025	Relies upon machine learning algorithms and knows the way how to utilize natural language, generates program code by generating and examining in a real environment.	Aids in programming, automation of program coding and detecting of error.
BingAI Microsoft 2023	An AI-based search tool. Capable of conducting advanced searches, comprehending natural language, crafting text as per specific parameters and producing images and videos based on DALL-E3.	Facilitates quick information look-ups, report and essay writing, and creating projects and presentations. Permits to search for information according to an image.
OpenAI playground 2023	Sandbox for testing AI programs without writing any code.	Lets developers verify AI behavior without programming first, so they can test, simulate and even develop a prototype.

BardAI Google 2023	Developed on the Transformer artificial neural network, it is grounded in work of next-generation PaLM2 language model that integrates language thinking coding.	It can search for data based on specific criteria while considering the context of sentences and not just individual words. It creates texts by covering all available information. It can handle great content queries. It comes with an audio file creating feature. It includes sources to fight all plagiarism.
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Source: Created by the author based on (Adetayo et al., 2024; Chang et al., 2024; Potwora et al., 2024).

Given that the potential of AI and the popularity of AI applications, another important dimension should be considered: assessment has paid little attention in the literature. AI developers may focus on the opportunities of automatic assessment (being lighter for teachers), but one should also take account of AI's role in enriching formative assessment. Since formative assessment means an ongoing process of comparing results with a one-on-one mentality of

gradually modulating educational programs, AI, as the merging entity between the roles in testing and personal learning, will see to it that formative assessment principles are observed. But let's not forget the teacher leading this exercise as well. A summary of AI-assisted programs implemented for automated assessment and the associated potential effects on formative assessment are presented in Table 3.

**Table 3.** The role of AI in assessing student achievement

AI program for assessment	Program capabilities	Significance for formative assessment
Google NotebookLM	The system enables users to develop tests and assignments and surveys which will evaluate student performance through built-in assessment tools.	Allows for automatic assessment after each lesson and automatic test creation based on the information provided.
ChatGPT	Based on specified parameters, it helps create tests and assignments and checks their compliance with the original material.	Helps quickly create test assignments and analyze the level of mastery of the learning material.
Quizizz	Creates interactive tests in the form of a game.	Helps engage students in completing homework assignments and promotes a positive emotional attitude toward testing.
LearningApps	The system should enable students to download mobile-friendly interactive test questions which they can access through their devices.	Provides convenient testing and the ability to self-assess and identify problem areas.

Strikeplagiarism, Advego Plagiatus	Plagiarism detection software.	Helps combat academic fraud and identify active links to the original source.
GPT Detector, AI Text Classifier	Detection of text generated by artificial intelligence.	Helps determine the originality of a student's work.

Source: Created by the author based on (Miranda, 2025; Handoko et al., 2021; Elkhatat et al., 2021).

Indeed, as Table 3 shows the AI programs that could potentially support formative assessment are wide-ranging and heterogeneous considering that, in principle, any type of AI is helpful for teachers to carry out it. This is because AI can produce information and abstract the content, in turn, a factor that contributing to generating tasks and tests. This 'teacher-AI' collaboration allows teachers to dedicate less time to developing tests. The teacher has merely to furnish the teaching materials and check the test results for conformity.

Another is that some AI software can automatically review test scores, a way for teachers to save time with the reviewing of grading. Grading essays and open-ended questions is still a challenge, however. This demands costly next-generation AI programs with as little bias as possible. Therefore, a regular AI program cannot give an acceptable and over fair assessment about essays and open ended questions because there is a hazard of being rated higher AI result by taking it that the students' original and independent answer is worse or negative. So at this level extended answers, projects and essays are still a large amount of teacher time compared to test tasks which can be graded by AI.

The most time consuming and demanding form of the formative assessment is changing (discarding) teaching material in accordance with students' results on procedures, i.e., systemic analysis synthesizing data characterizing the result of assimilation of material and weaknesses. This task can also be institutionally outsourced to AI programs. Perhaps AI can do this by reporting what knowledge deficits learners have and forecasting where they are headed in their learning. AI systems that keep a record of queries and judgements to do some thinking about would be able to do this. This task can be done by the new-generation AI programs. However, even they are unable to offer quality assessment and pick up a personalized plan of

study without the teacher's control. But teachers can't do this step without AI anymore than we can, because good personalized learning is hard to achieve even through tutoring (with a teacher focusing in on just one student). Most of the time, while looking at a group of students' performance, it is impossible for a teacher to create an adaptive learning plan without artificial intelligence.

Also, a fair assessment is one of main principles of the formative assessment, so the investigation of copying/homework and non-independence doing works should be reliable. This principle also depends on teacher-AI collaboration, because in the absence of plagiarism-detection software and AI-authored text, teachers are unable to detect them. At this point, though, support from university administrators and educational officials is also critical since identifying academic fraud calls for frequent updating of AI programs that can spot them. It is also very relevant to preserve the discipline process for these students that often neglect.

To estimate the performance of AI for a web-based formative assessment system, a mathematical model has been presented depending upon following criteria:

1. creation of educational content,  $c_1$  ;
2. creation of test tasks,  $c_2$  ;
3. automatic checking of test tasks,  $c_3$  ;
4. determining trends in the assimilation of educational materials,  $c_4$  ;
5. checking assignments for plagiarism,  $c_5$  ;
6. checking assignments for AI abuse,  $c_6$  ;
7. other criteria at the request of the university,  $c_n$ .

The AI efficiency coefficient (K) is defined as the arithmetic mean of the sum of the formative assessment criteria according to the formula:

$$K = \frac{\sum_{i=1}^n c}{n}$$

$n$  - number of formative assessment criteria;

$c$  – coefficient of the formative assessment criterion.

We recommend calculating the formative assessment criterion coefficient ( $c$ ) using the formula for the sum of the time cost ( $t$ ) and economic feasibility ( $e$ ) coefficients and the expert assessment of academic task performance.

$$c = t + e + E$$

The time cost coefficient ( $t$ ) indicates the impact of AI on the performance of academic tasks and is calculated using the formula:

$$t = \frac{\sum_{i=1}^n a}{\sum_{i=1}^n b}$$

$t$  - time cost coefficient;

$a$  – time spent on performing tasks using AI;

$b$  - time spent on performing similar tasks by a teacher;

$n$  – number of tasks;

The economic feasibility coefficient ( $e$ ) indicates the feasibility of financial costs for the implementation of AI programs and is calculated using the formula:

$$e = \frac{\sum_{i=1}^n A}{\sum_{i=1}^n B}$$

$e$  - economic feasibility coefficient;

$A$  – funds spent on performing tasks using AI;

$B$  - funds spent on performing similar tasks by a teacher;

$n$  – number of tasks.

Tasks may include various types of academic activities, and the funds for their implementation must take into account the cost of maintaining AI programs and the cost of training teachers to work with AI, so it is advisable to make calculations taking into account academic work lasting at least 6 months.

The expert assessment of academic tasks ( $E$ ) includes the average rating of various types of academic tasks performed with the help of AI and is calculated using the formula:

$$E = \frac{\sum_{i=1}^n m}{n}$$

$E$  - expert assessment of academic tasks performed using AI;

$m$  – assessment of the quality of the task performed using AI;

$n$  – number of tasks.

This mathematical model will allow university administrations to choose the AI tools that are most justified in terms of compliance with the key principles of formative assessment, taking into account the needs of the university, the quality of tasks, the reduction of the workload on teachers, and financial costs. Thus, our research has shown that high-quality "teacher-AI" cooperation is necessary to ensure the principles of formative assessment. Namely, the involvement of AI in the creation and verification of test tasks, analysis and forecasting of trends in the assimilation of educational material, as well as the detection of plagiarism and misuse of AI. It should be noted that the detection of AI-generated texts should be entrusted to AI developers. Educators have the right to be protected from the uncontrolled penetration of AI into education. To this end, it is advisable for authorities to legislate that AI developers create, in parallel with new generations of AI, key programs for detecting traces of AI, which should be made available to higher education institutions.

## 5. Discussion

The findings of our research have identified an advantages and limitations of the use of AI in higher education that teachers have a low professional competence in working with AI, which can be compensated for by training within the framework of advanced training courses for teachers. A review by Fakhra et al. (2024) in the note on AI (using AI as CPD) suggested that teachers should use AI for their own continuous professional development and try out different educational programs to gain some practical experience of using AI. But the application of AI in the teachers' development are inadequate at present (Tan et al., 2025; Fakhra et al., 2024). We also need to enhance digital infrastructure in higher education institutions and offer high-quality AI programs for teachers alongside their professional development. When rolling out new AI tools, it may be best if programmers are trained the teachers alongside practical training.

One more significant disadvantage is the threat of academic cheating, demanding premium class programs for unacademic borrowings and AI violence detection, high level of teacher's competence in using AI, and active support by university leaders and education managers those measures which are directed to countering with

academic cheating. There is a strong research tradition that focuses on the influence of AI and academic integrity (Mohammadkarimi, 2023; Yavich & Davidovitch, 2024), but modern AI tools can sneakily rephrase limited content through text manipulations that are hard to spot. This is the reason why it makes sense for governments to compel AI developers to provide academic institutions with access to programs that can find traces of AI.

Once we eradicate the above disadvantages, teachers will be more willing to let AI being involved in teaching, and therefore it would allow such cooperation between teachers and AI partners would be considered as a reasonable stage (Kim, 2024). The latter in particular will enhance the integration of formative assessment as an approach to contemporary student evaluation by automatically generating tests and assignments for students and their automated AI-based correction while integrating adaptive learning systems and systems for checking plagiarism and AI based responses. Nevertheless, the adaptive learning programs are not a popular tool, they need financial support and good digital skills; but small innovative experiments using smart training partners and massive open online courses (MOOCs) have proven successful for small size samples (Da-Ta: 2011; Niu et al., 2022; Zhang, 2024).

## 6. Conclusion

The main benefits of AI in higher education are the automation of educational processes and adaptive & personalized learning according to the study above. However, the dark sides of it was that teachers need high digital competence, IT infrastructure should be built in universities, and there might be more cheating or financial loss due to its resistance barrier put AI into education. Recommendations on protecting against the harm from AI were suggested through improving teachers' training for professional development and promoting the use of AI, in particular digital technology, in their practice activities, developing digital technologies including AI at universities; creating disciplinary and legal regulation of violations of academic integrity; requiring developers to create codes allowing detecting texts created with the use of AI and providing higher education institutions with access to them. The relevance of the integration of AI into education, as it pertains to formative assessment is determinant in its capacity for automatic test creation and assignment development, analysis of trends in assimilation of educational material, preventing plagiarism and resisting the abuse by students when using AI tools was justified through development of a mathematical model that allowed us to evaluate functionality. This model can be of practical interest to the management of higher education institutions since it provides the identification of AI tools, which satisfy university requirements for formative assessment, especially in the quality of academic tasks, decreasing the workload on teachers as well as financial sense.

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## 8. Author Declaration

The authors confirm that this manuscript is an original work, has not been previously published, and is not under consideration for publication elsewhere. All sources, ideas, and materials used in the preparation of this article have been appropriately cited in accordance with academic standards.

The authors declare that there are no conflicts of interest, financial or otherwise, that could have influenced the research design, data collection, analysis, interpretation, or the presentation of the findings.