



## GENERATIVE ARTIFICIAL INTELLIGENCE (GAI) AND ITS EDUCATIONAL IMPLICATIONS FOR CULTIVATING INTELLECTUAL VIRTUES

### LA INTELIGENCIA ARTIFICIAL GENERATIVA (IAG) Y SUS IMPLICACIONES EDUCATIVAS PARA EL CULTIVO DE VIRTUDES INTELECTUALES

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#### ABSTRACT

The article examines the transformation of higher education under the influence of generative artificial intelligence (genai) technologies. It argues that the main risks in higher education associated with the active integration of genai stem from the internal contradictions of higher education itself. New technologies only exacerbate the problems inherent in higher education. The author contends that the educational challenges intensified by the use of genai are linked to its outcome-oriented approach at the expense of the learning process. Since genai is a tool for delegated problem-solving, its use in an outcome-centered education system creates a paradox: the possibility of achieving learning outcomes without engagement in the learning process. The resolution of this paradox is seen in a new higher education strategy based on cultivating epistemic virtues. Key principles include: (1) viewing learning as an open-ended process; (2) prioritizing the learning process over outcomes; (3) focusing on developing the learner's epistemic virtues – curiosity, open-mindedness, intellectual honesty, etc. In conclusion, the article asserts that the value of genai lies in exposing the flaws of the higher education system that need to be addressed. Simply integrating genai instrumentally into the old outcome-centered learning strategy cannot fundamentally transform higher education. A new approach is needed—one that places the learning process and the individual characteristics of the learner at the center.

#### Keywords:

Generative artificial intelligence; genai; epistemic virtues; higher education.

#### RESUMEN

El artículo examina la transformación de la educación superior bajo la influencia de las tecnologías de inteligencia artificial generativa (genai). Argumenta que los principales riesgos en la educación superior asociados con la integración activa de genai provienen de las contradicciones internas de la propia educación superior. Las nuevas tecnologías solo exacerbaban los problemas inherentes a la educación superior. El autor sostiene que los desafíos educativos intensificados por el uso de genai están vinculados a su enfoque orientado a resultados en detrimento del proceso de aprendizaje. Dado que genai es una herramienta para la resolución de problemas delegada, su uso en un sistema educativo centrado en resultados crea una paradoja: la posibilidad de lograr resultados de aprendizaje sin involucrarse en el proceso de aprendizaje. La resolución de esta paradoja se ve en una nueva estrategia de educación superior basada en el cultivo de virtudes epistémicas. Los principios clave incluyen: (1) considerar el aprendizaje como un proceso abierto; (2) priorizar el proceso de aprendizaje sobre los resultados; (3) centrarse en el desarrollo de las virtudes epistémicas del estudiante: curiosidad, mentalidad abierta, honestidad intelectual, etc. En conclusión, el artículo afirma que el valor de genai reside en exponer las deficiencias del sistema de educación superior que deben abordarse. La simple integración de genai instrumentalmente en la antigua estrategia de aprendizaje centrada en resultados no puede transformar fundamentalmente la educación superior. Se necesita un nuevo enfoque que centre el proceso de aprendizaje y las características individuales del estudiante.

#### Palabras clave:

Inteligencia artificial generativa; genai; virtudes epistémicas; educación superior.



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## INTRODUCTION

The rapid invasion of generative artificial intelligence into higher education has become a reality. Teachers, students, and administrators are forced to adapt to the new technology in many aspects of the educational process, from organizing classroom activities to solving difficult ethical problems. The impact of widely available generative artificial intelligence technology on higher education is difficult to overestimate. However, artificial intelligence, like any new technology, rather highlights existing crises and contradictions than creates them. Artificial intelligence acts as a mirror in which we can examine the shortcomings of modern higher education.

The first part of the article examines the positive and negative aspects of the introduction of genai into higher education. It explores the foundations of both optimistic and pessimistic forecasts regarding the use of genai in the learning process. The conclusion is drawn that the primary cause of the negative consequences of genai adoption lies not in the nature of the technology itself or how it is used, but in the inherent contradictions of higher education.

In the second part, I present a thought experiment to illustrate the paradox of integrating genai into higher education. The essence of the paradox is that genai, as a tool for delegated problem-solving, allows students to achieve formal learning outcomes (solving a math problem, writing an essay, passing a test, delivering a presentation, etc.) without engaging in the actual learning process. The use of genai in an educational system that measures success by formal outcomes leads to contradictions and various negative consequences. Therefore, a new, non-outcome-centered strategy for higher education is necessary.

The third part of the article is devoted to the theoretical justification of a new strategy for higher education that is resilient to the challenges posed by new technologies. The foundation of this strategy lies in a focus on the individual characteristics of the learner. The success of the educational process is measured not by the achievement of formal outcomes but by the presence or absence of the required epistemic virtues that the learner must develop or demonstrate in the course of their education. Shifting the focus of assessment from learning outcomes to the learner's personal growth allows for the use of genai technologies without the risk of alienating the student from the learning process itself.

## MATERIALS AND METHODS

The main criterion for selecting sources is the diversity of approaches to empirical and theoretical research into the transformation of higher education under the influence of

the active introduction of generative artificial intelligence (genai) into learning processes.

To demonstrate the importance of epistemic virtues in the context of the active implementation of genai in education, I draw on the work of (Code, 1984; Sosa, 2007; Zagzebski, 2020). These studies allow us to identify the significant role of intellectual agent characteristics such as curiosity, honesty, and open-mindedness in the learning process. Based on the arguments of supporters of the responsibility approach, it is argued that when assessing the success of learning, it is necessary to first of all take into account not the formal results, but the agent's involvement in the process.

Criticism of the outcome-centered approach, as the most widespread in contemporary higher education, is carried out using the arguments set out in the works of Perkinson (1969), which argues that learning is a fundamentally incomplete process, and Mišević (2016), who highlights the special role of curiosity as an intellectual virtue of learners.

The problems of higher education in the context of active implementation of digital technologies are analyzed using (Bretag, 2016; Ragnedda & Muschert, 2013; Safonov & Mayakovskaya, 2020). These sources confirm the conclusion that the implementation of genai does not create fundamentally new problems in the field of higher education, but only exacerbates existing ones. These publications demonstrate that such significant issues in the context of the emergence of genai as academic integrity and the problem of access to technology were actively discussed before the invasion of genai into education.

The collective monograph by Crompton & Burke (2024), serves as a resource for analyzing the diverse impact of genai on higher education. The monograph explores various strategies for integrating genai into the learning process. Cooper et al. (2024) consider the possibility of using genai technology for training critical thinking. The most comprehensive and complete possible strategies for applying ai in the field of education are given in De Bem Machado et al. (2024).

The selection of sources was carried out with the aim of providing a comprehensive understanding of the impact of genai on higher education, including philosophical, technological and pedagogical aspects. The theoretical review allows us to outline future effective strategies for implementing the learning process in higher education, which integrates the total use of genai by students, professors and administrative staff. The purpose of the theoretical review is to highlight the negative and positive

aspects of the influence of the new genai technology on education, and to form a conceptual basis for a new strategy for higher education.

The main result of the study is the identification of the main conceptual elements of the new learning strategy in the context of active implementation of genai. These results are presented in Table 1.

Table 1: Principles of a new strategy in higher education.

Principles	Description
Learning never ends	The learning outcomes recorded during the final assessment do not reflect the completion of education, but only an intermediate stage.
Educational success manifests in the learning process rather than its outcomes	The student's involvement in the learning process is more important than the results he can demonstrate in a limited time
Meaningful learning engagement requires the cultivation of epistemic virtues	A student's level of engagement in the learning process can be assessed by examining their individual constellation of epistemic virtues.
Intellectual curiosity represents the fundamental epistemic virtue	The presence of the virtue of curiosity in a student fundamentally determines his involvement in the educational process.

Source: Prepared by authors

Artificial intelligence does have the potential to be widely used in higher education. Among the possible forms of using ai, researchers highlight: personalization of learning, intelligent tutoring systems, automated assessment, data analysis and predictive modeling, virtual classrooms, translators, virtual assistants, adaptation assessment, support for faculty, etc. (De Bem Machado et al., 2024).

In addition, the use of artificial intelligence can intensify ethical discussions around the use of such technologies in education, increasing critical attitudes and awareness among students.

The experience of professors using genai in the teaching process demonstrates that generative models help students acquire important epistemic skills (Cooper et al., 2024). The dialogue with chatgpt on the research topic shows, firstly, that knowledge exists in the communication process, and, secondly, that genai technology is not an epistemic authority in itself, but only provides access to the sum of knowledge, the carrier of which is the whole society. In these conditions, the skill of critical thinking acquires special importance. Students have access to a universal digital dialogue simulator, which, if used correctly in teaching, can become an excellent assistant in training the skill of critical thinking in the form of a critical dialogue (Dickerson, 2024).

However, the potential for erroneous responses and genai “hallucinations” imposes specific demands on learners. They must critically evaluate generated answers and refine their queries carefully—otherwise, they risk receiving false information. Just as a responsible agent in real life critically assesses information and its sources, students must cultivate the same skill when interacting with genai models, remaining mindful of their imperfections.

Despite all the potential benefits of ai in higher education, digital tools cannot fully replace humans in the educational process: *“ai systems excel in processing vast amounts of data, analyzing patterns, and providing customized learning experiences. However, this does not account for the invaluable human elements that educators bring to the educational process”* (Burke & Crompton, 2024, p. 326). I argue that these “human elements” are not merely supplementary aspects of learning but constitute the very core of education as a social practice. Clearly, the rapidly advancing digital technologies in education cannot address all facets of the learning process. For instance, social communication skills and soft skills cannot be acquired in isolation from real-world practice (Stewart, 2010), which renders ai-driven remote and individualized learning largely ineffective for such purposes. The negative experiences of students forced into remote learning during the covid-19 pandemic starkly demonstrate this (Safonov & Mayakovskaya, 2020). Thus, we should not expect ai to become a universal solution for the challenges facing higher education.

Moreover, the benefits of innovation inevitably come with a host of challenges. Researchers identify several key issues in students’ use of generative ai in higher education: access disparities, personal data privacy, reliance on biased information, copyright infringement, and academic integrity (Howe et al., 2024).

**Access inequality:** not all students have equal access to ai technologies, exacerbating educational inequities.

**Personal data privacy:** information shared during registration or use of ai platforms may be exploited without students’ knowledge, including for system training purposes.



**Biased information:** generative ai may produce factually inaccurate or prejudiced content that students uncritically incorporate into their work.

**Copyright issues:** ai-generated responses may draw on copyrighted sources without attribution, and “hallucinations” may present unsourced or fabricated information.

**Academic integrity:** overreliance on ai can undermine the development of profession-critical skills. Concealing excessive ai use in assignments may result in misrepresenting students’ actual knowledge and competencies.

These challenges highlight the flip side of technological advantages. A closer examination reveals that these issues are not new to education. Problems like academic dishonesty (Bretag, 2016), the digital divide (Ragnedda & Muschert, 2013), and biased information (Acosta-Servín et al., 2025; Casimiro-Urcos et al., 2025; Grimes et al., 2017) were widely debated long before genai emerged. This suggests that the challenges of genai in higher education stem not from the technology itself but from preexisting systemic flaws in education—genai merely amplifies them.

Whether we are overly optimistic or pessimistic about ai’s role in higher education – anticipating radical transformations for better or worse—we risk treating technological progress as capable of altering the very essence of learning. The challenges posed by genai are symptomatic of deeper educational contradictions that predate its arrival. Blind faith in technological fixes may only worsen these entrenched issues. Thus, whether genai’s impact on higher education proves positive or negative largely depends on our ability to resolve long-standing systemic contradictions rather than on the technology itself.

Ultimately, the merits and drawbacks of genai in higher education are determined by pedagogical practices and the learning process itself, not by the nature of the technology. The ai problem in higher education is, first and foremost, a problem of education itself.

The positive and negative aspects of ai integration in higher education demonstrate that outcome-centered learning organization is fundamentally flawed. An emphasis on specific sets of knowledge, skills, and competencies as learning outcomes becomes problematic in the context of rapidly developing digital technologies. This approach leads to a situation where demonstrating learning outcomes becomes completely disconnected from the actual learning process.

The paradox of the crisis in higher education lies in the fact that achieving learning outcomes no longer requires genuine learning. Ai technologies clearly show that one can demonstrate knowledge, write texts, conduct analyses,

and perform other academic tasks without actually learning these skills – it’s sufficient to master digital tools that significantly reduce effort and accelerate the achievement of learning outcomes.

The absurdity of an outcome-centered approach in the context of genai implementation can be demonstrated through the following thought experiment. Imagine professor p, who assigns students to write essays on given topics. However, due to time constraints, the assignment itself was generated by ai. Let’s assume this takes place in the near future when the technology has become more advanced, and genai outputs are reliable enough to require no additional verification. Consequently, professor p only knows the general subject matter of the assignment but is unaware of the specific topics formulated by the ai.

Results-oriented students, in turn, also complete the assignment using genai. The essays submitted for evaluation are thus entirely ai-generated, with students having only a vague understanding of their content. Remembering that professor p is pressed for time, they also use ai to assess the essays. Given that the texts were ai-generated, it’s easy to imagine all students receiving good grades and successfully completing the course.

In this scenario, the learning process occurs without any meaningful engagement from either the instructor or the students. While learning outcomes were demonstrated and assessed, no actual learning took place. The ai formulated the assignment, completed it, and evaluated it—rendering the educational process entirely hollow.

The most obvious strategy to avoid this paradox is to acknowledge ai proficiency as an essential competency for modern graduates. What matters is not how deeply students were immersed in the educational process, but whether they can solve professional problems in the most effective way. If modern digital technologies provide an exceptionally efficient problem-solving tool, then competent professionals must be skilled in its application within their field. Therefore, higher education, amid widespread ai integration, must cultivate these competencies in students. Graduates without ai skills will simply be uncompetitive.

From this perspective, we might argue that professor p, by assigning the task, is actually helping students develop ai proficiency. Students using ai to complete assignments aren’t excluded from the learning process – they are instead tasked with crafting effective prompts, which directly influence the final output. In this new digital reality, the skill of “writing an essay” no longer means working with a text editor but rather with genai.

In the described thought experiment, learning outcomes would not be achieved without the learning process, as students would effectively be training to produce text using



a new digital tool. Rather than banning or restricting ai use as antithetical to education, higher education should integrate ai skills as another legitimate means of achieving professional outcomes. The focus must shift from policing tools to ensuring students master their application in ways that enhance, rather than replace, genuine competence.

Many researchers studying the impact of ai on higher education have adopted precisely this strategy (Crompton & Burke, 2024). The transformation of higher education in contemporary conditions necessitates incorporating ai proficiency into the framework of developed competencies. Higher education must integrate ai utilization into the learning process. From this strategic perspective, ai is merely a new tool that students must be taught to use. Consequently, while education maintains its outcome-oriented approach, the means of achieving these outcomes undergo qualitative revision. This strategy adapts existing educational concepts to new digital realities by expanding and transforming the understanding of graduate competencies. If modern professionals employ ai technologies to solve work-related tasks, graduates must possess corresponding technical skills. Blanket restrictions imposed by universities would only result in graduates lacking crucial professional competencies. The learning process would then focus primarily on mastering new technological tools.

This strategy presupposes that the skill of writing essays using genai is equivalent to proficiency with other text-creation tools. In other words, genai as a tool is analogous to a pen, typewriter, or word processor – albeit more advanced, efficient, and versatile, yet functionally similar. Just as students once needed to master microsoft word, they must now learn to use chatgpt.

A significant counterargument to this approach highlights the fundamental ontological difference between genai and all pre-existing writing tools. The defining feature of new technologies lies in their capacity for task delegation—an unprecedented capability. Word processors, typewriters, or pen and paper cannot generate text independently. While one cannot delegate essay writing to a typewriter, formulating a chatgpt prompt achieves precisely this. Genai represents a tool of delegated task execution: the user doesn't solve problems through the tool but rather assigns the task to the tool itself. If we disregard that ai is an inanimate technology, the problem-solving method students learn reduces to skill in task delegation to another agent. In this context, the solution differs little from scenarios where a student might ask a friend to write the essay or pay a professional writer—in all cases, the student instrumentally leverages another agent's skills and knowledge. While one could argue this constitutes a legitimate problem-solving method requiring specific competencies,

universities are unlikely to incorporate such delegation into curricula. More likely, it would be considered fraudulent.

Therefore, the strategy of integrating ai into curricula must account for the fundamental reality that students will be utilizing a delegated problem-solving tool. This creates a risk (when ai is overused) of achieving formal education outcomes without any substantive learning process occurring.

An alternative strategy for resolving the paradox of ai integration in education involves shifting the focus from learning outcomes to the learning process itself. This approach recognizes that the described paradox stems from inherent contradictions within outcome-centered education models. Rather than merely incorporating new ai technologies into existing systems, it necessitates transforming education itself to resolve these contradictions.

The root of the contradiction lies in the outcome-focused approach, which operates on the assumption that education's primary purpose is to equip students with a predetermined set of knowledge, skills, and competencies. Accordingly, assessments – whether course-specific or program-wide – focus on verifying these outcomes. Professors assign mathematical problems, essays, tests, etc., all designed to evaluate students' mastery of specific knowledge and skills. Task completion becomes equated with skill acquisition.

This outcome-centric paradigm permeates all levels of educational design: curriculum development, course structures, and evaluation systems are all oriented toward achieving concrete results. Similarly, the expectations of students, faculty, and employers are all framed in terms of measurable outcomes – specific knowledge and skills to be acquired. All this creates outcome-centrism, the result of which is the paradoxical possibility of achieving learning outcomes without learning itself, which is what the ai invasion reveals.

The obvious step here seems to be a move away from focusing on learning outcomes to the detriment of learning itself. This requires an alternative approach to the educational process in higher education. The central idea of the new approach to learning is that the learner's involvement in the process of solving a problem is considered more important than the final result. To do this, it is necessary to make the epistemic virtues of learners the subject of assessment, since virtues are acquired qualities of an agent that help him achieve his goals (Sosa, 2007). I take a responsibility approach to the epistemic virtues, according to which the agent is responsible for choosing the ways and methods of knowing (Code, 1984; Zagzebski, 2020).

Therefore, the new approach to learning assumes the implementation of the following principles in the learning process:

1. Learning never ends;
2. Educational success manifests in the learning process rather than its outcomes;
3. Meaningful learning engagement requires the cultivation of epistemic virtues;
4. Intellectual curiosity represents the fundamental epistemic virtue.

Learning never ends.

This principle asserts that learning outcomes captured through final assessments do not represent the completion of education, but merely an intermediate stage. When a student receives full marks for a course, this signifies only that they have completed the formal curriculum - not their learning journey in the subject. This concept represents the pedagogical embodiment of fallibilism, the philosophical position that scientific knowledge is inherently incomplete (Perkinson, 1969). The unfinished nature of cognition thus demands continuous engagement in the learning process itself. While this constitutes a broad interpretation of learning, it effectively demonstrates that higher education represents just one component within the broader, lifelong pursuit of knowledge.

- Educational success manifests in the learning process rather than its outcomes.

This principle asserts that a learner's engagement in the learning process is more important than the results they can demonstrate within a limited timeframe. Engagement in the learning process presupposes the learner's genuine interest in acquiring and applying both "knowledge that" and "knowledge how." implementing this principle requires shifting the assessment focus from outcomes to evaluating the learner themselves. The individual characteristics of the learning agent play a more significant role in assessing the learning process.

This principle can only be implemented through direct interpersonal student-teacher interaction. The teacher must primarily focus on the learner's personal characteristics as manifested during the learning process – something that is clearly impossible to achieve, for example, in mass online education settings.

- Meaningful learning engagement requires the cultivation of epistemic virtues.

A student's level of engagement in the learning process can be assessed by examining their individual constellation of epistemic virtues. By focusing on these virtues, educators shift evaluation from measuring educational outcomes to assessing the *ethos* of the learning process

itself. This approach necessitates careful course design – assignments must be structured to provide opportunities for students to both demonstrate and cultivate essential epistemic virtues. The most crucial of these include: intellectual curiosity, intellectual honesty, perseverance, open-mindedness, and others.

Intellectual curiosity represents the fundamental epistemic virtue.

Among the core epistemic virtues, intellectual curiosity occupies the central place. I contend that a learner's possession of this virtue fundamentally determines their engagement in the educational process. Curiosity represents a distinct intellectual interest fulfilled through the act of knowing (Mišević, 2016). It thus serves as an intrinsic motivational force for both formal learning and subsequent independent inquiry.

A learner whose curiosity is nurtured will strive to embody this virtue throughout their lifelong educational journey. Without the inherent desire to seek new knowledge, the learning process itself becomes inconceivable. Therefore, intellectual curiosity enables deep engagement with learning itself – rather than mere attainment of formal outcomes.

Returning to the thought experiment of ai's incursion into education, this strategy would not classify the situation as successful learning. While students completed their assignments, neither the learners nor the professor were genuinely engaged in the learning process. Generative ai merely enabled the achievement of learning outcomes without personal involvement from the educational agents, thereby exposing the inherent paradox of outcome-oriented education.

The principles of this new educational strategy circumvent such paradoxes while preserving the essential nature of learning as a social activity grounded in interpersonal relationships. By focusing on learners themselves and their epistemic virtues – which they cultivate and apply throughout the learning process – we can establish a resilient educational environment that remains impervious to disruptions caused by emerging technologies.

## CONCLUSIONS

It is obvious that the new educational strategy does not deny the usefulness of ai in education and beyond. One can agree and accept many ways of adapting ai technologies in education, which will certainly have a positive impact on the learning process. Moreover, in the context of this strategy, its application does not result in paradoxical breaks with the learning process. New ai technologies do have the potential to revolutionize existing higher education, but this potential lies in the fact that ai clearly demonstrates the imperfections of the higher education

system that need to be corrected. The simple introduction of new technology is not able to transform education in itself.

A new approach to higher education is required, in which the learning process and students are in the center, only then will the introduction of new technologies have only positive consequences. Therefore, pessimism about ai in education in fact turns out to be a pessimistic view of the future of the outcomes-centered learning strategy that has become ubiquitous in modern conditions.

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