

Human as a Subject of Research and Artificial Intelligence as a Tool of Science: Psychological and Methodological Analysis

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Abstract: The article addresses the issue of transformations in the notion of subjectivity within scientific inquiry in the context of the active integration of artificial intelligence (AI) technologies into science and education. The study combines theoretical and empirical analysis, including a survey of students and academic staff (N = 90), which revealed differences in the perception of AI either as an instrument or as a conditional “co-author” of research activities. The theoretical part builds upon philosophical and psychological concepts of subjectivity (S. L. Rubinstein, A. N. Leontiev, L. B. Schneider, E. Husserl, K. Popper), emphasizing the uniqueness of human motivation, value-based foundations, and critical reflection. The empirical findings demonstrate that students tend to view AI as a tool for optimizing educational and research tasks, whereas academics highlight cognitive risks and threats to academic integrity. Based on statistical data analysis (correlation and factor analysis, Student’s t-test, Cronbach’s alpha), the study concludes that the leading role as the subject of research remains with the human. The practical significance of the work lies in the necessity of fostering a digital research culture oriented toward the responsible use of AI in higher education practice.


1 INTRODUCTION

The rapid advancement of artificial intelligence (AI) technologies in recent years has become one of the most significant factors reshaping both scientific and educational practices. Contemporary machine learning algorithms and generative models can perform a wide range of cognitive functions that were previously regarded as the exclusive prerogative of humans: processing large-scale datasets, generating texts, proposing interpretations, and even formulating hypotheses (Chen et al., 2020). Such developments inevitably raise the question of the boundaries of subjectivity in science: does the human being remain the central subject of research, or is AI beginning to claim a more active, quasi-subjective role in knowledge production?

The relevance of this problem is underscored by several considerations. First, digital technologies have become an integral part of university environments and research practices. Their use enables significant acceleration of routine tasks – from literature review and data analysis to statistical

modelling – thereby increasing the productivity of scholarly work. At the same time, the very speed and autonomy of AI systems generate discussions about their status: are they merely tools in the hands of the researcher, or do they constitute active participants in the research process, shaping aims, tasks, and outcomes?

The issue of subjectivity in science is of fundamental importance, as it touches upon core philosophical and psychological categories. Traditionally, the subject of scientific inquiry was defined as a human being, endowed with motivation, value orientations, critical reflection, and responsibility for results. These features distinguished the researcher from any instruments employed in knowledge production. With the emergence of AI, however, a qualitatively new dimension appears: algorithms can operate autonomously, learn from vast amounts of data, and propose solutions not explicitly programmed by their developers. This “pseudo-subjectivity” challenges traditional understandings of research and calls for a

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reconsideration of the human role in scientific inquiry.

For educational psychology, this dilemma is especially salient. On the one hand, AI is widely implemented in teaching and learning: automated testing, intelligent tutoring systems, adaptive courses, and personalized learning environments. On the other hand, such technologies pose risks of diminished independent cognitive activity, erosion of academic integrity, and the substitution of authentic research experience with machine-generated outcomes. Thus, the question is not purely philosophical but directly affects psychological and pedagogical practices of training future professionals.

The perspectives of students and faculty reflect this duality. Students tend to perceive AI as a means of optimizing academic and research tasks, thereby facilitating self-realization and accelerating learning. At the same time, such reliance risks fostering cognitive passivity, superficial knowledge acquisition, and reduced intrinsic motivation. Faculty members, by contrast, emphasize concerns about academic honesty, the preservation of reflective and critical thinking, and the dangers of over-dependence on algorithmic systems. This tension between efficiency and integrity reveals the profound complexity of integrating AI into higher education.

Beyond its psychological and pedagogical dimensions, the issue of subjectivity in the age of AI is inherently interdisciplinary. It intersects with the philosophy of science, cognitive psychology, technology ethics, and the sociology of education. From this perspective, AI is not merely a technical innovation but a factor reshaping the very nature of knowledge and the identity of the research subject (Kamalov et al., 2023).

In this context, empirical studies examining how students and academics perceive the role of AI – whether as an instrument, collaborator, or even as a potential research subject – acquire particular importance. Such investigations make it possible to assess the extent to which traditional foundations of human subjectivity remain relevant, and which aspects of research and educational practices require rethinking.

Therefore, the problem of subjectivity in scientific inquiry in the age of artificial intelligence has both theoretical and practical implications. On the one hand, it challenges fundamental assumptions about the human role in knowledge production; on the other, it defines concrete tasks for educational psychology, such as sustaining cognitive activity, fostering research identity, and safeguarding

academic integrity among students. These issues form the central focus of the present article.

2 MATERIALS AND METHODS

We turned to an analysis of existing theoretical studies addressing the problem of subjectivity in the context of the digitalization of science and education. Their systematization revealed that scholarly discourse has not yet produced a unified understanding of the boundary between the instrumental function of artificial intelligence and the possibility of attributing elements of subjectivity to it. This ambiguity defined the need for empirical verification and for a deeper examination of how AI is perceived as a participant in research processes.

To this end, we conducted an empirical study aimed at identifying how students and academics conceptualize the role and significance of artificial intelligence in the academic environment. The findings made it possible to capture differences in the assessment of AI's potential and risks, as well as to clarify the psychological foundations underlying perceptions of the boundaries of subjectivity.

2.1 Theoretical Review of the Problem of Subjectivity in the Context of the Digitalization of Science and Education

Scholars increasingly emphasize the ambivalent influence of artificial intelligence (AI) on science and education. On the one hand, there is a noticeable rise in productivity, faster information processing, and expanded opportunities for personalized learning trajectories. On the other hand, researchers identify risks of cognitive passivity, declining motivation, and superficial knowledge acquisition (Goldie, 2012). Some studies argue that the organic integration of AI into the educational process can foster the development of critical thinking skills, while a complete ban often leads to plagiarism and the use of circumvention tools. Thus, the issue of subjectivity under conditions of digital transformation acquires urgency: does the human remain the central subject of inquiry, or is AI gradually assuming this role?

The problem of the subject of research has deep roots in philosophical and psychological traditions. In classical Russian psychology, S. L. Rubinstein formulated the principle that through activity the subject not only transforms the world but also

develops and changes himself (Rubinstein, 2003). The human being does not merely respond to external stimuli but actively shapes reality and his own qualities in the process of cognition. For Rubinstein, the subject is always conceived as an agent endowed with intentionality, value-based motivation, and reflective capacity (Rubinstein, 2003). This means that the subject of scientific inquiry cannot be reduced to a bearer of cognitive operations alone but is always embedded within systems of meaning, goals, and personal orientations. It is precisely this fundamental feature that distinguishes humans from algorithmic systems: AI may reproduce reasoning, but it cannot set goals or values that define the trajectory of inquiry.

A. N. Leontiev further developed the activity approach, highlighting its motivational and value dimension. In his framework, subjectivity is not an abstract capacity to think but always activity, grounded in motives and goals (Leontiev, 1977). For science, this implies that the researcher not only produces knowledge but also recognizes the meaning and direction of his actions, aligning them with broader sociocultural tasks. Leontiev stressed that it is the motive that provides cognition with its meaning-making function, turning it from a mechanical operation into an act of creative search (Leontiev, 1977). Algorithmic systems lack motives; their functioning is predetermined by external parameters and prescribed algorithms. Hence, AI cannot be regarded as a genuine subject but only conditionally as a “pseudo-subject.”

A significant contribution was made by L. B. Schneider, who investigated the phenomenon of professional identity. In her works, the subject is considered not only as a carrier of cognitive activity but also as a personality developing identity through activity (Schneider, 2001). In the scientific and educational environment, this aspect is particularly important: research is always associated with the formation of belonging to a professional community, the assimilation of academic integrity norms, and the awareness of personal responsibility for results (Schneider, 2008). These qualities emerge through socialization and professionalization and cannot be reproduced by AI, which lacks selfhood and identity (Schneider, 2017).

In the Western tradition, similar emphases were articulated by philosophers of science and phenomenologists. E. Husserl, through his phenomenological method, argued that the subject of knowledge is always embedded in the “lifeworld,” which provides horizons of meaning (Husserl, 1970). For him, the subject is not merely consciousness

registering facts but consciousness constituting reality through acts of intentionality. Scientific inquiry, in his view, is impossible without subjective experiences and meanings (Husserl, 1970). From this standpoint, it becomes evident that AI, which lacks phenomenological experience, cannot act as a genuine subject: it does not experience, it merely processes data.

K. Popper, in turn, considered the subject of scientific inquiry through the lens of his “three worlds” concept – the physical world, the mental world, and the world of objective knowledge (Popper, 2002). In his view, the subject operates in a unique nexus: not only observing and recording facts but also generating hypotheses, critically testing them, discarding false theories, and constructing new explanatory models (Popper, 2002). For Popper, the defining quality of the subject is critical rationality and the ability to self-correct. It is this quality that makes humans subjects of science. AI, in this context, can be seen only as part of the third world – a repository of objective knowledge – but not as an active subject endowed with responsibility and reflection.

Thus, an analysis of philosophical and psychological perspectives reveals several key characteristics of subjectivity: activity and transformation (Rubinstein), motivated activity and meaning making (Leontiev), identity and social embeddedness (Schneider), experience and intentionality (Husserl), critical rationality and responsibility (Popper).

It is precisely this integrity – the combination of cognitive, motivational-value, social, and existential levels – that distinguishes the human researcher from artificial systems (Zawacki-Richter et al., 2019). Algorithms may imitate discrete elements of cognitive activity but lack motivation, values, and critical self-reflection (Yan, 2023). In this sense, AI can be more accurately described as a “pseudo-subject” – a functional analogue performing specific tasks without possessing the essential characteristics of subjectivity.

Consequently, theoretical analysis demonstrates that the dilemma of whether the subject of scientific inquiry is “human or machine” has not only applied but also fundamental significance (Zawacki-Richter et al., 2024). It touches upon the very foundations of scientific activity, the identity of the researcher, and the role of critical reflection in knowledge production. In this context, educational psychology emerges as a key discipline capable of identifying how human subjectivity is preserved and transformed

amid the rapid integration of artificial intelligence technologies.

2.2 Methodology

The methodological foundation of this study was grounded in the principles of educational psychology, which view educational activity as a holistic process integrating cognitive, motivational, and value-based aspects. The research also relied on broader scientific principles: systematicity (considering educational experience and attitudes toward artificial intelligence as a multidimensional phenomenon), activity (acknowledging the active role of the subject within learning and research processes), development (addressing the dynamic nature of research identity formation at different stages of higher education), and the principle of research ethics (Bogatyrev, 2025).

Within the framework of the dilemma “human as the subject of research or artificial intelligence,” special attention was paid to how AI is perceived and used in scientific and educational practices by students and faculty members. Thus, the methodological design combined a theoretical analysis of philosophical and psychological approaches to subjectivity with an empirical examination of current perceptions among participants in the educational process.

The empirical stage was conducted in the form of a survey aimed at identifying attitudes toward artificial intelligence as either a tool or a potential “co-author” of scientific inquiry. The sample included 90 respondents: 60 undergraduate and master’s students (third- and fourth-year students, representing both humanities and technical fields) and 30 university faculty members. This composition enabled a comparison of perspectives between two groups with differing levels of research experience and academic responsibility.

Inclusion criteria for participants required prior engagement in preparing academic or research papers during the preceding academic year. This ensured that all respondents possessed relevant and recent experience of working with digital tools and an understanding of the ethical norms of academic work.

The survey instrument comprised 20 items organized into three thematic blocks:

- Perception of AI as a means of facilitating and optimizing research work.
- Evaluation of AI’s influence on cognitive activity, motivation, and research independence.
- Attitudes toward ethical aspects – including the acceptability of using AI in academic and research

writing and the possibility of regarding AI as a “co-author.”

Responses were measured on a five-point Likert scale (from 1 – “strongly disagree” to 5 – “strongly agree”), which enabled the quantification of subjective attitudes and subsequent statistical analysis.

Reliability testing of the scale was conducted using Cronbach’s alpha. The obtained value ($\alpha = 0.82$) indicated a high level of internal consistency, allowing for the aggregation of items into integrative indicators.

Data analysis was performed using SPSS 27.0. The following methods were applied:

- descriptive statistics (means, standard deviations),
- Pearson correlation analysis to identify relationships between indicators,
- factor analysis (principal components with Varimax rotation) to structure latent factors of attitudes toward AI.

Emphasis was placed on comparing the two sub-samples – students and faculty. To test for statistically significant differences, an independent samples Student’s t-test was employed. This procedure made it possible to capture not only general trends in the perception of AI but also group-specific differences that reflect the distinctive research positions of students and academics.

Ethical considerations were fully observed. Participants were informed about the aims and procedures of the study, participation was voluntary, and anonymity and confidentiality were guaranteed. All data were used in aggregated form only, in full compliance with the ethical standards of psychological and educational research.

The methodology combined quantitative analysis with interpretation within the theoretical framework of educational psychology. This approach made it possible to conceptualize attitudes toward AI as a multidimensional phenomenon that includes cognitive, motivational, and ethical components.

Limitations of the study should be noted. The sample size was relatively small and limited to students and faculty of Russian universities, predominantly from humanities and technical disciplines. These factors reduce the universality of the findings and indicate the need for further studies, including larger-scale and cross-cultural comparisons as well as the involvement of participants from other academic domains.

In sum, the methodological design provided a solid foundation for empirically testing the hypothesis that artificial intelligence is perceived by

students and faculty in an ambivalent manner: as a useful tool for optimizing academic and research tasks, but also as a source of cognitive and ethical risks. This methodological framework laid the groundwork for interpreting the findings and discussing them in the broader context of the problem of subjectivity in scientific inquiry.

3 RESULTS AND DISCUSSION

3.1 Results

Table 1 presents the mean scores of students' and faculty members' attitudes toward the use of AI in scientific research.

Table 1: Mean scores of attitudes toward AI (scale 1–5).

Indicator	Students (N=60)	Faculty (N=30)
AI facilitates research work	4.2 (SD=0.74)	3.6 (SD=0.81)
AI reduces cognitive activity	3.1 (SD=0.89)	4.1 (SD=0.77)
AI can be regarded as a "co-author"	2.9 (SD=1.02)	1.8 (SD=0.66)
Use of AI in coursework is acceptable	3.8 (SD=0.81)	2.5 (SD=0.73)
Trust in AI-generated results	3.5 (SD=0.84)	3.2 (SD=0.79)

Students assessed AI more positively as a means of simplifying research work and expressed greater acceptance of its use in coursework. Faculty members demonstrated greater caution and expressed stronger concerns about the reduction of cognitive activity. To assess the reliability of the questionnaire, Cronbach's alpha was calculated (Table 2).

Table 2: Cronbach's alpha coefficients for reliability testing.

Scale	Cronbach's α
Perceived practical utility of AI	0.81
Concerns about cognitive consequences	0.78
Ethical attitudes toward AI	0.76
Overall questionnaire	0.82

Values of $\alpha > 0.75$ indicate high internal consistency of the scale, confirming the reliability of the instrument.

To identify latent structures of AI perception, factor analysis was performed using the principal components method with Varimax rotation (Table 3).

Table 3: Results of factor analysis of attitudes toward AI.

Factor	Students	Faculty
Practical utility	0.78	0.65
Concerns about quality reduction	0.62	0.81
Ethical doubts	0.55	0.72
Total variance explained, %	63.1	59.7

For students, the leading factor was "practical utility," whereas for faculty the dominant factor was "concerns and ethical doubts." This finding highlights the differences in AI perception between the two groups within the educational process.

Group differences were further assessed using Student's t-test (Table 4).

Table 4: Comparison of groups using Student's t-test.

Indicator	t (df=88)	p-value
AI facilitates research work	3.41	0.001 **
AI reduces cognitive activity	-4.27	<0.001 **
AI as "co-author"	2.65	0.010 *
Acceptability in coursework	5.02	<0.001 **
Trust in AI results	1.54	0.128 (n.s.)

Statistically significant differences were observed for most indicators. Students were much more likely to emphasize the practical benefits of AI and to consider it acceptable in coursework, whereas faculty members were more concerned about reduced cognitive activity. No significant differences were found in trust toward AI-generated results, which reflects a generally critical stance shared by both groups.

Figure 1 illustrates the mean ratings of students (N = 60) and faculty (N = 30) regarding the use of AI in research and academic work. Respondents evaluated statements on a 5-point Likert scale (1 – "strongly disagree" to 5 – "strongly agree"). The indicators reflect perceptions of AI's practical utility, its potential impact on cognitive activity, attitudes toward ethical aspects, and the degree of trust in generated results.

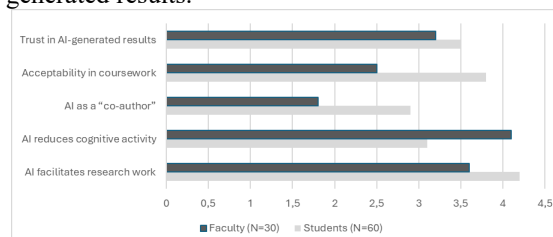


Figure 1: Comparison of students' and faculty attitudes toward the use of AI in education.

The data suggest that students primarily view AI as a tool of practical utility, whereas faculty members tend to regard it as a potential risk factor for cognitive development and academic integrity. This confirms the presence of generational differences in perceptions of AI and underscores the need to design educational programs aimed at fostering a culture of critical and responsible AI use.

3.2 Discuccion

The results of the study confirm that the perception of artificial intelligence within academic and educational contexts is multidimensional and ambivalent. Students primarily regard neural network models as tools of practical utility: they emphasize the simplification of literature searches, the convenience of structuring material, and the acceleration of writing academic and research papers. For them, AI functions as a cognitive assistant, alleviating part of the routine workload and allowing greater focus on the substantive aspects of research (Lee et al., 2023).

Faculty members, in contrast, emphasize the risks associated with the excessive use of AI. In their responses, higher scores were recorded on indicators reflecting concerns about diminished cognitive activity and weakened critical thinking. This finding aligns with theoretical perspectives in educational psychology, according to which the development of research identity requires the active engagement of the subject in processes of analysis, interpretation, and reflection. When these functions are partially or entirely delegated to a machine, there is a risk of shifting from authentic subjective inquiry to the imitation of research activity.

An especially noteworthy finding emerged regarding the scale “AI as a co-author.” Students were more likely than faculty to admit the possibility of perceiving AI as a conditional participant in the research process. This may be linked to the characteristics of digital socialization: students, having grown up in an environment of intensive digital technology use, perceive algorithms as a natural component of their academic and research environment. Faculty, by contrast, grounded in traditional norms of academic culture, tend to more strictly separate tool from subject.

Factor analysis revealed structural differences in perception. Among students, the dominant factor was “practical utility,” while among faculty the leading factor was “ethical doubts and concerns about the quality of knowledge.” This finding is consistent with results of both Russian and international studies,

which highlight the ambivalence of attitudes toward AI: it is simultaneously perceived as a means of increasing efficiency and as a source of threats to academic integrity.

Thus, the dilemma of “the human as the subject of research versus artificial intelligence” is manifested not only at the level of philosophical and methodological debate but also within educational practice. For students, AI represents a convenient resource, whereas for faculty it poses a challenge that calls into question the preservation of fundamental principles of scientific inquiry.

4 CUNCLUSION

Summarizing the results, it can be asserted that the human being remains the principal subject of research, since it is the human who assumes responsibility for problem formulation, critical evaluation of data, and interpretation of results. Artificial intelligence may perform the functions of a “pseudo-subject,” imitating certain research operations, but it lacks consciousness, value-based motivation, and intentionality. Its “subjectivity” is externally reproduced in activity but lacks genuine content (Bogatyrev, 2024).

Applied to educational practice, this means that AI should be regarded as a tool for enhancing students’ cognitive capacities, but not as a substitute for them. The task of higher education is not to prohibit or unconditionally encourage the use of AI, but rather to foster a culture of its responsible application. This involves teaching students the skills of critical evaluation of information, understanding the limitations of algorithms, and reflecting on ethical aspects. Faculty members, in turn, need to integrate AI into educational programs while preserving the leading role of personal interaction and research independence (Bogatyrev, 2025).

The main conclusions:

- 1) Students and faculty perceive the role of AI differently: students emphasize its practical benefits, while faculty stress risks of cognitive decline and threats to academic integrity.
- 2) Students demonstrate greater readiness to consider AI as a conditional “co-author,” reflecting their digital socialization and habitual interaction with algorithms.
- 3) Faculty display a stable caution linked to the potential substitution of authentic research activity by automated procedures.

4) AI may be regarded as a “pseudo-subject,” performing individual research functions but lacking the essential characteristics of subjectivity.

5) Humans retain the leading role in scientific inquiry, as they define goals, formulate hypotheses, and bear responsibility for the quality and validity of results.

6) A promising direction for the development of education is the cultivation of a digital research culture that combines technological literacy, critical thinking, and ethical responsibility.

Theoretical significance. The study contributes to the development of psychological science by clarifying the status of the subject in the context of the digital transformation of education and science. Theoretically, the findings support the interpretation of artificial intelligence as a phenomenon of “pseudo-subjectivity” – capable of performing discrete cognitive functions of research activity, yet devoid of value-based motivation, consciousness, and reflection. This enriches the conceptual framework of the psychology of science and educational psychology, provides a foundation for further debate on the boundaries of subjectivity, and advances conceptualizations of human–machine interaction in educational and research environments.

Practical significance. The results may be applied to the organization of educational processes in universities, the development of programs for fostering digital research culture, and the promotion of responsible approaches to the use of AI in academic and research activities. The materials of the study may inform new approaches to instructional design, support a balance between AI integration and student independence, guide the formation of academic integrity policies, and consider the differing perceptions of technology among various groups of educational stakeholders. This opens opportunities for improving the quality of student training, enhancing pedagogical support, and formulating university digitalization strategies that address not only technical but also psychological aspects of AI integration.

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