#### **ORIGINAL ARTICLE**

# Motivating academic integrity: utilizing information resources in medical education

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#### ABSTRACT

Aim: To determine the main approaches to forming principles of academic integrity and motivating higher education students in medical higher education institutions.

**Materials and Methods:** The study combines quantitative and qualitative methods and was conducted at the Bogomolets National Medical University, Kyiv, Ukraine, in 2024. During the research process, a complex of general scientific and specialized methods was applied. In particular, the logical-analytical method was used to structure information and identify cause-and-effect relationships. Theoretical-logical analysis allowed for the formulation of theoretical propositions and hypotheses. Comparative analysis was applied to compare different approaches and concepts. Quantitative sociological methods, including the collection, systematization, and statistical analysis of information, were used to process empirical data. The method of formalization and generalization facilitated the formulation of conclusions based on the results obtained. The object of the study is medical education students at Bogomolets NMU (N=233). The study involved students of the second master's level (N=172), students of the third educational-scientific level (N=12), and students of professional pre-higher education (N=49), the vast majority of whom are full-time students (N=215). Statistical data processing was performed using the IBM SPSS Statistics software package. **Results**: Adherence to academic integrity is an important component of knowledge transfer. Honest teaching, documenting, and disseminating research results contribute to the understanding of information and knowledge between scientists, students, and the public. All these factors improve the quality of higher education and the development of scientific research. Adherence to academic integrity is an important component. With the increasing use of AI, more and more questions arise regarding the mechanisms of its correct use and the strengthening of control over compliance with the principles of academic integrity.

**Conclusions**: Adherence to the principles of academic integrity serves as a key motivator for students and faculty in the context of complying with academic standards. In this regard, a relevant area of scientific research is the development of a methodology for studying the phenomenon of academic integrity in higher medical education institutions. The proposed methodology involves an empirical study of the attitudes of participants in the educational process towards fundamental value orientations, which will provide objective data for further analysis and the development of practical recommendations.

KEY WORDS: academic integrity, values, higher medical education, social research, AI (artificial intelligence), principles of academic integrity

Wiad Lek. 2025;78(5):1091-1098. doi: 10.36740/WLek/205376 DOI 2

#### INTRODUCTION

Adherence to academic integrity is an important component of knowledge transfer. Honest teaching, documenting, and disseminating research results contribute to the understanding of information and knowledge between scientists, students, and the public.

Academic integrity entails commitment to the fundamental values of honesty, trust, fairness, respect, responsibility, and courage [1]. The importance of academic integrity lies in ensuring the trust of both the public and all participants in the educational process in the scientific community, maintaining a high level of research quality, and protecting intellectual property. It is the foundation for the development of science and the acquisition of new knowledge, and the basis for building trust in the student community and a sense of fairness. Adherence to academic integrity is an important responsibility for every participant in the educational process and contributes to the creation of an honest and progressive academic environment.

What negative consequences can result from violating the principles of academic integrity? Moral impact: Violation of academic integrity can affect the self-esteem and moral attitudes of a student, teacher, or scientist. This can lead to feelings of guilt, stress, and insecurity in one's abilities.

Loss of opportunities: Violation of academic integrity can deprive a student, teacher, or scientist of opportunities they have strived for, such as participation in scholarship or grant programs, the opportunity to publish



**Fig. 1.** Distribution of respondents among the faculties and institutes of Bogomolets NMU

research results, and reputational losses that can play a significant role in their career and further development.

Legal consequences: Some violations of academic integrity may have legal consequences. For example, the detection of plagiarism or falsification, fabrication of data may lead to the deprivation of acquired academic degrees or academic titles, and lawsuits.

Therefore, violation of academic integrity can have serious consequences that can significantly affect the life of a student, teacher, or scientist. This underscores the need to adhere to the norms, principles, and values of integrity in the educational and scientific environment.

#### AIM

To determine the main approaches to forming the principles of academic integrity and motivating higher education students to adhere to academic integrity through the use of information resources in medical higher education institutions.

## MATERIALS AND METHODS

The study combines quantitative and qualitative methods and was conducted at the Bogomolets National Medical University, Kyiv, Ukraine, in 2024.

During the research process, a complex of general scientific and specialized methods was applied. In particular, the logical-analytical method was used to structure information and identify cause-and-effect relationships. Theoretical-logical analysis allowed for the formulation of theoretical propositions and hypotheses. Comparative analysis was applied to compare different approaches and concepts. Quantitative sociological methods, including the collection, systematization, and statistical analysis of information, were used to process empirical data. The method of formalization and generalization facilitated the formulation of conclusions based on the results obtained. The object of the study is medical education students at Bogomolets NMU (N=233). The study involved students of the second master's level (N=172), students of the third educational-scientific level (N=12), and students of professional pre-higher education (N=49), the vast majority of whom are full-time students (N=215). Statistical data processing was performed using the IBM SPSS Statistics software package.

#### RESULTS

The distribution among the institutes and faculties of Bogomolets NMU followed this principle (Fig. 1). The





Fig. 3. How to motivate students to adhere to academic integrity using information (per 100 persons)

vast majority of respondents are representatives of the Medical Faculty No. 3 (43.8%, N=102), who are studying in the specialty "Pediatrics"."

The distribution of respondents among the year of study was more even (Fig. 2). The largest proportion of respondents are 1st-year students (34.8%, N=81). The proportions of 2nd, 3rd, 4th, and 5th-year students are 20.2% (N=47), 12% (N=28), 14.2% (N=33), and 14.2% (N=33) respectively. The smallest proportion of respondents are in their 6th year (4.7%, N=11)."

According to the survey results, to the question "Are you familiar with the definition of "integrity educational environment" in the context of medical institutions of higher education?" the vast majority of respondents answered "Yes," so it can be concluded that most participants in the educational process are familiar with this definition (88.4%). Among 1st-year students (7.7%, N=18), the answer "Difficult to answer" was also encountered, which indicates the need for conducting introductory and educational work on academic integrity among them.

To the question "What basic principles of integrity do you think are most important for the educational process in medical (pharmaceutical) institutions?" 233 responses were received, among which individual principles mentioned by respondents can be distinguished (Table 1). The question was open-ended and aimed to form an understanding of which principles students are familiar with in general. The vast majority of senior students (4th, 5th, 6th year) named honesty as the main principles of integrity (37 out of 77 respondents, 48%), transparency (10 out of 77 respondents, 13%), respect for intellectual property (9 out of 77 respondents, 11.7%), and humanity (8 out of 77 respondents, 10.4%)."

Among junior students (1st, 2nd, 3rd year, N=156), the main principles of integrity named were: honesty

Principle of Academic Integrity	Number of Respon- dents (N=233)	Rate per 100 respondents ±error	Qualitative Analysis		
Honesty	67	28,8±3,0	The main and most frequently mentioned principle, en- compassing the avoidance of cheating, plagiarism, and fraud.		
Responsibility	27	11,6±2,1	Involves personal responsibility for the learning process, independent completion of tasks, and ethical behavior.		
Fairness	23	9,9±2,0	Includes equal treatment of all students, objective assess- ment, and absence of discrimination.		
Ethics	17	7,3±1,7	Includes moral aspects of learning, respect for teachers and colleagues, and compliance with professional stan- dards.		
Transparency	14	6,0±1,6	Important for fair assessment, open rules and procedures in the learning process.		
Respect for Intellectual Property	14	6,0±1,6	Includes avoiding plagiarism, recognizing the contribu- tions of other researchers, and correctly citing sources.		
Objectivity	13	5,6±1,5	Absence of bias in teaching, research, and assessment.		
Humanity	12	5,2±1,4	Means benevolence, support, equal treatment, and adher- ence to ethical standards in communication.		
Independence in Learning	12	5,2±1,4	Avoiding cheating, independently completing tests, prac- tical assignments, and research.		
Absence of Corruption	8	3,4±1,2	Rejecting bribery, dishonest schemes for obtaining grades and privileges.		
Critical Thinking and Self-Development	8	3,4±1,2	Using own knowledge, analytical understanding of infor- mation, lifelong learning.		
Trust	6	2,6±1,0	Building relationships between students and teachers based on honesty and respect.		
Confidentiality	6	2,6±1,0	Protecting personal data, academic information, and re- search results.		
Professionalism	6	2,6±1,0	Adherence to the standards of the medical profession, competence, and ethical responsibility.		

Table 1. \	What are the main (	principles of integ	rity that are most im	portant for the educational	process in medical (	(pharmaceutical)	institutions
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(30 out of 156 respondents, 19%), responsibility (24 out of 156 respondents, 15%), fairness (21 out of 156 respondents, 13%), ethics (15 out of 156 respondents, 10%), objectivity (12 out of 156 respondents, 8%).

The responses received from students provide an understanding of how they perceive academic integrity in medical and pharmaceutical educational institutions, according to the respondents. The principle that was mentioned most often is honesty (28.8%, N=67), which indicates that students understand it as a key component of integrity. They associate it with avoiding plagiarism, cheating, data falsification, and the use of dishonest methods to obtain grades. Responsibility is the second most popular principle (11.6%, N=27). Many respondents emphasized personal responsibility for the learning process, which includes independent completion of tasks, thorough preparation for classes, and a responsible attitude towards their future profession. A significant number of responses indicate the need for fair assessment, equal treatment of all students, and the

exclusion of any manifestations of subjectivism or corruption. This underscores the importance of transparent and understandable evaluation criteria. The responses of students demonstrate that ethics, respect for intellectual property, and humanity play an important role in the learning process. They point to the need to adhere to moral standards, properly cite sources, and recognize the contributions of other researchers. Some responses emphasize the importance of independent learning, critical thinking, and continuous self-development. This indicates an awareness among students of the need to develop their own skills and knowledge, which is especially important in medical education. Several responses (3.43%, N=8) directly indicate the unacceptability of corruption, bribery, unjustified grade inflation, or other shadow practices. This also indicates the fact that most respondents do not consider corruption, bribery, and unjustified grade inflation or other shadow practices unacceptable. This once again emphasizes the need for a transparent educational system that operates

No.	Information Technologies	Purpose	Number of Respondents (N=233)	Rate per 100 respondents ±error
1	Anti-plagiarism systems	Checking the uniqueness of student works	25	10,7±2,0
2	Electronic testing platforms	Objective assessment of knowledge	25	10,7±2,0
3	Video surveillance systems	Control over exams	20	8,6±1.8
4	Educational portals with activity tracking	Monitoring student participation in learning	20	8,6±1.8
5	Software for analyzing results	Uniform assessment of student achievements	17	7,3±1,7
6	Chatbots and artificial intelligence (ChatGPT, probably Al)	Automated responses and learning support	15	6,4±1,6
7	Online learning platforms	Equal access to learning materials, standardized evaluation criteria	14	6,0±1,6
8	Video surveillance, Moodle, automation of work submission processes	Control and convenient organization of the educational process	12	5,2±1,4
9	Digital boxes of trust	Quick communication with the rectorate, the Department of Medical Personnel, Education and Science of the Ministry of Health of Ukraine	10	4,3±1,3
10	Platforms for automatic evaluation	Anonymous evaluation, interactive platforms for feedback, mobile applications for learning	9	3,9±1,3
	l don't know / Difficult to answer (all other respondents)		86	36,9±3,2

Table 2.	What	informatio	n technolo	gies can	help	ensure fairness	in the	learning process
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according to clear and fair rules. And such principles as "trust," "confidentiality," and "professionalism" were considered important only by individual students (6 out of 233 each).

26.6% of respondents have previously used plagiarism detection software, 25% use free programs, which in turn creates risks of copying scientific texts by "predatory" programs and providing biased information.

To the question "What information technologies, in your opinion, can help ensure fairness in the learning process?" the following answers were received (Table 2).

The most popular information technology that, according to students, can help ensure fairness in the educational process is anti-plagiarism systems, which were mentioned by 25 respondents (10.7%).

From these responses, it can be concluded that information technologies can help ensure fairness in the learning process, and their use as technical support will facilitate the work for both students and academic staff of higher education institutions. For the second year in a row, Bogomolets National Medical University has been holding seminars "School of a Competent Teacher," and is also actively implementing "School of Digital Competence for Students," because we are all part of the "digital society" and must keep pace with modern technologies. 36.9% of participants state that technologies greatly help in maintaining adherence to academic integrity, especially when it comes to plagiarism checking, time management, or learning.

Organizing the transparency of the work evaluation process using information resources is an important aspect, as it ensures clarity and accessibility of evaluation criteria, which allows maintaining objectivity and honesty.

Teachers, like students, use information resources, because some may have strict requirements regarding sources of information and plagiarism, while others may be less passionate about this issue. It is important that students are aware of the rules for using information resources and adhere to the requirements for maintaining academic integrity. This needs to be communicated and explained to them from the first day of their studies, and at the beginning of classes, so that they understand the criteria for assessing knowledge.

Our present is closely related to academic integrity, because it is a component of the Law of Ukraine "On Education" and all participants are involved in it, as evidenced by the result of 76.4%.

To the question "Can information technologies contribute to increasing the level of academic integrity?" (57.1%) answered "Yes," information technologies can contribute to increasing the level of academic integrity when checking for plagiarism, preventing copying of works, for checking the authenticity of scientific works, and can also help in creating educational platforms, courses.

To the question "In your opinion, how can students be motivated to adhere to academic integrity using information resources?" the following answers were received (Fig.3).

The majority of respondents were unable to provide specific suggestions for motivating students to adhere to academic integrity through information resources (11.6%, 27 out of 233 respondents), indicating that a significant proportion of students do not have a clear understanding of how information resources can help support academic integrity, or have difficulty formulating specific suggestions. This may indicate a lack of student awareness regarding available resources and strategies. The most popular suggestion was access to resources (scientific databases, quality materials, educational platforms), which was supported by 7.7% (N=18) of respondents. This suggests that students feel the need for reliable and verified sources of information that would help them complete assignments independently and avoid plagiarism. Suggestions for incentives (extra points, privileges) and creating a supportive environment (adequate assessment, teacher support) indicate that students need positive motivation and support from teachers. It is important not only to control adherence to academic integrity but also to encourage honesty and responsibility. Emphasis on the importance of the teacher's personal example 6% (N=15), communication, and support indicates that students value interaction with teachers and need their help in shaping the values of academic integrity. Teachers should be not only controllers but also mentors who inspire students to learn honestly. Using interactive methods: Interest in interactive teaching methods (online courses, webinars, games) indicates that students are open to new forms of learning and need more engaging and interactive learning materials. Although plagiarism detection systems are not mentioned as often 5% (N=12), their presence is still important for controlling and teaching students. It is important to use these systems not only to detect violations but also to teach students proper citation and formatting of work.

Analyzing the results of the study, our students, despite high demands or competition, do not use "dishonest methods" (45.1%), and this confirms the fact that information resources cannot always be trusted.

It is important to understand and be able to use AI to avoid negative consequences. Since AI can be an effective "push" for making decisions or finding useful sources when preparing for a lesson or writing scientific papers. If AI is used as a resource for plagiarism checking, a positive attitude is possible, but it is really difficult to answer, because this information resource has not been fully studied and we do not know its limits.

### DISCUSSION

This is not the first study conducted at the Bogomolets National Medical University regarding the problem of academic integrity and the formation of key principles of integrity in a modern University. Thus, in the 2022-2023 academic year, a survey was conducted in which 108 postgraduate students of Bogomolets NMU in the conditions of the ongoing war took part. This study revealed significant challenges in their academic activities. Approximately 70% of students reported experiencing interruptions to their classes due to air raid alerts or shelling, with 68% resuming their studies on the same day. Concentration was significantly impaired for 77% of students, with many attributing this difficulty to emotional distress and bereavement. Despite these challenges, a substantial majority (85%) of applicants maintained a vision of their professional future in Ukraine as physicians, scientists, or educators. The degree of adaptation to emergency conditions varied, with half of the student population demonstrating adequate adjustment, including 12% who indicated complete adaptation to the wartime circumstances [2].

In 2023, a survey was also conducted among full-time medical students of Bogomolets NMU and scientific-pedagogical staff who provide teaching of fundamental, specialized and socio-humanitarian disciplines at the university. In this investigation, data were collected via survey methodology from a cohort of 153 scientific and pedagogical staff members and 472 students. The survey instrument focused on academic integrity, specifically examining the attitudes of educational process participants toward fundamental values and principles. A significant proportion (71.9%) of the surveyed scientific and pedagogical personnel indicated that instructors and students bear equal responsibility for adhering to the tenets of academic integrity. Conversely, a majority (59.7%) of the participating higher education students perceived the primary responsibility for upholding academic integrity as residing with the student [3].

Our research is a continuation of these studies, it focuses not only on the problem of forming the principles of academic integrity, but also on ways to motivate students to adhere to academic integrity through the use of information resources.

Research on academic integrity has also been conducted in other higher education institutions, but it was not as in-depth. For example, in 2022, Tkachuk S. and Filimonova I. [4]. note that students generally have a positive attitude towards academic integrity. In their study, they note that some students allow certain forms of academic integrity violations, such as cheating. In contrast to our study, where 45.1% of respondents claim that they do not use "dishonest methods", this may indicate that students of Bogomolets National Medical University are more aware of academic integrity. Our study shows that the most popular information technology for ensuring fairness in the educational process is anti-plagiarism systems (10.7%). This is consistent with the fact that 26.6% of respondents in the Tkachuk S. study had previously used plagiarism detection software. Our study is also consistent with another study by Dorozhko A. [5], which emphasizes the importance of honesty, responsibility, and fairness as the basic principles of academic integrity.

An undeniable complexity of the conducted research is the fact that we are talking about the formation of basic principles of academic integrity in the context of military aggression [6]. While education is recognized for its potential to provide stability and a semblance of normalcy for students in conflict-affected regions, prolonged exposure to conflict often intensifies academic and emotional burdens, ultimately influencing their career aspirations and psychological health [7]. The ongoing war in Ukraine presents a diverse array of challenges for the majority of medical schools, their faculty, staff, and students, as they strive to uphold the standards of medical education [8]. The superposition of armed conflict upon a pre-existing pandemic context generates a climate of uncertainty and instability that exerts a negative influence on mental health outcomes, especially for individuals directly exposed to the exigencies of war [9, 10]. The findings from the experimental investigation into the effects of martial law on the research motivation of doctoral students at Sumy State Pedagogical University named after A.S. Makarenko, specializing in the 011 Educational, Pedagogical Sciences discipline, demonstrated a statistically significant decline in their scholarly drive [11].

Acknowledging that the university educational system was not directly affected by the war, the pre-war efficiency and functionality of educational processes were key in maintaining a quality education during the war [12].

Considering the adoption of the new Law of Ukraine on Academic Integrity, it is promising to create a methodology for a comprehensive sociological study based on the provisions of the law and adapted to the specifics of medical education.

## CONCLUSIONS

The survey results indicate that students understand academic integrity not simply as a formality, but as an integral part of quality education and professional ethics. The main emphasis is placed on honesty, responsibility, fairness and independence in learning. At the same time, there is a certain demand for improving transparency and eradicating corruption risks in the educational process.

The information received from students gives us a valuable understanding of their views, needs and problems regarding academic integrity and ways to support it. In general, we have formed a clear understanding that maintaining academic integrity requires a comprehensive approach that includes: raising students' awareness of the values of academic integrity and available resources; providing access to quality learning materials and scientific databases; creating a supportive learning environment where students feel supported and encouraged; optimizing the learning process taking into account the individual needs of students; the use of interactive teaching methods and modern technologies. Given these findings, effective strategies and programs can be developed to support academic integrity in educational institutions.

The conducted research emphasizes the importance of a comprehensive approach to supporting academic integrity. It is not enough to simply proclaim principles – it is necessary to create a favorable environment, provide access to resources, use effective tools, and motivate students to adhere to ethical standards.

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The study was conducted within the framework of a research project of the Bogomolets National Medical University «Life, health, and human death in the context of biomedical technology development: philosophical, bioethical, sociological, and historical aspects» (2023–2025, No state registration 0123U101123).

#### **CONFLICT OF INTEREST**

The Authors declare no conflict of interest

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**RECEIVED:** 12.01.2025 **ACCEPTED:** 22.04.2025

