KAPITEL 6 / *CHAPTER 6* [6]
RESEARCH SUSTAINABILITY IMPROVEMENT AND ADHERENCE TO THE PRINCIPLES OF ACADEMIC INTEGRITY IN THE HIGHER EDUCATION SYSTEM

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Introduction

Modern institutional transformations in science as a sphere of human cognitive activity, awareness of the tasks and functions of science, criteria for recognizing the results of scientific activity make it necessary to improve and further develop the process of scientific research that ensures the development of scientific knowledge. An important area of scientific activity is scientific research in higher educational institutions, which forms the intellectual potential of the country, contributes to providing a qualitatively new content of competence of modern highly qualified specialists who are conductors of progressive changes in the practical activities of business entities.

The level of development of science is largely determined by the nature, reliability, and purpose of information obtained as a result of cognition. Information is a theoretical and experimental basis for achieving the goals of scientific research and solving the tasks set. It is proof of the validity of scientific provisions, their reliability and novelty. Information is created as a result of the activities of research teams and individual scientists and is recorded in a system of exact concepts, statements, theories, and hypotheses. Information is a general scientific concept that includes not only information, but also collection, storage, and processing. The receipt, dissemination and use of information have a significant impact on the development of science.

Ethics of science studies the principles that guide a scientist in his/her cognitive activity, as well as behavior in the scientific team, his/her relations with society as a whole. The ethical orientation of science should condemn the behavior of a scientist if such behavior for the sake of useful goals and interests violates the "norms" of research. A scientist should be aware not only of his/her own interest in the chosen direction of research, but also of the effectiveness of solving the chosen problem for science. Sumy National Agrarian University (Ukraine) has developed the Code of Academic Integrity, which provides for academic responsibility for both academic staff and higher education seekers [1].

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For violation of academic integrity, pedagogical, scientific-pedagogical and academic researchers of educational institutions may be brought to academic responsibility:

- refusal to award a degree of educational-scientific or educational-creative level or award an academic title;
- deprivation of the awarded degree of educational-scientific or educational-creative level or the awarded academic title;
- refusal to assign or deprive the awarded pedagogical title, qualification category;
- deprivation of the right to participate in the work of bodies defined by law or hold positions defined by law.
- For violation of academic integrity, higher education seekers may be brought to academic responsibility:
- repeated assessment (test paper, exam, credit test, etc.);
- repeated study of the relevant educational component of the educational program;
- expulsion from the educational institution (except for persons receiving general secondary education);
- deprivation of scholarships;
- deprivation of tuition benefits provided by the educational institution.

The article examines the principles of the system of ensuring academic integrity in the EU and Ukraine. The system of ensuring academic integrity is substantiated and the peculiarities of the influence of the scientist's culture and the principles of academic integrity on the results of scientific research and academic responsibility are clarified. The legal support of academic integrity; components of academic dishonesty and responsibility for violation of academic integrity are analyzed. The system of ensuring academic integrity and academic responsibility is studied.

6.1. Literature review

A literature review and search for articles related to the current study have been conducted. The time period (2015-2022) is chosen based on the large amount of literature published during this time period. A total of 34 articles have been found

through a systematic review of the literature and analyzed the complexity and interdependence of research problems that require new ideas and approaches, which makes it necessary to find new ways to improve academic integrity.

Academic integrity is an essential and important component of any true educational experience – integrity on the part of both academic staff and higher education seekers. Academic integrity is based on the consent of all participants in the academic process to comply with the rules and fulfill the duties assigned to them. This is an honest and responsible approach to educational and scientific activities.

Academic career in different countries differs in both form and content. The study [2] has clarified the conditions of employment and career progression, provided information on the number of positions, salaries, access for foreigners, and gender issues.

The development of the higher education system in Ukraine, the integration of the state into the European Educational Space have put on the agenda the issue of improving ethical standards of educational and scientific activities. Unfortunately, despite the significant achievements of the national higher education system, numerous problems related to violations of academic integrity leads to the depreciation of higher education diplomas by Ukrainian and foreign employers. According to the Unified State Register of Judicial Decisions, from 2016 to the present, the courts of Ukraine have made 52 decisions related to academic plagiarism [3, 4].

Gryshova, I.; Demchuk, N.; Koshkalda, I.; Stebliuk, N.; Volosova, N., considering the issues of the sustainable innovative development of the market of educational services in the higher education system, believe that compliance with academic integrity is an important component of the development of this market [5].

The origins of modern academic integrity go back to 1960, when after a sociological survey initiated by several scientific institutions in the United States, it turned out that 75% of respondents admitted to cheating. After that, most universities began to declare a virtuous attitude to learning and study among the main requirements for students.

European and New Zealand scientists Lofstrom, E., Trotman, T., Fournari, M., Shepard, K. define the concept of academic integrity as an awareness of the culture of behavior in the academic environment and the ability to honestly act in it in accordance with established ethical standards and respect the scientific achievements of colleagues. The concept of academic integrity is comprehensive. It concerns not only the general corporate culture of the higher educational institution, but also the internal

culture of the individual [6, 7].

The National Agency for Higher Education Quality Assurance of Ukraine has developed recommendations for higher education institutions on the development and implementation of a university system for ensuring academic integrity [8, 30, 32].

Denysova-Schmidt, O. explores the problem of students' academic misconduct, which includes various types of deception, such as attending classes or taking exams on behalf of another student; plagiarism; services, gifts, informal agreements; payments in exchange for admission, grades, previous exams and credit tests; preferential treatment; fictitious degrees [9, 10].

Ryzhko, O. notes that the problem of plagiarism is complex and multidimensional, and the components of its understanding are largely contradictory. Scientists use different approaches to the definition and classification of plagiarism [11]. The classification of plagiarism is mainly based on the versatility and complexity of the phenomenon itself and contains three main blocks: 1) generalizing (as in Senchylo-Khliabich, I. or Ulianova, H.); 2) concluded in the context of academic integrity (plagiarism.org, turnitin.com according to the results of the survey "Academic Culture...", Melnychenko, A.); 3) industry-specific (here, in particular, Kuznetsova, O.). However, due to the specifics of social communications, there is a need to improve the classification of plagiarism in this area, in particular, it should contain, for example, cyber plagiarism. If we are talking about the so-called "self-plagiarism", then it is justified and logical, in our opinion, to operate with a new category proposed by Ulianova, H. – "author's duplication of scientific results" and, in fact, in the academic environment [4, 12].

Sereda, Kh. believes that an effective mechanism for observing the norms of academic integrity and combating plagiarism in scientific works is the creation of special units and commissions that will be entrusted with monitoring the compliance with the norms of academic ethics. In addition, an effective factor in increasing the level of academic ethics is an increase in the level of computer literacy of scientists, the strict condemnation of the phenomena of plagiarism and self-plagiarism by the entire academic community, and the definition of clear and well-established requirements for evaluating the uniqueness of texts of scientific works [13].

From the point of view of Tytska Ya., the decisive step in supporting academic integrity and countering academic dishonesty should be the formation of a national system for higher education quality assurance. Without assurance of the quality of higher education at the institutional and systemic levels, it is difficult to talk about

effective activities in this direction.

Glendinning, I. has analyzed differences in sanctions and practical experience in European countries regarding violations of academic integrity [14]. In [15], she investigated the impact of plagiarism policies in higher education in Europe and compared academic integrity policies in higher education in the European Union.

The analysis of the issue of publications by region, country or economy is given in the articles [16, 17]. In 2018, the volume of publications reached 2.6 million. In 2018, HICS (the United States, Germany, Japan, and other similar countries) accounted for 56% of scientific articles, while Upper MICS (China, Russia, Brazil, and other similar countries) accounted for 34%, and lower MICS (India, Indonesia, Pakistan and other similar countries) issued 9% of publications).

The Science, Research and Innovation Performance of the EU, 2020 (SRIP) analyses Europe's performance dynamics in science, research and innovation and its drivers, in a global context. The Report combines a thorough indicator-based macroeconomic analysis with deep analytical research dives into hot policy topics. The aim of the Report is to build a robust narrative that speaks to an audience of both Research and Innovation and Economics and Finance policy-makers and analysts. This is a flagship biennial publication by the European Commission's Directorate-General for Research & Innovation that draws on a long tradition of indicators and economic analyses. It is the third edition in this report series [18].

The Science, Research and Innovation Performance of the EU, 2022 (SRIP) conducted every two years provides a report from the European Commission, which contains a comprehensive analysis of the main trends in the effectiveness of European countries in science, research, innovation and draws conclusions for EU policy [6, 19, 20, 21]. This is the result of intensive joint work of the Commission's departments and includes current topics, contributions from leading scientists and international organizations.

The EU remains a strong player in terms of research, production and technology productivity, which is essential for the determination to increase competitiveness and sustainability. It is important to emphasize that there are still some bottlenecks that need to be addressed in order to fully benefit from research and innovation potential. These include lack of investment, difficult access to finance by innovative companies, unfavorable regulatory frameworks for innovation, persistent differences in the innovation capacity of companies and regions, and difficulties in engaging and retaining talented individuals. To solve them, we need to work together and learn from

each other.

PhD Percentage by Country and Number of Doctorate Degrees per Country 2022 is given in the article [22]. The study [23] has proven that the EU and China are world leaders in terms of scientific products, while the United States retains leadership in terms of scientific quality.

Océane Peiffer-Smadja, Bianca Cavicchi and Julien Ravet have analyzed research papers for sustainability [24]. A favorable environment for research and innovation has been studied by Valentina Di Girolamo, Alessio Mitra, Océane Peiffer-Smadja, Julien Ravet [25]. Andreas Teichgraeber and John Van Reenen have investigated a set of policy tools for increasing research and innovation in the European Union [26].

The article Kyzym M., Khaustova V., Reshetnyak O., Danko N. discusses the development of the digital economy, especially how it affects investment flows [27]. Particular attention is given to the main trend prediction of FDI and forecasts of the growth rate of FDI in the global economy. It is statistically proved the correlation between the GDP of the country and FDI flows. It is also demonstrated the development and importance of the global expansion of digital companies. The paper provides three crucial elements of the strategy for the upgrowth of the digital economy.

In the article Ma X, Gryshova I, Koshkalda I, Suska A, Gryshova R, Riasnianska A, Tupchii O. the state of higher education was analyzed under war conditions and its development in the post-war period was predicted. This will aid the country's recovery and ensure the sustainable development of society in the post-war period. This study can complement and enhance the theoretical discussion and practical experience on sustainable development from the perspective of higher education [28].

6.2. Promoting the fundamental values of academic integrity

From the idea to its implementation, scientific search goes through several stages of a purposeful process of cognition, the results of which are presented in the form of scientific research. The form of existence and development of science is scientific research, namely scientific (research) activities aimed at obtaining and applying new knowledge. Scientific research is an activity aimed at a comprehensive study of an object, process or phenomenon, their structure and connections, as well as obtaining and implementing useful results for a person.

Scientific research is carried out in order to optimize the process of cognition of

new phenomena, explain previously unknown facts, or identify the incompleteness of outdated ways of explaining known facts. Such unresolved issues are most clearly manifested in problem situations, that is, in situations where the available scientific knowledge is insufficient to solve the tasks set. Scientific research consists of finding out the unknown.

By the content, the information support of the research process is divided into legislative, planned and regulatory reference, contractual, technological, organizational and managerial, and factographic (Figure 1).

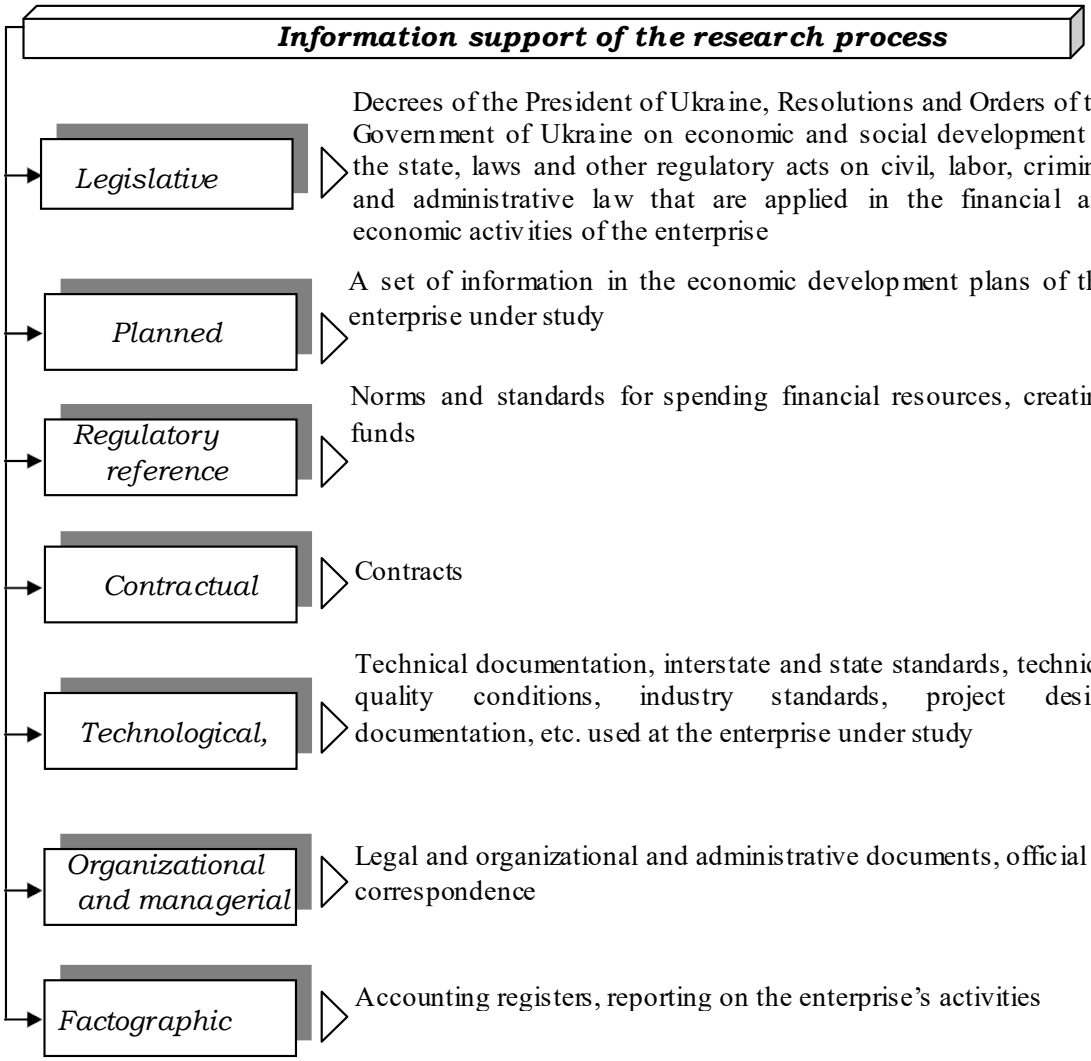

Figure 1 – Classification of information support for the research process

Sources: author's development

The source of primary and secondary information containing any scientific facts and information is documents.

Search tools and technology used to satisfy information needs are determined by

the type and state of the core activity analytical task being solved, the ratio of knowledge and ignorance of the user-analyst about the object under study.

Two types of them have become widespread – web directories and search engines.

Search engine is a software and hardware complex with a web interface designed to search for pages that contain a given word or phrase or meet other criteria.

The search engine today is an online service that provides the ability to search for information on the Internet. A search engine is a website that hosts the front-end interface of the system. The software part of the search engine is a search engine as a set of programs that provides the functionality of the search engine. Each system indexes pages in its own special manner, and their priorities when searching by index are also different.

Web directory is a site that contains many links to other sites, sorted and divided into categories according to the topic.

The main advantage of a web directory is that links are selected and sorted based on certain indicators, such as the quality of the site's content or the interest it may represent to users. Since people select and organize links, such selection is usually quite high-quality.

Among search engines, there are specialized ones for certain search queries or those that accumulate the work of several searchers.

Electronic collections of free-access scientific periodicals and search engines for scientific information are an important element of the tools and technology used to meet information needs.

The Law of Ukraine "On Higher Education" [31] defines *academic integrity* as a set of ethical principles and rules defined by law to be governed by participants in the educational process during training, teaching and carrying out scientific (creative) activities in order to ensure trust in the results of training and/or scientific (creative) achievements.

The components of academic integrity are shown in Figure 2.

The Code of Honor is a set of rules and regulations, ethical principles that the academic community shall live by. In accordance with these ideas, acceptable and unacceptable behavior in the academic environment is determined.

The Code of Academic Integrity of Sumy National Agrarian University (Ukraine) defines academic integrity as a set of principles, rules of behavior of participants in the educational process, aimed at the formation of an independent and responsible person

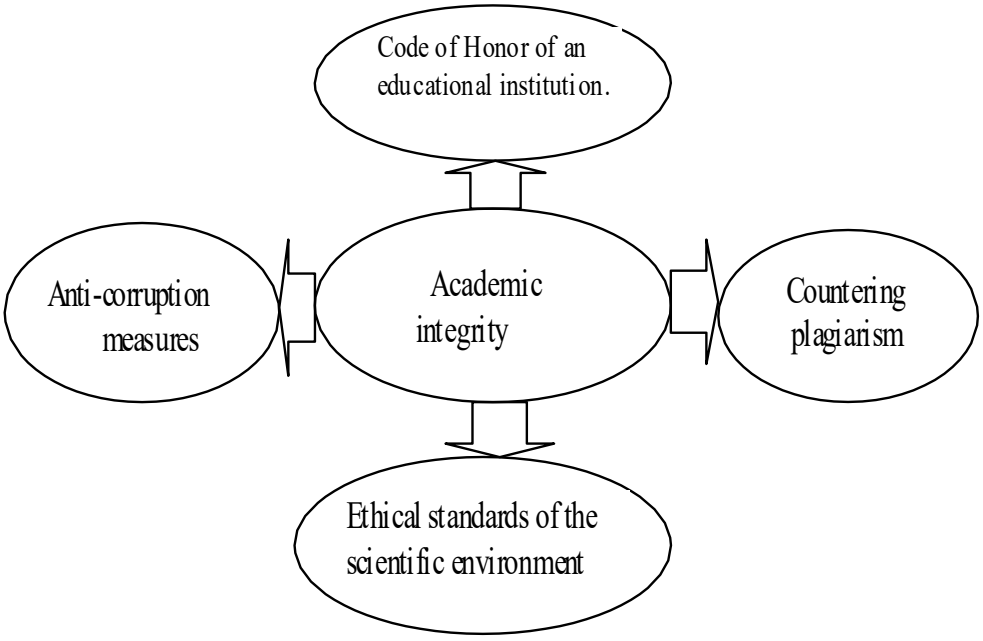

Figure 2 – Components of academic integrity

Sources: author's development

who is able to solve problems in accordance with the educational level in compliance with the rules of law and public morality.

Ethical standards of the scientific environment include:

1) *standards* regulating everyday scientific activity:

- accurate compliance with the rules for obtaining and selecting data in force in a particular scientific discipline
- reliable organization of protection and storage of primary data. Clear and complete documentation of all important outcomes;
- comprehension of implicit, axiomatic assumptions. A vigilant attitude to wishful thinking attempts caused by personal interest or even ethical reasons. Cautious attitude to the probability of misinterpretation due to methodically limited ability to identify the object of research

2) *standards* regulating relations between colleagues and employees:

- obligation not to interfere with the scientific work of competitors, for example, by delaying feedback or transmitting the obtained scientific results to a third party, subject to confidentiality;
- active promotion of academic career path of young scientists;
- openness to criticism and doubts expressed by other scientists and colleagues at work;

•attentive, objective and unbiased assessment of the work of colleagues; unbiased attitude towards them.

3) standards regulating the publication of results include:

•mandatory publication of the results of work performed at the expense of public funds (the principle of public availability of basic research outcomes);

•appropriate presentation of unconfirmed hypotheses and recognition of errors (the principle of scientific culture that allows for the possibility of mistakes in science);

•honest recognition of merits and proper assessment of the contribution of predecessors, competitors and colleagues (the principle of merit recognition).

Countering plagiarism is automated search engines that help establish the facts and volumes of borrowings, and special courses that teach how to use sources correctly.

Anti-corruption measures are measures aimed at preventing, detecting and combating corruption. For example, in an educational institution, anti-corruption measures include: periodic assessment of corruption risks in the institution's activities; anti-corruption standards and procedures in the institution's activities.

Compliance with academic integrity by research and academic staff provides for:

- links to sources of information in the case of using ideas, developments, statements, information;
- compliance with the legislation on copyright and related rights;
- provision of reliable information on research methods and results, sources of information used, as well as their own pedagogical (scientific and pedagogical, creative) activities;
- control over the observance of academic integrity by higher education seekers;
- objective assessment of learning outcomes.

Compliance with academic integrity by higher education seekers provides for:

- independent fulfillment of educational tasks, tasks of current and final control of learning outcomes (for persons with special educational needs, this requirement is applied taking into account their individual needs and capabilities);
- links to sources of information in the case of using ideas, developments, statements, information;
- compliance with the legislation on copyright and related rights;
- provision of reliable information on the results of their own educational

(scientific, creative) activities, using research methods and sources of information.

The International Center for Academic Integrity (ICAI) defines academic integrity as adherence to six fundamental values: honesty, trust, fairness, respect, responsibility, and courage (Table 1).

Table 1 – Fundamental values of academic integrity

Value	Characteristics
Honesty	Necessary foundation for teaching, learning, research, and work, and prerequisite for full realization of trust, fairness, respect, and responsibility. It is essential that academic principles and procedures convey a clear message that data falsification, lying, cheating, deception, and other forms of dishonest behavior are unacceptable. When seeking knowledge, both students and academic staff must be honest with themselves and with each other.
Trust	Virtue that is based on actions, not words, and means that all participants in the scientific process are not afraid to share their thoughts and ideas. The same applies to the educational context, when academic staff set clear requirements for students' work and evaluate them honestly. Having confidence in the scientific results of others, one can justify their own research and conduct it with confidence.
Fairness	Ability to predict, transparency, clear and reasonable expectations. A correct and objective response to dishonest behavior or violations of academic integrity is also an element of fairness. Fair, appropriate and unbiased assessment plays an important role in the educational process, and fairness here is essential for establishing trust between academic staff and students.
Respect	Scientific and educational process is an interaction in which all participants must respect each other's work. Respect in the academic environment should be a mutual category. Self-respect means acting virtuously when faced with difficulties. Respect others means to appreciate differences of opinion and adequately assess the fact that one's own ideas often have to be questioned, refuted, tested and improved.
Responsibility	Each participant in the educational and scientific process is responsible for his/her integrity. Being responsible means resisting violations of academic integrity and negative pressure from colleagues, as well as setting an example with one's own posture.
Courage	Ability to stand up for the key values of academic integrity and actually move from words to actions.

Sources: author's development

Promoting the fundamental values of academic integrity requires a certain balance between high standards of integrity, educational mission, commitment, and interest. Creating a favorable climate of academic integrity requires the following steps:

1) To create and promote clear and fair rules, standards and procedures for academic integrity that are practically understandable and can be consistently implemented.

2) To promote the dissemination of specific aspects of academic integrity across all segments of the university's campus. Educational activities should include discussing fundamental values, highlighting the link between academic integrity and a wider range of ethical issues.

3) To inform all members of the academic community about the standards of academic integrity, so that they perceive the expected results as integral components of their community culture.

4) To practice actions prescribed in the rules and regulations of the university consistently and transparently. Provide support to those who adhere to the rules and regulations.

5) To develop, clarify and maintain unbiased and transparent systems for dealing with violations of academic integrity.

6) To keep up to date with current developments in the field of technological and educational practices in order to anticipate increased risks and solve potential problems related to academic integrity.

7) To evaluate regularly the effectiveness of integrity rules and regulations, procedures, and practices. If necessary, review and improve them for updates and improvements.

The details of academic integrity programs depend on the specifics of a particular academic community. The relationship between norms and procedures, community standards, and daily behavior should be appropriate and consistent with its institutional values.

Approaches to the formation of the system of ensuring academic integrity are clearly justified by the National Agency for Higher Education Quality Assurance of Ukraine in the Recommendations for Higher Education Institutions on the Development and Implementation of the University System of Ensuring Academic Integrity [8]. The university system of ensuring the principles of academic integrity and ethics of academic relations includes the following logically related elements:

1) *a regulatory framework* that describes at the system level the mechanisms for implementing the principles of academic integrity in scientific and educational processes, measures to ensure compliance with the principles of academic integrity, procedures for preventing and combating violations of the principles of academic integrity.

The main elements are:

- basic normative documents: Code of Corporate Culture; Code of Academic Integrity; Regulation on Academic Integrity and Ethics of Academic Relations; Regulations on Academic Integrity Commissions and University Commission on Ethics and Conflict Management; Regulation on the Academic Integrity Promotion Group;
- other regulatory documents that establish the implementation of relevant types of educational and scientific activities in a higher education institution, which also reflect issues of academic integrity;

2) *structural divisions and authorized commissions* that ensure the popularization of the principles of academic integrity, their implementation in the educational and scientific activities of higher education institutions, as well as perform a supervisory and controlling function.

Include:

- academic integrity promotion group;
- permanent university Commission on Ethics and Conflict Management, permanent and temporary (if necessary) composition of which is appointed by orders of the rector;
- one-time commissions on academic integrity, which, if necessary, are created by orders of the rector, orders of the vice-rectors of the university, the director of the institute (dean of the faculty), the chairman of the organizing committee of the conference, the editor-in-chief of a scientific journal, chairman of the specialized academic council;

3) *information base* that promotes the principles of academic integrity and raises the level of awareness of all participants in educational and scientific activities at the university in matters of academic integrity.

The main elements are:

- website (site category) “Academic Integrity”;
- informational and methodological materials devoted to information literacy and prevention of plagiarism created jointly with representatives of companies that develop programs for checking works for uniqueness;
- informational materials on corporate culture in the workplace and the benefits of honest learning, created jointly with representatives of employers;
- materials dedicated to popularizing the principles of academic integrity among people receiving higher education (banners, infographics, handouts, etc.);

4) *tools for implementing the principles of academic integrity* in the educational and scientific activities of the university, which have an educational function and with the help of which it becomes possible to prevent cases of violation of the principles of academic integrity, including:

- information and advisory support of employees of the higher educational institution (pedagogical, scientific and pedagogical, scientific workers and other categories of employees) and higher education seekers through the creation of appropriate resources on the library's website, printing booklets and posters, development and distribution of video clips and other activities to promote the principles of academic integrity;
- mass open online courses on academic integrity and basic information literacy;
- implementation of the program of advanced training of scientific-pedagogical and academic staff, for example, on the topic "Ethics and Academic Integrity in Education and Science", "Information Literacy, Work with Bibliographic Managers and Introduction to Scientometry";
- lectures of the main stakeholders of higher education (well-known graduates, employers, experts, etc.) on the benefits of honest learning and implementation of scientific research, training cycles for all participants in educational and scientific processes under all-Ukrainian and international projects on academic integrity, grant programs, etc.;

5) *tools for monitoring compliance with academic integrity* in the educational and scientific activities of higher education institutions, which, in particular, provide for:

- conducting a survey of participants in scientific and educational processes for violations of academic integrity;
- mandatory verification of scientific, educational, methodological, qualification and educational works for signs of academic plagiarism in accordance with the established regulatory framework.

6.3. Basis of academic integrity

The culture of a scientist, which is the basis of academic integrity, is designed to: determine the limits of the extension of moral norms to research activities; promote universal values, Ukrainian national traditions and customs, theoretically justify their

necessity, essence and specifics of manifestation in practice; reflect the norms of employee behavior, subject it to critical value analysis; promote the appropriate selection of certain rules of relationships and principles of morality.

The components of the scientist's culture are shown in Figure 3.

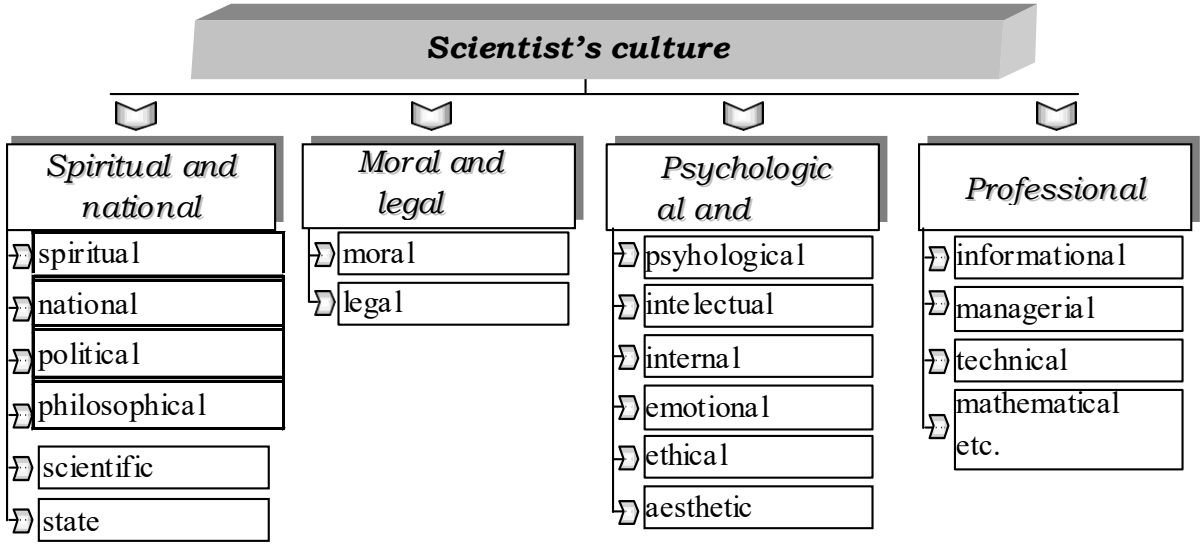

Figure 3 – Components of the scientist's culture

Sources: author's development

National culture of a scientist implies the awareness of the cultural and legal heritage of his/her nation, its rights, political and legal goals, assimilation of speech culture and their implementation in professional activities. Indicators of the national culture of a scientist are the state language, speech (word), speech mode and etiquette.

Political culture of a scientist is a system of knowledge about politics, the ability to implement this knowledge, as well as really implement it.

Moral culture of a scientist is the result of the formation of one's own harmony between the achieved maximum level of higher morality and the active use of moral norms in research activities. A scientist should always and everywhere be a bearer of moral norms and legal rules, act as a creator of new moral values, promote and prove by his/her own example that life should be built according to moral laws.

Legal culture of a scientist is the knowledge of current legislation, legal theories, the ability and skills to implement them, as well as compliance with the rules for conducting research work.

Psychological culture of a scientist consists in the organic unity of knowledge and skills of psychology, methods of auto-training, self-regulation, will, appropriate professional and psychological qualities that have an effective impact on the process

of scientific research.

Intellectual culture of a scientist is the knowledge of the laws of logic, the ability to use them in the study of business operations, the ability of a scientist to make logically based decisions, and ensure their confirmation. Intellectual culture manifests itself through such properties as abstraction, prudence, creativity, depth of knowledge, potential, freedom of thinking, emotions and personal activity, as well as features of perception, memory, thinking and imagination.

Internal culture of a scientist consists in the ability to regulate feelings, form beliefs in order to solve legal problems. Almost all moral principles and norms can be considered the main means of influencing the internal culture of a scientist. These are politeness, thoughtfulness, moderation, tact, honesty, truthfulness, frankness, simplicity, modesty, generosity, loyalty, responsiveness, attentiveness, moral purity, mutual respect, mutual assistance, etc.

Emotional culture of a scientist is understood as his ability to exert volitional influence on the situation that is being studied based on feelings. Emotional culture manifests itself in certain principles: the search for truth, emotional optimality and efficiency, emotional and legal balance, etc.

Ethical culture of a scientist is the knowledge of moral rights and obligations, their use in professional activities. The main principles of the scientist's ethical culture are: humane attitude to a person, honesty and truthfulness, benevolence and responsiveness, simplicity and modesty, compliance with official and commercial secrets.

Aesthetic culture of a scientist consists in understanding the rules of external harmony of his/her professional activity and their implementation in practice in order to effectively solve research problems. The main principles of aesthetic culture include: personal harmony of the scientist, aesthetic dominant, the phenomenon of creative will, professional majority, service design.

Information culture of a scientist is understood as the degree of possession of the proper amount of information for conducting research, the ability to obtain and effectively implement it in his/her activities. The information culture of a scientist is determined by the following principles: reliability, accuracy, completeness, necessity, usefulness, fairness, rationality, expediency, objectivity, responsibility and reliability of information.

Academic integrity implies compliance with a set of principles and rules of behavior of each participant in the educational and scientific community, aimed at

forming an independent and responsible person who is able to learn, teach and carry out scientific activities, adhering to ethical and legal rules.

In accordance with the Code of Academic Integrity at Sumy National Agrarian University (Ukraine), scientific, scientific-pedagogical, academic staff, employees, students, postgraduates, doctoral students and other persons studying at the University shall comply with the rules and norms defined by this Code, based on the principles of:

- rule of law and rule of dignity;
- freedom and human dignity;
- patriotism and service to the Ukrainian people;
- professionalism and competence;
- honesty and decency;
- justice and tolerance;
- partnership and mutual assistance;
- respect and mutual trust;
- openness and transparency;
- collegiality and democracy;
- self-improvement and self-development;
- personal responsibility and work for the result;
- intolerance regarding non-compliance with the rules and norms of the Code of Academic Integrity.

Taking into account the mass violations of ethical rules, principles that should be guided by participants in the educational process during training, teaching and carrying out scientific (creative) activities in order to ensure trust in the results of training and/or scientific (creative) achievements, the concept of *academic responsibility* is introduced as responsibility for violating the norms of academic integrity.

Subjects of academic responsibility are all members of the academic community and academic institutions (universities and other social institutions engaged in educational and scientific activities)

Object of academic responsibility is academic (scientific and pedagogical) activities.

Subject of academic responsibility may be administrative, financial, research, or teaching activities.

There is a distinction between external and internal responsibility.

External academic responsibility is realized in the interaction of a particular

subject with its social environment and means the ability to meet the needs of interested parties, that is, society, the state, the labor market, etc.

Internal academic responsibility affects various aspects of the activities of academic staff, higher education seekers, academic and administrative staff. Under such conditions, we are talking primarily about the so-called positive social responsibility, that is, about a proper, conscientious attitude to the fulfillment of academic duties, which is based on a high level of legal awareness and understanding of the high vocation of academic staff and scientists.

According to the Ministry of Education and Science of Ukraine, men predominate among applicants for the Doctor of Science degree in Ukraine [32]. The number of women receiving the Doctor of Science degree in 2011 was 28%, in 2016 this figure was 47%, but in 2020 it reached 50.6%.

Among the applicants for the PhD degree, women predominate. At the beginning of the 2011 period, this indicator was at the level of 53-57%. In 2016, it reached 59.8%, and in 2020 – 54.2%. At the same time, there is a stable trend of predominance of women among PhD candidates in the humanities.

In Ukraine, regulatory legal acts on the certification of highly qualified scientific personnel enable to carry out scientific research and defend dissertations for academic degrees for citizens of Ukraine and other countries, regardless of gender and age. According to the information on the number of women who have received the Doctor degree and PhD, with the distribution by branches of science in the period from 2011 to 2020, the most popular specialties for the dissertation defense is economic: 1,075 women received the Doctor degree, the degree of Candidate of Economic Sciences – 6,032. The smallest number of doctoral dissertations defended by women for ten years is in the Military Sciences – there are only 6 of them, and no PhD theses were defended in this field of science.

6.4. Plagiarism and its varieties

The most general definition comes from the etymology of the word "plagiarism" itself, which originally comes from the Latin "plagiatus" – "stolen". For example, the glossary of the site: plagiarism.org provides for the following definition: "plagiarism is the reproduction or appropriation of someone else's work without crediting the source; passing off someone else's work as one's own."

Merriam-Webster online dictionary classifies the following actions as plagiarism:

- to steal and pass off the ideas or words of another as one's own;
- to use another's production without crediting the source;
- to commit literary theft;
- to present as new and original an idea or product derived from an existing source.

In other words, plagiarism is an act of fraud that involves stealing someone else's work and lying about that work. The same definition of plagiarism is given by the website of the International Center for Academic Integrity: "using someone else's work or ideas, passing them off as one's own."

According to Ukrainian legislation, plagiarism is defined as the publication, in whole or in part, of someone else's work under the name of a person who is not the author of this work (Article 50 of the Law of Ukraine "On Copyright and Related Rights") [33].

The Law of Ukraine "On Higher Education" (paragraph 4 of Article 42) [31] defines academic plagiarism as the publication (in whole or in part) of scientific (creative) results obtained by other persons as the results of one's own research (creativity) and/or reproduction of published texts by other authors without specifying authorship.

Table 2 shows a list of academic plagiarism types (ranked by severity and frequency of occurrence in texts), compiled on the basis of a survey of about 900 university faculty members across the globe.

In the world, depending on the form of plagiarism, there are two main types:

1) explicit/open/undisguised (complete, direct, obvious, direct);

2) hidden (complex, indirect).

Open plagiarism is divided into*:*

1) holistic (complete appropriation of someone else's work, i.e. Clone);

2) partial (assigning a part of someone else's text that has an independent character, for example, a section of a workbook, such as CTRL-C);

3) citation (assigning fragments of someone else's work without their own additions or changes, such as Hybrid or Mashup).

Table 2 – Academic plagiarism types

Type	Characteristics
Clone	copying, accurately reproducing (word for word) someone else's text and passing it off as one's own
CTRL-C	contains a significant part of the text of the same source without changes
Find – Replace	main content of the source is saved with changes in keywords and phrases
Remix	paraphrases of materials from multiple sources are arranged so that the text looks complete
Recycle	in fact, the author duplicates his/her own results ("self-plagiarism"), significant pieces of previously published texts without references
Hybrid	perfect combination of cited sources and copied paragraphs without reference
Mashup	mixing copied materials from multiple sources
404 Error	text contains links to non-existent sources, false information about sources
RSS Feed	text has a proper design of quotes, but almost does not contain original thoughts
Re-tweet	text contains a proper citation, but essentially duplicates the wording and / or structure of the original (original) text

Sources: author's development

Hidden plagiarism may be:

1) editorial (editing someone else's text or texts without one's own additions, we are not talking about editing, but about creating a new text based on someone else's, that is, a mix);

2) patchwork (larger or smaller fragments of others without links are added to one's own text);;

3) adaptive (adaptation, reproduction of someone else's text without the right to such reproduction and reference to the original source, we are talking about adapting a book into a movie script, creating a comic based on the film, translations, etc.);

4) co-author's (an inseparable combination of someone else's and one's own fragments in the text, for example, writing a new story based on an existing one);

5) informational (means the misappropriation of elements of someone else's text that are not protected by copyright, such as: methodology, structure, certain information, etc. and further author's processing of them, that is, related to "stealing ideas").

It is expedient to consider the requirements for the uniqueness of scientific papers and responsibility for plagiarism.

Uniqueness (originality) of the text is the definition opposite to plagiarism. The more plagiarism in a text, the less original it is, and vice versa – the less plagiarism, the higher the uniqueness of this text is.

For example, if a plagiarism checking program shows that a certain text is 90%

original, it means that 10% of that text is unoriginal. That is, from the point of view of the plagiarism checker, 10% in this case is plagiarism. But free plagiarism checking programs are basically programs for checking the text for originality, but not for the correctness of citation, as such programs consider correctly quoted borrowing to be plagiarism.

It is worth noting that in Ukraine, at the legislative and regulatory level, it is not justified what percentage of uniqueness shall be in a unique text. Different institutions set their own criteria for this parameter. In some cases, this is at least 90% uniqueness (i.e., there shall be less than 10% plagiarism). But there are also quite loyal conditions – to get a positive result, the uniqueness shall be at least 50%.

The Ministry of Education and Science of Ukraine does not regulate a specific percentage of plagiarism or uniqueness – neither for students, nor for dissertations or doctoral students. The fact is that modern plagiarism checking programs are not perfect. Each of them shows a different percentage depending on the algorithm used and the database of texts for comparison, as well as the settings of the program itself.

The uniqueness of a scientific work consists in:

1) in the analysis, selection and arrangement of scientific materials, theoretical, methodological and legislative sources on the subject of research;

2) in the logical structure and sequence of presentation of statements and argumentation;

3) ways to generalize scientific judgments and facts;

4) obtaining independent conclusions, provisions of scientific novelty, specific proposals and recommendations on this basis.

When carrying out a survey in EU countries to conduct training to prevent plagiarism, there were 5 possible answers (fully agree, agree, not sure, disagree and completely disagree) (Figure 4) [34]. There are big differences between countries. More than 75% of students said what training they completed in Austria, Greece, the United Kingdom and Finland. At the same time, on the other hand, we see countries where less than a third of students have completed such training: Bulgaria, the Czech Republic and Poland. However, some Eastern countries are among the highest ranked countries (Estonia, Slovenia, Slovakia) and training is less common in some Western countries (Portugal, Spain, France).

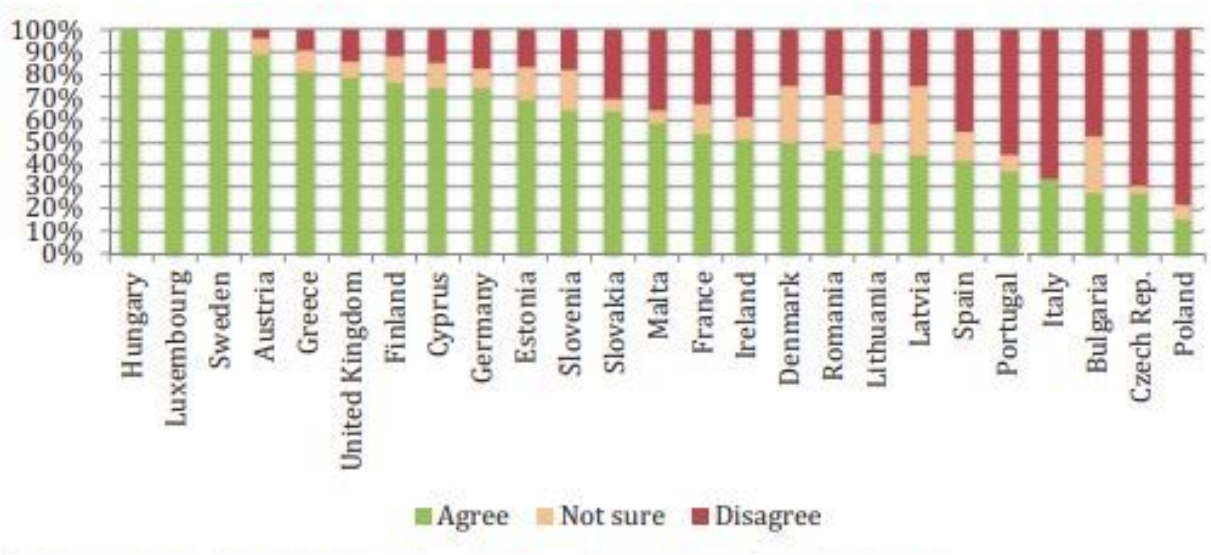

Figure 4 – I have received training in techniques for scholarly academic writing anti plagiarism issues

Sources: [34]

There are two main types of approaches to detecting plagiarism:

1) *Internal* – refers to cases where plagiarism should be detected on the basis of a single text, which may contain both non-plagiarism and plagiarism passages. The detection task is aimed at detecting plagiarized parts in the text without reference to any original text;

2) *External* – refers to cases where sets of suspicious plagiarized texts and their potential original texts are available. The detection task aims at identifying pairs of relevant cases of a suspicious source by analyzing the similarity of each suspicious case to a collection of potential source texts;

3) *Mixed* – a combination of the previous two approaches. It is usually used as an improvement at the filtering stage, where external detection is used as a filtering strategy, and then internal detection is used to determine the location of plagiarism, and vice versa.

For external and hybrid approaches, there is a distinction between online and offline approaches.

The online approach compares not only the local data set, but also searches the Internet for texts that may be original documents.

The offline approach is based on algorithms for detecting evidence of plagiarism in a local text collection

There are also different methods for detecting plagiarism by the number of languages used:

1) *Monolingual recognition* – considers suspicious cases and sources of only one language;

2) *Detection between languages* – when suspicious cases come from sources in different languages. This approach usually requires generalizing the language as part of the preprocessing step.

Plagiarism detection is carried out using specialized computer programs and services, the list of which is shown in Table 3.

Table 3 – Plagiarism checkers

No.	Software name	Access to software
1	AntiPlagiarism.NET	http://antiplagiarism.net/ru/
2	Advego Plagiatus	http://advego.ru/plagiatus/
3	Cognitive Text Analyzer	http://www.cognitivetpg.com/
4	Compare Suite	http://www.comparesuite.ru/
5	Double Content Finder (DC Finder)	http://progidarom.ru/soft/internet/ DCFinder.exe
6	Etxt Антиплагиат	https://www.etxt.ru/antiplagiat/
7	Plagiarism-Detector Personal	http://plagiarism-detector.com/
8	Turnitin	http://turnitin.com/en_us/
9	Viper	http://www.scanmyessay.com/
10	Unplag	https://unplag.com/
11	Плагиата.НЕТ	http://www.mywebs.ru/plagiatanet.html

Sources: author's development

Functions of anti-plagiarism systems:

- determine the degree of similarity (as a percentage) of the academic text to the texts of documents contained in the university database (Sumy NAU), the database of the database exchange program (StrikePlagiarism and Unicheck systems), and Internet resources;
- recognize types of text manipulation such as replacing alphabet characters, using special software tools, replacing text with graphic images, etc.
- generate a detailed Report of the Similarity of the analyzed text. Everyone also needs to know that:
- systems provide information that enables to carry out an independent assessment of the correctness and legality of borrowing, to determine the percentage of originality of scientific work;
- systems do not determine whether the work contains new scientific knowledge, research results, or plagiarism;
- works with a high or low percentage of similarity may not be qualified as

containing or not containing plagiarism;

- final decision on the presence of ideas and scientific results obtained by other authors in the work and reproduction of published texts by other authors without appropriate reference is made by the responsible competent person;
- when identifying text borrowings using specialized computer programs and services, it is essential to take into account that today there are significantly fewer scientific publications in electronic publications and on the Internet than in printed ones, and some electronic documents may have limited access. This indicates that a computer program or service cannot take into account all possible variants of text borrowings, in particular those published earlier, since the search is performed only on the array of information available on the network.

In addition, the use of programs is paid, and the use of free online services for checking for plagiarism of texts has some inconveniences, which include:

1) need for registration or payment for long-term use;

2) demo mode of a free session

3) limited number of files or characters that can be checked in guest mode without registration;

4) verification takes a long time.

In Sumy National Agrarian University (Ukraine), verification for text borrowings in academic texts is defined by the Regulation on the Procedure for Checking Academic and Scientific Texts for Uniqueness and precedes all other review procedures. The procedure for checking academic texts by anti-plagiarism systems is defined in this Regulation. In order for a student to prevent plagiarism when writing a scientific paper, it is necessary to:

- define a clear task and structure of work;
- create a schedule for completing tasks, manage his/her time;
- focus on describing the main ideas;
- express his/her own thoughts, be independent;
- link information from sources to his/her ideas;
- analyze, verify information, and focus on primary sources;
- summarize, organize information, use bibliographic managers;
- check the text for borrowing using special programs;
- ask the faculty member/librarian for help.

A survey was conducted in EU countries on the existence of policies and

procedures in a particular higher education institution (Figure 5) [34]. We see that there are countries where almost all students are convinced that their institution has policies and procedures for dealing with plagiarism (Slovakia, Malta, Great Britain, Ireland), while in Greece this number is less than 20%.

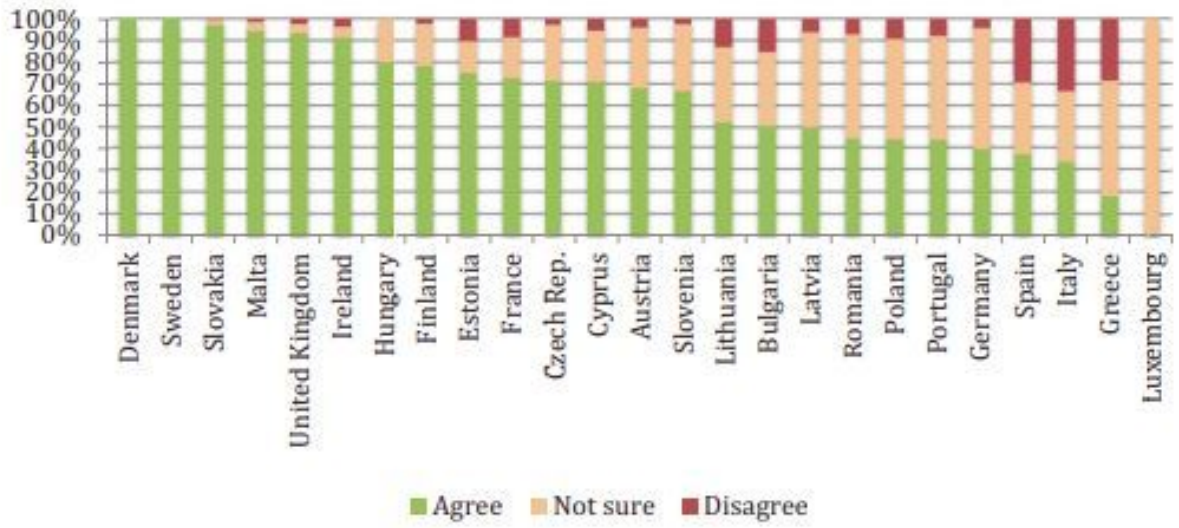

Figure 5 – Institutions where I now study has policies and procedures for dealing with plagiarism

Sources: [34]

However, the answer to this question does not tell us whether policies are applied properly, consistently, and effectively to punish, deter, and prevent academic dishonesty. Thus, two more questions were asked:

1. I know what penalties apply to students for various forms of plagiarism and academic dishonesty.

2. I believe that all faculty members follow the same procedures for such cases of plagiarism.

Each response was evaluated (1 – completely disagree, 2 – disagree, 3 – not sure, 4 – agree, 5 – completely agree), then it was summed up for each respondent, and the average value for each country was calculated. The results are shown in Figure 6. As we can see, the order of countries has changed somewhat, but the differences are not so significant.

In order to compare different EU countries surveyed for IPPHEAE it was established that it would be useful to try to quantify the maturity of policies and procedures using the survey results and other evidence from the research. However, it became clear that the evaluation would depend on many different factors. Therefore

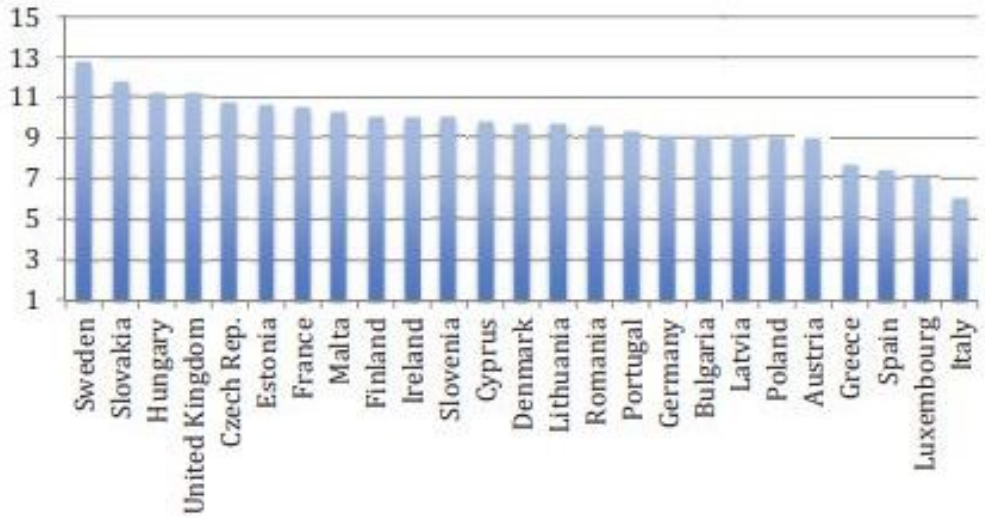

Figure 6 – Policies for plagiarism exist, are known and effective

Sources: [34]

the project leader developed the Academic Integrity Maturity Model (AIMM), inspired by Carnegie Mellon's Capability Maturity Model (CMMI). AIMM combines many questions from the survey, includes all levels of survey responses and also incorporates relevant data from other sources, based on nine separate criteria, each in the range 0–4.

The graph in Figure 7 [34] compares the AIMM scores for each country, depicting each criterion and the total score (sum of the scores for the nine criteria), giving a maximum possible score of 36.

A spider chart has been constructed for each country using the same the metrics to show strengths and weaknesses of policies in each country. Spider charts for UK and Bulgaria are included here as examples (charts in Figures 8) [34]. In Ukraine, this diagram is shown in Figure 9.

The histogram (Figure 10) provides a comparison of AIMM scores for the 27 countries studied according to scores based on the survey results for nine categories, as shown [34].

Categories were rated in the range from 0 to 4, and nine points were added up (equal weight) to get a maximum score of 36.

According to the Ministry of Education and Science of Ukraine [32], men predominate among applicants for the degree of Doctor of Science in Ukraine. The number of women receiving the degree of Doctor of Science in 2011 was 28%, in 2016 this figure was 47%, but in 2020 it reached 50.6%.

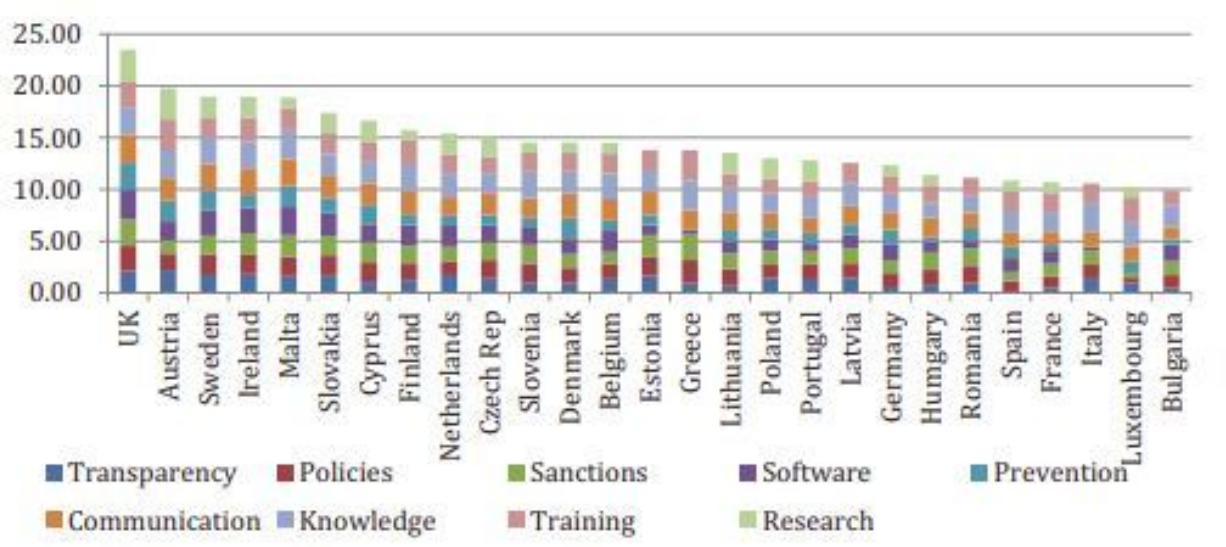

Figure 7 – AIMM scores for 27 EU countries

Sources: [34]

Figure 8 – Spider charts of AIMM scores for UK and Bulgaria

Sources: [34]

Figure 9 – Spider charts of AIMM scores for Ukraine

Sources: author's development

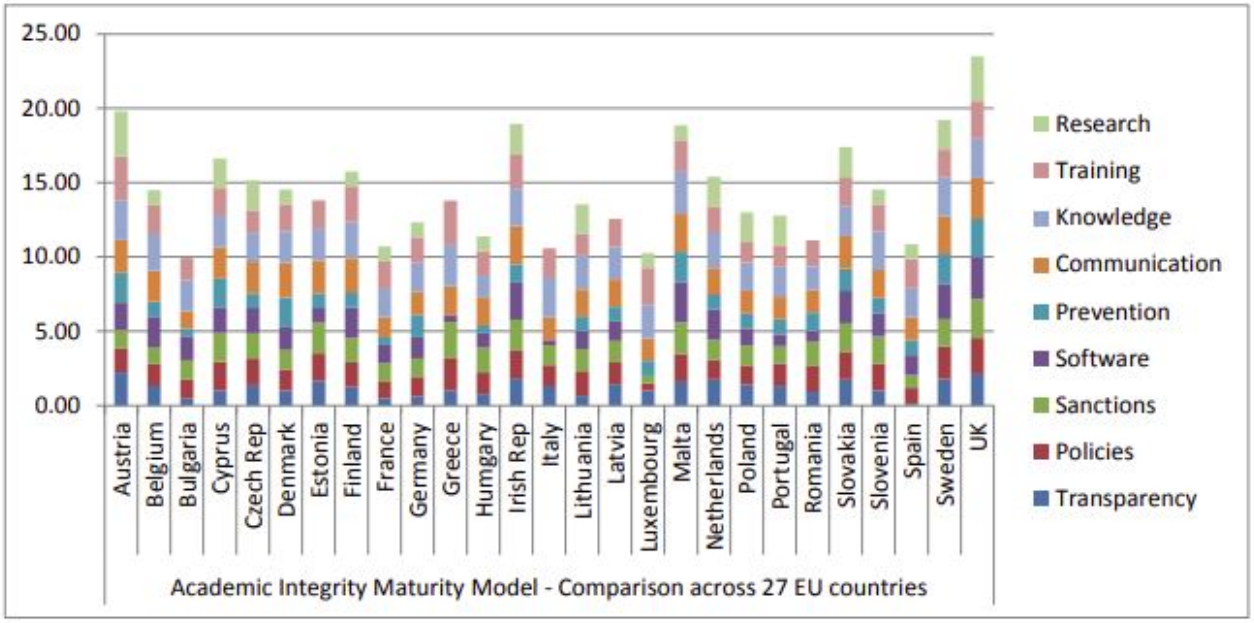

Figure 10 – AIMM – Comparison across 27 EU countries

Sources: [34]

Among the applicants for the PhD degree, women confidently predominate. At the beginning of the 2011 period, this indicator was at the level of 53-57%. In the same year, 2016, it reached 59.8%, and in 2020 – it is 54.2%. At the same time, there is a stable trend of predominance of women among the Candidates of Science in the humanities.

Conclusions

The main results were as follows:

1. Academic integrity, on the one hand, is a complex interdisciplinary category that combines ethical norms and rules of human behavior in the educational and scientific environment, and the mechanisms and tools by which they are implemented in practice. On the other hand, there is a whole set of factors, primarily moral, cultural, institutional, educational, which affect the University inside and outside, determining its ability and desire to counteract academic dishonesty. In any case, such an integral system of standards, rules, and structures requires significant resources, time, and even the will and courage of individuals to establish themselves, and in no case can it appear simultaneously or accidentally.

2. The principles of scientific worldview and ethical culture of the scientist are

the fundamental philosophical foundations for the preparation of a modern highly qualified, competitive, integrated into the European and world scientific and educational, research innovation space of a specialist of higher education in all areas of knowledge, capable of independent scientific, research, organizational and pedagogical, innovative practical activities in the specialty, as well as teaching in higher educational institutions.

3. Fostering of academic integrity is one of the tasks of higher education institutions. A participant in the educational process, who is accused of academic plagiarism, as well as other violations of academic integrity, should be provided with the opportunity to provide explanations and prove his/her innocence. To ensure uniform requirements for software verification, it is advisable to develop a separate user manual for the corresponding software.

4. Overcoming the crisis of academic integrity and, in particular, the problems of plagiarism and self-plagiarism requires, among other measures, the establishment of clear procedures and criteria for identifying these violations by special laws and regulatory documents of higher educational institutions and scientific institutions. They should become safeguards for the possibility of releasing violators from liability on the basis of decisions based on legislation that is not related to problems of academic integrity. When developing internal documents, one should take into account similar procedures and recommendations of leading European and American universities.

The practical significance of the results obtained involves the development of approaches to the formation of a system for ensuring academic integrity for higher educational institutions; the introduction of a procedure for checking academic texts by anti-plagiarism systems, defined in the Regulation on the Procedure for Checking Academic and Scientific Texts for Uniqueness in Sumy National Agrarian University (Ukraine); the application of the University system for ensuring the principles of academic integrity and ethics of academic relations.

The objectives of further research on this problem are to find ways to increase the level of sustainability of scientific research and compliance with the principles of academic integrity; prevent plagiarism and academic dishonesty; introduce changes in policies and recommendations at the institutional level in order to achieve proportional responses in conducting surveys, consistency, transparency and fair results for applicants for higher education.