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The signal notes using for improving mastery of the discipline "Academic Integrity in Higher Education Institutions" by future teachers, specialists in natural sciences and public health

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Abstract:

The article shows the importance of using signal notes when studying the discipline "Academic Integrity in Higher Education Institutions". The main principles and stages of creating signal notes, laid down by the famous Ukrainian educator Viktor Shatalov, are highlighted. The advantages of signal notes independently completed by students compared to works completed using artificial intelligence are shown. Signal notes, or key reminders, significantly boost mastering academic integrity by highlighting core values (honesty, fairness, respect, responsibility, trust, courage), clarifying ethical expectations (plagiarism, cheating), showcasing real-world professional impacts, and providing actionable strategies, thereby embedding these principles into student behavior for better learning and career readiness. The use of signal notes in the study of academic integrity by students in the teachers, natural sciences and medicine facilitates the assimilation of the basic principles of academic integrity in educational and scientific activities and can be recommended for implementation in the educational process at universities.

Keywords: academic integrity, artificial intelligence, signal note, student, university

1. Introduction

Academic misconduct remains a pervasive issue in higher education institutions, undermining both academic integrity and the quality of the educational environment. The academic integrity values form the cornerstone of university culture, yet their interpretation and implementation depend on cultural, institutional, and technological factors (Zhu, 2025). Integrating discussions of integrity issues into science and health curricula allows students to connect these valuesto future professional practice. The importance of studying the principles of academic integrity in the scientific and educational activities of future specialists in natural sciences and public health has been highlighted in recent publications, including: Deykun et al (2025), Lukash & Szikura (2025), Lukash et al. (2025).

Instead, an important issue in mastering the basics of academic integrity is engaging the sensory capabilities of students in order to better master the applied aspects of the academic discipline. It is known that signal phrases in academic writing allow writers to give credit where credit is due. By incorporating them, writers credit existing literature to its source and in turn, maintain academic

integrity. If writers do not give recognition to the direct source, it would be considered plagiarism. Signal integrity has been identified as one of the key areas for scientific education and research at the national level. Nationally, few universities offer courses in signal integrity, and there are none in the immediate area. Therefore, there is a critical need for signal integrity training and support (Morales A. & Agili, 2017).

2. Methodology

The study used a controlled experimental design, implementing an educational program (Lukash & Szikura, 2025) to modify future teachers' and specialists in natural sciences and public health attitudes toward academic integrity, assessing its effectiveness by observing changes in student behavior and understanding compared to a control group, and ultimately showing improved mastery through structured learning.

3. Results & Analysis

Key points of integrity in education center on core values like honesty, trust, fairness, respect, responsibility, and courage, applying to students and educators to build a trustworthy academic environment focused on genuine learning, ethical conduct (avoiding plagiarism, cheating), and upholding the value of education. It means being truthful in actions, taking ownership of mistakes, and acting ethically even when unobserved, fostering a culture where ethical behavior and critical thinking are paramount over shortcuts.

Learning visualization helps students by simplifying complex ideas, boosting memory and engagement, improving critical thinking, and making abstract concepts concrete through tools like diagrams, charts, and mind maps, leading to deeper understanding and better performance. It transforms learning into a more interactive, personalized, and accessible experience, making it easier to see connections and retain information (Shatri & Buza, 2017).

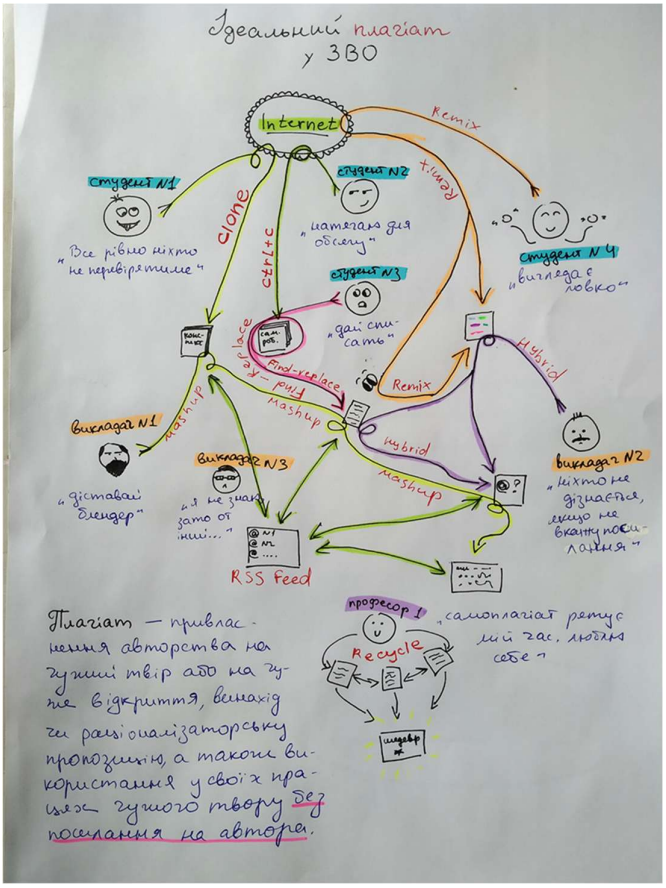
Innovative Ukrainian educator Viktor Shatalov developed a teaching system using reference cues. This system simplifies the process of presentation and comprehension and is aimed at developing students' creative thinking (Shatalov, 1998). The modern understanding of the concept of "signal note" has its origins in the scientific approaches of V. Shatalov (1998). A signal note (or reference note) is a highly condensed, symbolic, and visual model of educational material that captures key ideas, facts, formulas, or relationships using signs, symbols, drawings, diagrams, and colors to ensure rapid recall of information (Fig. 1). It is a system of "reference signals" that encode the main semantic milestones of a topic and help in memorizing and systematizing knowledge.

Figure 1 – Example of a signal summary. Author: student Jána Csernicskó (Ferenc Rakoczi II Transcarpathian Hungarian University).

Let us give examples of the use of signal notes in the study of academic integrity by students of pedagogical, natural science, and medical specialties of universities. When studying violations of academic integrity in educational and scientific activities, students are asked to create a warning note "Model of Ideal Plagiarism in the Higher Education Institution". Creating a "Model of Ideal Plagiarism" as a warning note is crucial because it makes students actively engage with the definitions, forms, and consequences of academic dishonesty, fostering deep understanding beyond simple rules; it turns abstract concepts into concrete scenarios, highlighting ethical responsibilities, building critical thinking, and ensuring fairness and credibility in academic work by demonstrating what not to do, thus preventing future violations and upholding scholarly standards.

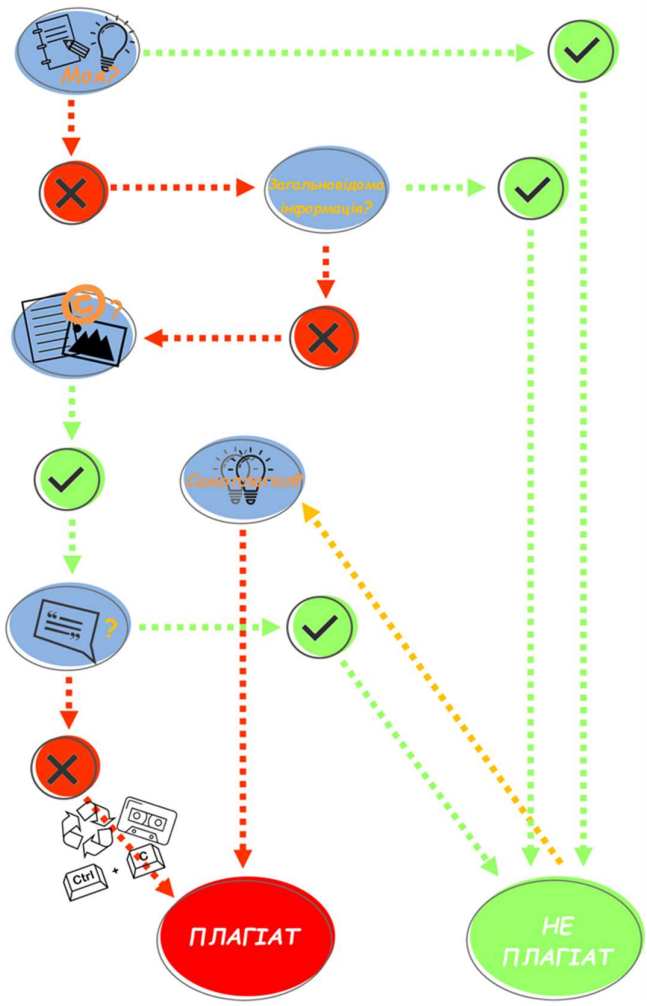
The Figures 2 and 3 show original works by University students – signal notes "Model of Ideal Plagiarism in the Higher Education Institution".

Figure 2 – Example of a signal note "Academic Integrity in Higher Education Institution", created by a student without the use of artificial intelligence. Author: student, Valeria Dey (T.H. Shevchenko National University "Chernihiv Colehium")



Students' interpretations of learning tasks significantly shape actual learning, meaning educational design must account for these varied perspectives, moving beyond simply providing content to creating flexible, learner-centered environments that foster deep engagement, rather than just passive consumption or rote action, by designing tasks that align with higher-order thinking and provide scaffolding for complex problem-solving.

Figure 3 – Example of a signal note "Academic Integrity in Higher Education Institution", created by a student without the use of artificial intelligence. Author: student Oleksandr Alevros (T.H. Shevchenko National University "Chernihiv Colehium")



Understanding how students interpret tasks (e.g., seeing them as challenges vs. chores) is crucial for educators to design effective activities that promote motivation, satisfaction, and deeper understanding, rather than mere compliance.

Fig. 4 shows a signal note "Academic Integrity in Higher Education Institution," created by a student using artificial intelligence

Figure 4 – An example of a signal summary "Academic Integrity in Higher Education Institution", created by student Tetyana Shevchenko (T.H. Shevchenko National University "Chernihiv Colehium") using artificial intelligence

Independently completed student work “Model of Ideal Plagiarism in the Higher Education Institution ” offers deeper critical thinking, genuine creativity, emotional depth, and authentic voice, fostering personal growth and unique perspectives, while AI-generated work excels at speed, efficiency, and handling repetitive tasks, often lacking the nuanced understanding, personal connection, and originality that comes from human experience and struggle, which are vital for true learning and skill development.

The advantages of self-executed student work and work done using AI are listed in the Table 1.

Table 1 - The advantages of self-executed student work and work done using AI.

Advantages of student work (human-created)	Advantages of ai work (for learning support)
Authentic understanding. Shows a student's unique interpretation, thought process, and struggle to grasp concepts, revealing true comprehension. Personal voice and creativity. Infuses personal experiences, style, and original ideas, making the work unique and reflective of the individual. Critical thinking. Demonstrates the ability to evaluate, question, and synthesize information, rather than just accepting AI outputs. Emotional intelligence. Conveys empathy, passion, and nuanced human emotion that AI struggles to replicate genuinely. Skill development. The process of creating the work builds essential skills like problem-solving, research, and writing, which AI bypasses. Academic integrity: Represents genuine learning and intellectual effort, essential for educational goals.	Efficiency. Quickly generates drafts, summarizes texts, and helps with grammar/structure, saving time on mundane tasks. Personalized learning. Offers instant feedback, adaptive difficulty, and tailored resources, supporting individual pace. Accessibility. Provides 24/7 tutoring and assistance, breaking down time and location barriers. Brainstorming and scaffolding. Helps overcome writer's block, suggests ideas, and provides structures to build upon.

Independent student work, including creating personal “signal notes” is crucial for academic integrity as it fosters ownership, deep learning, and ethical responsibility, directly countering plagiarism and ensuring students genuinely grasp material, building personal accountability rather than relying on shared answers, and developing essential skills for future professional honesty. This process transforms passive learning into active engagement, promoting trust and respect for knowledge, fundamental pillars of integrity.

The key characteristics of signal notes are as follows.

Concise. Only the most important points are included, without unnecessary details.

Structured. Information is divided into logical blocks, using headings and subheadings.

Visualization. Uses diagrams, tables, arrows, colors, and symbols (reference cues).

Symbolism. Replaces complete sentences with associative symbols.

Logic. Clearly shows the connections between elements.

The goals of using signal notes in the study of academic integrity include a quick introduction to the topic and identification of the main points, understanding of the structure of the material and the connections between concepts, facilitating memorization and repetition, as well as developing creative abilities and the ability to present knowledge.

The main stages of compiling a signal summary are the following: 1) defining the purpose and main elements of the topic; 2) highlighting the main concepts, facts, and ideas; 3) structuring (dividing into semantic parts using headings; 4) visualization (transforming theses into diagrams, symbols, and tables); 5) use of key words (selection of vivid associations); 6) addition and revision (working with notes, adding to them, rereading).

4. Conclusion

The use of signal notes in the study of academic integrity by students in the teachers, natural sciences and medicine facilitates the assimilation of the basic principles of academic integrity in educational and scientific activities and can be recommended for implementation in the educational process at universities.

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