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# VALUE INTELLIGENCE AND ETHICAL AWARENESS OF GENERATIVE AI AMONG THERAPY AND REHABILITATION STUDENTS: A CROSS-SECTIONAL STUDY IN UKRAINIAN UNIVERSITIES

# ЦІННІСНИЙ ІНТЕЛЕКТ ТА ЕТИЧНА ОБІЗНАНІСТЬ ЩОДО ГЕНЕРАТИВНОГО ШТУЧНОГО ІНТЕЛЕКТУ СЕРЕД СТУДЕНТІВ СПЕЦІАЛЬНОСТІ «ТЕРАПІЯ ТА РЕАБІЛІТАЦІЯ»: ПОПЕРЕЧНЕ ДОСЛІДЖЕННЯ В УКРАЇНСЬКИХ УНІВЕРСИТЕТАХ

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**Abstracts**

**Introduction.** The study aimed to examine value priorities, the level of Value Intelligence (VI), and ethical awareness regarding the use of generative artificial intelligence (AI) among students enrolled in Therapy and Rehabilitation programmes at Ukrainian universities. It also aimed to explore the association between VI and ethical awareness and to describe how these indicators varied across age groups.

**Materials and Methods.** A cross-sectional survey was conducted among 326 bachelor's and master's students from seven Ukrainian state universities. Data were collected using an author-developed questionnaire comprising a 16-item Value Intelligence scale and an 8-item ethical awareness scale concerning the use of generative AI in educational and research activities. Descriptive statistics, distributional analyses, Pearson correlation, chi-square tests, and age-group comparisons were applied. The VI instrument was exploratory and showed limited internal consistency ($\alpha$=0.564).

**Results.** The sample comprised 142 men and 184 women; 121 participants were aged 18–21 years, 137 were aged 22–34 years, and 68 were aged 35–55 years. Respondents predominantly evaluated responsibility, tolerance, morality, career, interaction, ambition, duty, prudence, and justice as positive values, whereas injustice, vanity, egoism, egocentrism, and benefit were predominantly evaluated negatively. The median VI score was 73.5 (mode = 77; SD = 11.37), and the median ethical-awareness score was 33.0 (mode = 33; SD = 5.48). In the 18–21 and 22–34 age groups, sufficient VI was the most frequent category (43.0% and 38.0%, respectively), whereas the average level predominated among participants aged 35–55 years (58.8%). Ethical awareness was most often classified as average in all age groups: 47.1%, 47.4%, and 54.4%, respectively. Pearson correlations between VI and ethical awareness ranged from 0.47 to 0.54 across age groups and were 0.50 in the full sample. The reported chi-square statistics were below the critical value for df=9 at $\alpha$=0.05, indicating no statistically significant categorical association between the four-level classifications.

**Conclusions.** The results establish the levels of students' value preferences and provide preliminary evidence of a positive descriptive relationship between value intelligence and ethical awareness regarding the use of generative artificial intelligence. However, the exploratory nature of the questionnaire and the limited internal consistency of the value intelligence scale require cautious interpretation. The results do not establish causality, predictive validity, or the influence of age on development. Further research should validate the measurement instruments, provide full statistics of the findings and effect sizes, and investigate the proposed relationship in larger, culturally diverse samples and in different educational and professional contexts.

**Keywords:** alue Intelligence, Artificial Intelligence, ethics in education, decision-making, therapy and rehabilitation students, generative AI, ethical awareness.

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**Мета.** Метою дослідження було вивчення ціннісних пріоритетів, рівня ціннісного інтелекту (ЦІ) та етичної усвідомленості щодо використання генеративного штучного інтелекту (ШІ) серед студентів, які навчаються за програмами терапії та реабілітації в українських університетах. Його метою також було дослідити зв'язок між ЦІ та етичною усвідомленістю, а також описати, як ці показники відрізняються між віковими групами.

**Матеріали та методи.** Було проведено перехресне опитування серед 326 студентів бакалаврату та магістратури з семи українських державних університетів. Дані були зібрані за допомогою розробленої авторами анкети, що містить 16-пунктову шкалу ціннісного інтелекту та 8-пунктову шкалу етичної усвідомленості щодо використання генеративного ШІ в освітній та дослідницькій діяльності. Були застосовані описова статистика, розподільчий аналіз, кореляція Пірсона, тести хі-квадрат та порівняння вікових груп. Інструмент ЦІ був дослідницьким та показав обмежену внутрішню узгодженість ($\alpha$ = 0,564).

**Результати.** Вибірка складалася з 142 чоловіків та 184 жінок; 121 учасник був віком 18-21 рік, 137 – 22-34 роки, а 68 – 35-55 років. Респонденти переважно оцінювали відповідальність, толерантність, моральність, кар'єру, взаємодію, амбіції, обов'язок, розсудливість та справедливість як позитивні цінності, тоді як несправедливість, марнославство, егоїзм, егоцентризм та користь оцінювалися переважно негативно. Медіанний бал етичної обізнаності становив 73,5 (мода = 77; SD = 11,37), а медіанний бал етичної обізнаності – 33,0 (мода = 33; SD = 5,48). У вікових групах 18–21 та 22–34 роки найчастішою категорією був достатній рівень етичної обізнаності (43,0% та 38,0% відповідно), тоді як середній рівень переважав серед учасників віком 35–55 років (58,8%). Етичну обізнаність найчастіше класифікували як середню у всіх вікових групах: 47,1%, 47,4% та 54,4% відповідно. Кореляція Пірсона між ціннісним інтелектом та етичною обізнаністю коливалася від 0,47 до 0,54 для різних вікових груп та становила 0,50 у повній вибірці. Зазначена статистика хі-квадрат була нижчою за критичне значення для df=9 прим$\alpha$ =0,05, що вказує на відсутність статистично значущого категоріального зв'язку між чотирирівневими класифікаціями.

**Висновки.** Результати встановлюють рівні ціннісних уподобань студентів та надають попередні докази позитивного описового зв'язку між ціннісним інтелектом та етичною усвідомленістю щодо використання генеративного штучного інтелекту. Однак, дослідницький характер анкети та обмежена внутрішня узгодженість шкали ціннісного інтелекту вимагають обережної інтерпретації. Результати не встановлюють причинно-наслідкового зв'язку, прогностичної валідності чи впливу віку на розвиток. Подальші дослідження повинні перевірити інструменти вимірювання, надати повну статистику результатів та розмірів ефектів, а також дослідити запропонований зв'язок у більших, культурно різноманітних вибірках та в різних освітніх та професійних контекстах.

**Ключові слова:** ціннісний інтелект, штучний інтелект, етика в освіті, прийняття рішень, студенти спеціальності «Терапія та реабілітація», генеративний ШІ, етична обізнаність.

## 1. Introduction

Research relevance: The problem of using AI in the educational process is gaining momentum and is attracting the attention of social institutions [24], researchers of the scientific field [21], university and school teachers-practitioners. According to J. Fazlagić, “the scope of the use of AI will cover a wide range of didactic and organizational processes in school” [15, p. 54], and it means that the research on the use of AI in the educational process should have started at least a few years earlier. The programming and codification of all the data arrays of humanity very quickly enter the territory of ethical interaction between a human and society and this, unfortunately, prevents the development of a fragile system of such interaction in unstable societies. The greatest risk is that codification and digitalization tend to expand to the mindless use in education, which is the main space of instilling values into future generations. This arises a problem of vulnerability of young people who, not having sufficiently developed Value Intelligence, should eventually become social capital with the dominance of value-ethical interaction for the preservation of humanity, nature, and society. AI has many advantages and disadvantages and its rapid spread can no longer be regulated centrally, therefore, in our general opinion, the solution to the issue of its regulation depends on the internal control by people of their values. The Ministry of Education and Science of Ukraine, trying to establish control over the problem, has made publicly available draft recommendations on the use of AI in schools [4], which are planned to be officially issued after discussion in the near future, and the Ministry of Digital Policy of Ukraine has developed the “Roadmap for the implementation of regulation of

AI systems in Ukraine" [2]. Despite the lack of a single regulatory act that would regulate the use of AI, Ukraine is considered one of the leading countries in Eastern Europe in this regard. This is due, in particular, to the existence of the "Concept of Artificial Intelligence development in Ukraine" [2]. The concept of Artificial Intelligence development identifies nine priority areas for the implementation of AI: education and vocational training, science, economy, cybersecurity, information security, defense, public administration, legal regulation and ethics, and justice. In 2020, the Committee of the Council of Ministers for the Digitalization of Poland (KRMC) adopted the Policy for the development of Artificial Intelligence in Poland. This document defines the goals and applications of AI in the short term (until 2023), medium term (until 2027), and long term (after 2027). In turn, the European Union prepared and adopted rules on Artificial Intelligence [14], which is one of the first legal frameworks in the world to regulate the use of AI in Europe. This document is designed to ensure the safe use of AI systems while respecting existing rights and complying with the fundamental values of the European Union [5]. On the UNESCO website, we also find information that "…rapid changes (the rapid rise in AI – auth.) also raise profound ethical concerns" [13]. Gabriela Ramos, Assistant Director-General for Social and Human Sciences of UNESCO, announced the creation of the Global AI Ethics and Governance Observatory to provide a global resource for policymakers, regulators, academics, and others to address pressing issues related to AI (ibid.). Therefore, the problem of the ethical use of AI has now acquired a global scale.

Therefore, in our opinion, one of the safeguards against the possible destructive consequences of using AI in various spheres of public life, starting from education, is the development of a high level of Value Intelligence in students and postgraduates. This innovative concept was first theoretically substantiated by us in 2020, and we have been developing this theory for 4 years [36]. In addition, attempts to create such a concept were announced much earlier [46]. In this research, we try to draw attention not so much to the positive aspects of using AI in education [10], but to the possible negative ethical consequences of its use.

Conceptualizing "Artificial Intelligence" and "Value Intelligence": the world-known company IBM, explaining what Artificial Intelligence is, uses the definition "technology that allows computers and machines to imitate human intelligence and problem-solving abilities" [22]. At the same time, at the official level in the European Union, the following definition of the Artificial Intelligence systems is used: Artificial Intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications) [11]. Taking into account the above definitions, we emphasize that there are actually two concepts regarding the use of generative Artificial Intelligence technology: 1) positive – for creating personal assistants, such as voice assistants or virtual chatbots, for organizing own schedule, reminders, or information search; 2) negative – for automatic text processing, creating synthesized content, performing information processing tasks without personal participation and involving own intellectual activity.

Under the concept of "Value Intelligence", we mean the presence of a certain mental potential in a person, which manifests itself as "... the ability to think in a system of value coordinates (taking into account universal human and, when necessary, professional values), to adequately respond to challenges (in particular, of the value order) of the social and natural environment, to make timely effective decisions and take responsibility" [32, p. 351].

Value Intelligence appears as an important prerequisite for an adequate and effective response to the challenges (in particular, of the value order) of the social and natural environment. At the same time, Value Intelligence, which is extremely connected with axiological knowledge, actually appears as a means of installing theoretical axiology in the modern social and cultural space [33, 35]. At this stage of the study, we developed a model of value intelligence and clarified how its components interact [36]. We took the defining characteristics of Value Intelligence into account in the process of compiling a questionnaire for the participants of the proposed study.

We emphasize that there is a fundamentally important correlation between such phenomena as intelligence, Social Intelligence, Emotional Intelligence, and Value Intelligence, which is reflected in Fig. 1 [35].

Types of AI used by students: we conducted a short blitz survey of students to determine what types of AI they use in their educational activities. Based on the received responses (Fig. 2), we identified the main types of AI used by students in their educational activities. ChatGPT-4 is the most common AI tool among the respondents (56%). ChatGPT-4 capabilities include translation, text generation, question answering, speech recognition, etc. [25]. Gemini (Google Bard) is the second most popular AI tool (20.2%). These tools are the most popular, while Copilot, DeepAI, and other tools are less common. The obtained data indicate the significant popularity of text-based AI, which can be used to automate the creation of educational materials, provide assistance in answering questions, and optimize the learning process.

Since, as we see, students prefer only the simplest and free types of AI, we can assume that the didactic and research aspects of the theory and practice of involving generative Artificial Intelligence technologies in the educational process are at the stage of formation and study.

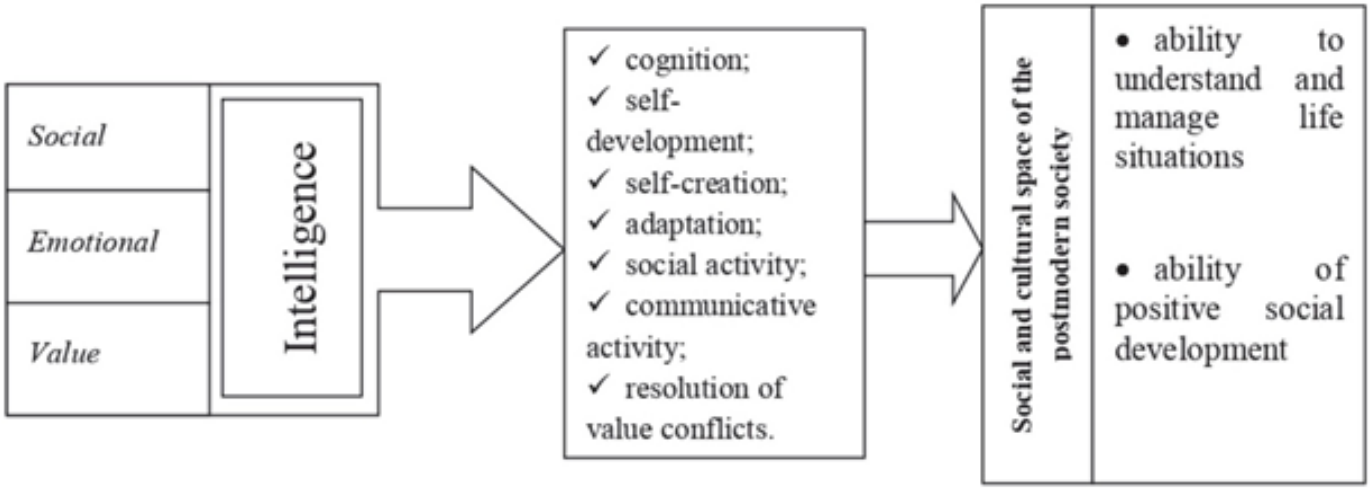


***Figure 1.*** *Correlation of intelligence (and its forms) with social and cultural space*
*Source authors' own development*

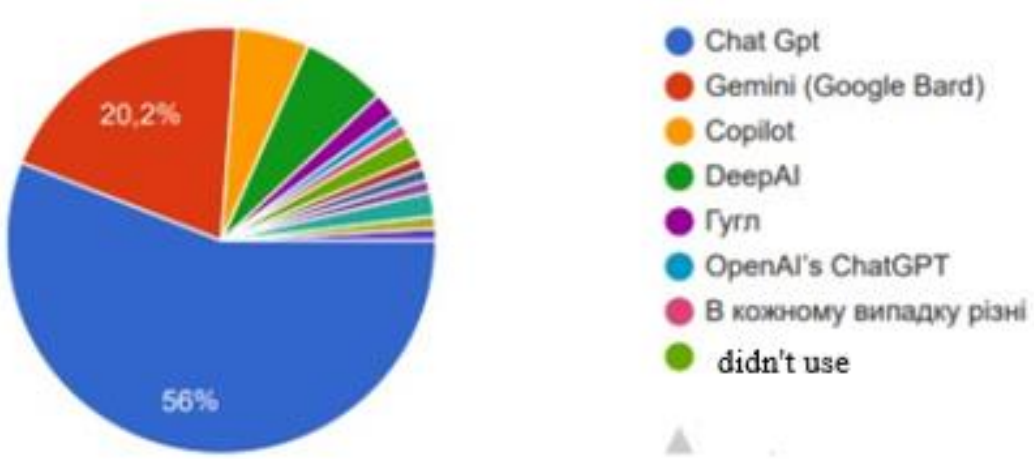


***Figure 2.*** *Types of AI used by students*
*Source: own development*

## 2. The aim of the study

The effective and safe use of AI in education is a global problem for the future of the social development. It is associated not only with concerns about the degradation of individual qualities, in particular, the inhibition of cognitive and mental processes of people: memory, critical thinking, analysis and synthesis of information, decision-making, etc.; hypertrophied digitalization (total use of IT resources in all areas), but also with the threat of the inability to independently develop rational ideas and interiorize the fundamental values of the civilized world. In our opinion, the presence of a high-level Value Intelligence in a person will facilitate the thoughtful and morally responsible use of AI in education. The working hypothesis of this research is as follows: "Therapy and rehabilitation students with a high and sufficient level of Value Intelligence will use AI in the educational process and research work ethically consciously as the informative and auxiliary component, which will allow a more meaningful from the moral point of view approach to the implementation of educational and scientific tasks, rather than their complete solution by Artificial Intelligence". Thus, we assume that the studied students with a developed moral sphere will not use artificial intelligence as a tool that completely replaces their ability to perform educational and research tasks.

Research Objectives:

1. Establish the levels of value preferences of the respondents.

2. To investigate the possible relationship between the level of development of value intelligence among undergraduate and graduate students in the specialty "Therapy and Rehabilitation" of universities and the level of ethical awareness of the use of AI for educational and research purposes.

3. To investigate whether the relationship between value intelligence and ethical awareness differed in different age groups.

Research Questions:

1. What values do respondents prefer?

2. What level of value intelligence dominates among the studied students and how is this related to age?

3. Is there a connection between the level of development of value intelligence and moral principles when using AI in the educational process and research?

## 3. Material and methods

A cross-sectional quantitative survey design was used to examine value intelligence and ethical awareness of generative artificial intelligence use among students enrolled in Therapy and Rehabilitation programmes in Ukraine. The study focused on three issues: participants' value priorities, their level of value intelligence, and their ethical awareness when using generative AI for educational and research purposes. A multistage sampling procedure was applied. The study included bachelor's and master's students enrolled in the selected programmes. Participation was voluntary and anonymous. Before completing the questionnaire, participants received information about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses.

Research Design: the research sample consisted of students from Ukrainian universities (Table 1). To select participants, the multistage sampling was used, which is a sampling technique that involves a step-by-step process of selecting participants from a large population.

***Table 1***

**Characteristics of the research sample (number of students by age and gender)**

| Age and gender distribution | | Total | Age 18-21 | Age 22-34 | Age 35-55 |
|---|---|---|---|---|---|
| Number of respondents | male | 142 | 47 | 58 | 37 |
| | female | 184 | 74 | 79 | 31 |
| | Total | 326 | 121 | 137 | 68 |

*Source: own development*

At the first stage of the study, 7 state universities were randomly selected from all universities in Ukraine that train future bachelors and masters in the specialty "Therapy and Rehabilitation" (Rivne State University of Humanities, National University of Water and Environmental Engineering, Open International University of Human Development "Ukraine", Lesya Ukrainka Volyn National University, Ivan Boberskyi Lviv State University of Physical Culture, Drochobych Ivan Franko State University, Uzhhorod National University. The next stage was to determine among the selected universities the faculties that train specialists in physical rehabilitation. At each faculty, students were divided, using proportional stratified sampling, into two groups: bachelors and masters. At the next stage, students of the last year of study were selected for each group. The practice of work proves that in the last year, students have more deeply formed value orientations and a more serious understanding of the ethics of using artificial intelligence systems. The total sample size was 326 people (see table 1), which allows obtaining results with p=0.05. The distribution of the number of age groups of respondents corresponded to the general trends in the country as a whole.

Instruments and Procedure: the test was developed after a detailed analysis of the literature [8, 17, 19, 26, 28, 31, 38] and expert assessment. We developed the first (basic) part of the questionnaire for measuring the level of Value Intelligence, which was based on a similar method of diagnosing Emotional Intelligence by N. Hall – "Hall's Test" [19]. This was a pilot version of the tool for determining the level of Value Intelligence. The questions were divided into two blocks. The first block (determination of the level of Value Intelligence) contained 20 questions, the first of which was related to determining the value priorities of students (Table 2). The total Value Intelligence score was calculated from 16 Likert-type items. The value-preference item was analysed separately and was not included in the total score. The special expert group of highly qualified psychologists of the Rivne State University of the Humanities under the leadership of Y. Pelekh. The items were rated on a six-point Likert-type scale ranging from 1 ("strongly disagree") to 6 ("strongly agree"). The value-preference item used a binary response format (positive/negative), identified 5 subscales with corresponding blocks of questions (I – 2,6; II– 4, 7, 9, 16; III – 3, 7, 17, 19; IV – 5, 8,18; V – 10, 15, 19, 20). The reliability for the entire scale and subscales was tested using Cronbach's Alpha. The Cronbach's alpha coefficient for our data is 0.564, indicating moderate consistency between the variables represented by Value Intelligence and ethical awareness when using AI, respectively. This also indicates how consistent the items are in measuring the same construct and confirms that the questionnaire questions cover all key aspects of the concept of "Value Intelligence" and correlate with the indicators of the construct "Emotional Intelligence" according to the "Hall's Test".

The questions in this block of the questionnaire were rated with a scale in which complete agreement was equal to 96 points and complete disagreement was equal to 16 points. In addition, one of the researchers, based on the analysis of sources [13, 30, 37, 43, 45, 49, 50], and expert opinions developed the second part of the questionnaire using the same tools for its validation, which contained a block of questions related to clarifying the ethical principles that guide bachelors and masters when using AI to implement educational tasks. The questions of the second block of the questionnaire used a scale in which full agreement was equal to 48 points and complete rejection – to 8 points.

Statistical analysis: statistical analysis was performed using Microsoft Excel 2016 and Statistica 6.4 (StatSoft Inc., Tulsa, OK, USA). Descriptive statistics were calculated for all main variables, including frequencies, percentages, median, mode, variance, and standard deviation. Graphical methods and the Kolmogorov-Smirnov test were used to examine distributional assumptions for the total value intelligence and ethical awareness scores. Age-group comparisons of value intelligence and ethical awareness levels were conducted using frequency and percentage analyses. The chi-square test of independence was used to assess the association between categorised levels of value intelligence and ethical awareness. Pearson's correlation coefficient was calculated to evaluate the linear relationship between total value intelligence and total ethical awareness scores. Analyses were performed for the full sample and separately for the three age groups. Internal consistency of the value intelligence scale was assessed using Cronbach's alpha. Due to the

modest value of this coefficient, results were interpreted with caution, and the scale was treated as a preliminary exploratory instrument. The level of statistical significance was set at $p<0.05$.

Ethical considerations. Participation was voluntary and anonymous. Respondents were informed about the purpose and general procedure of the study and were free to discontinue participation at any point without consequences. The study did not involve clinical intervention, deception, or the collection of personally identifiable information.

## 4. Results and discussion

The first stage of the research identified the respondents' value preferences (Table 2).

***Table 2***

**Answers to the question "Which of the following values do you associate with positive (score 1) or negative (score 0) values (mark with the appropriate points)?"**

| Gender | Answers | Tolerance | Morality | Career | Interaction | Vanity | Ambitions | Responsibility | Duty | Success | Egocentrism | Careerism | Prudence | Justice | Egoism | Power | Benefit | Injustice |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| male | 131 | 135 | 117 | 136 | 5 | 110 | 140 | 130 | 135 | 19 | 69 | 92 | 137 | 17 | 48 | 56 | 3 | 131 |
| | 92.3% | 95.1% | 82.4% | 95.8% | 3.5% | 77.5% | 98.6% | 91.5% | 95.1% | 13.4% | 48.6% | 64.8% | 96.5% | 12.0% | 33.8% | 39.4% | 2.1% | 92.3% |
| | 11 | 7 | 25 | 6 | 137 | 32 | 2 | 12 | 7 | 123 | 73 | 50 | 5 | 125 | 94 | 86 | 139 | 11 |
| | 7.7% | 4.9% | 17.6% | 4.2% | 96.5% | 22.5% | 1.4% | 8.5% | 4.9% | 86.6% | 51.4% | 35.2% | 3.5% | 88.0% | 66.2% | 60.6% | 97.9% | 7.7% |
| female | 182 | 177 | 174 | 182 | 9 | 152 | 182 | 173 | 182 | 29 | 109 | 73 | 179 | 19 | 69 | 52 | 7 | 182 |
| | 98.9% | 96.2% | 94.6% | 98.9% | 4.9% | 82.6% | 98.9% | 94.0% | 98.9% | 15.8% | 59.2% | 39.7% | 97.3% | 10.3% | 37.5% | 28.3% | 3.8% | 98.9% |
| | 2 | 7 | 10 | 2 | 175 | 32 | 2 | 11 | 2 | 155 | 75 | 111 | 5 | 165 | 115 | 132 | 177 | 2 |
| | 1.1% | 3.8% | 5.4% | 1.1% | 95.1% | 17.4% | 1.1% | 6.0% | 1.1% | 84.2% | 40.8% | 60.3% | 2.7% | 89.7% | 62.5% | 71.7% | 96.2% | 1.1% |

*Source: own development*

The analysis of value preferences showed that responsibility, tolerance, morality, interaction, duty, justice, career, ambition, and prudence were most frequently identified as positive values. In contrast, injustice, vanity, egoism, egocentrism, careerism, benefit, and power were less frequently associated with positive value orientations. The overall pattern was broadly similar among male and female respondents, although some differences were observed in the evaluation of individual values.

Based on A. Maslow's theory of the arrangement of human needs in terms of importance, in particular in education and the social sphere, we can state that the vast majority of respondents showed the ability to move towards higher value levels, which are a motivating factor for this movement. Value priorities, which, in our opinion, correspond to the real social behavior of the respondents, somewhat differ in the direction of growth from those that were recorded by us in previous studies [18]. Thus, both men and women prioritize "higher order" values, or "higher level needs", such as "responsibility", "justice", and "interaction". Men also rank "prudence" and "benefit" high in their value hierarchy, while women tend to be more ambitious and careerist. We also find it interesting that women give the highest priority to the value of "tolerance" and outperform men in terms of the values of "career" and "power". Men turned out to be slightly more selfish, while women were more tolerant. According to studies [6, 12], the value of "responsibility" is also slightly higher among female students compared to males.

The next step of the research was to determine the level of Value Intelligence (Table 3).

***Table 3***

**Descriptive statistics of the study scales**

| Value | Value Intelligence | Ethical awareness of AI use |
|---|---|---|
| variance | 129.28 | 30.03 |
| median | 73.5 | 33.0 |
| mode | 77 | 33 |
| standard deviation | 11.37 | 5.48 |

*Source authors' own development*

Based on the sample median and standard deviation, four descriptive levels of Value Intelligence were defined: initial, average, sufficient, and high. The corresponding score ranges and age-group distributions are presented in Table 4.

The initial level was more frequent among younger participants, whereas the average and high levels were relatively more common in the older age groups.

The proportion of respondents classified at the initial level decreased across the age groups, from 25.6% among participants aged 18–21 years to 4.4% among those aged 35–55 years. The sufficient level was most frequent in the youngest group, whereas the average level predominated among participants aged 35–55 years. After that, we conducted a study of the level of Value Intelligence using 5 scales (Table 5).

***Table 4***

**Level of Value Intelligence development**

| Level | Points | Age 18-21 | | Age 22-34 | | Age 35-55 | |
|---|---|---|---|---|---|---|---|
| Initial | up to 62 | 31 | 25.6% | 27 | 19.7% | 3 | 4.4% |
| Average | 63-73 | 24 | 19.8% | 38 | 27.7% | 40 | 58.8% |
| Sufficient | 74-84 | 52 | 43.0% | 52 | 38.0% | 10 | 14.7% |
| High | 85 and above | 14 | 11.6% | 20 | 14.6% | 15 | 22.1% |
| Total | maximum 16*6=96 | 121 | | 137 | | 68 | |
| | | | | | | | |

*Source authors' own development*

***Table 5***

**Results of the sample assessment using five scales of Value Intelligence**

| № | Scale | Question number | Maximum points | Mean value | Age 18-21 | Age 22-34 | Age 35-55 |
|---|---|---|---|---|---|---|---|
| 1 | Value awareness | 2, 6 | max=12 | 9.33 | 8.99 | 9.24 | 10.12 |
| 2 | Management of own values | 4, 7, 9,16; | max=24 | 16.87 | 16.68 | 16.74 | 17.47 |
| 3 | Self-motivation | 3,7,17, 19; | max=24 | 18.89 | 18.51 | 18.77 | 19.85 |
| 4 | Empathy | 5, 8, 18; | max=18 | 13.53 | 13.31 | 13.38 | 14.28 |
| 5 | Identification of other people's values | 10, 15,19, 20. | max=24 | 17.99 | 17.45 | 17.94 | 19.00 |

*Source authors' own development*

***Table 6***

**Level of ethical awareness of the use of Artificial Intelligence**

| Level | Points | Age 18-21 | | Age 22-34 | | Age 35-55 | |
|---|---|---|---|---|---|---|---|
| Initial | up to 26 | 7 | 5.8% | 10 | 7.3% | 4 | 5.9% |
| Average | 27-32 | 57 | 47.1% | 65 | 47.4% | 37 | 54.4% |
| Sufficient | 33-38 | 41 | 33.9% | 49 | 35.8% | 20 | 29.4% |
| High | more than 39 | 16 | 13.2% | 13 | 9.5% | 7 | 10.3% |
| Total | maximum 8*6=48 | 121 | | 137 | | 68 | |

*Source authors' own development*

The descriptive means for the five Value Intelligence subscales varied across age groups. Older participants tended to have higher mean scores on value awareness, management of one's own values, self-motivation, empathy, and identification of other people's values. However, because no inferential statistics were reported for these comparisons, these patterns should be interpreted as descriptive tendencies rather than statistically confirmed age effects.

We assume that the indicator of ability "to manage own values" is influenced by the factor of changing values depending on the number of social tasks related to financial self-sufficiency and building a socially influential career. With increasing age, these skills become more perfect, as they are associated with greater openness to acquiring new experience (curiosity, originality, intellectualism, openness to new ideas), greater conscientiousness, which includes good organization of own work, systematicity, punctuality, orientation towards drawing conclusions, etc.

As we can see, the level of self-motivation also increases with age, as the academic achievements of undergraduate and doctoral students also increase with age, although it is believed that these achievements are beyond intelligence. Here, in our opinion, the described [39] continuum of motivation quality contains a harmonious combination of both the intrinsic motivation of more mature and experienced individuals, which "is derived out of an expected gain or a separable outcome" (ibid.) and the extrinsic motivation, which is derived from the expected result. We can also talk here about the creation of an "autonomous type of motivation" [23], which is a result of a higher-level development of the system of value orientations of older students.

The sharp increase in the level of empathy in the middle and older age groups may be caused by stable value beliefs and attitudes, and the instillation of human values during school age and in student years.

Here, we also observe a noticeable increase in the level of identification in the middle and older age groups. Significant life experience and stable value beliefs undoubtedly contribute to the development of the ability to recognize the values of other people.

The third stage of this research was to measure the level of ethical awareness (i.e. responsibility for decision-making – auth.) when using AI. The obtained results are as follows, based on the sample median and standard deviation, four descriptive levels of ethical awareness regarding

AI use were defined: initial, average, sufficient, and high. The score ranges and distributions across age groups are presented in Table 6.

The average level of ethical awareness was the most frequent category in all three age groups: 47.1% among participants aged 18–21 years, 47.4% among those aged 22–34 years, and 54.4% among those aged 35–55 years. The sufficient level accounted for 33.9%, 35.8%, and 29.4%, respectively. The initial and high levels were less frequent across all age groups.

As we can see from Table 6, the initial level of ethical awareness of the use of AI practically does not change with increasing age, which may indicate the existence of a part of respondents who currently do not accept Artificial Intelligence and do not want to use it in their daily work. At the average and sufficient levels, the number of respondents, although changing somewhat, remains practically within the limits of the statistical error, which may indicate the interest of a significant part of the students in generative Artificial Intelligence systems. At the high level, the number also somewhat decreases with age (from 13.22% to 10.29%), which can be explained by the smaller volume of the use of IT content with age. This is logical and in accordance with the Big Five model, the fifth factor of which concerns the gradual increase in conscientiousness after the age of 30.

Having calculated the statistical coefficients $\chi^2_{\text{кр}}$ and rxy between the levels of Value Intelligence and ethical awareness of using AI, we did not find a statistically significant difference between the samples (all obtained values of $\chi^2_{\text{кр}}$ were less than the critical value). However, we note the average level of correlation between the obtained results, which may indicate the average level of perceived relationships between the level of Value Intelligence and ethical awareness of using generative Artificial Intelligence systems by the respondents (Table 7).

In the 18–21 age group, the distributions of Value Intelligence and ethical awareness were not identical across the four descriptive categories. The most pronounced descriptive difference concerned the sufficient category, in which Value Intelligence was reported more frequently than ethical awareness. These differences should be interpreted descriptively because the available.

***Table 7***

**Statistical coefficients between the levels of Value Intelligence and ethical awareness of using Artificial Intelligence**

| Statistic | Total sample | Age 18–21 | Age 22–34 | Age 35–55 |
|---|---|---|---|---|
| Pearson chi-square, $\chi 2$ | 0.31 | 0.78 | 0.34 | 0.23 |
| Degrees of freedom | 9 | 9 | 9 | 9 |
| Critical value at $\alpha$=0.05 | 16.92 | 16.92 | 16.92 | 16.92 |
| Pearson correlation, *r* | 0.50 | 0.54 | 0.47 | 0.53 |

*Source authors' own development*

A similar descriptive pattern was observed among participants aged 22–34 years. The frequency distributions of Value Intelligence and ethical awareness differed across the four categories, but these differences should not be interpreted as evidence that one construct determines the other.

Among participants aged 35–55 years, the sufficient level of Value Intelligence was more frequent than the corresponding level of ethical awareness. This pattern indicates a descriptive difference between the two distributions but does not demonstrate differences in actual AI-use behaviour.

Study limitations: the validity of the study was limited by the modest internal reliability of the VI instrument (Cronbach's $\alpha = 0.564$) and the cultural homogeneity of the participant pool (limited to Ukrainian respondents). In addition, the lack of critical statistics, including p-values and effect sizes, weakened the clarity of interpretation. Future research should aim to improve measurement instruments, take into account diverse cultural contexts, and ensure comprehensive disclosure of statistical data to deepen understanding of the concept of Value Intelligence.

**Discussion**. The research dealt with the level of Value Intelligence and its possible connection with ethical awareness when students make decisions about the use of Artificial Intelligence in the process of completing educational and research tasks. The use of AI was connected with the

optimization of solving educational tasks: creating personal assistants, such as voice assistants or virtual chatbots, organizing schedules, reminders or information search, issues of automatic text processing, creating synthesized content, performing information processing tasks, etc., and negative ones, such as the complete generation of scientific texts or research, etc. During the study, we focused on our [34, 51] and other works that investigated the relationship between Value Intelligence and ethical awareness in the application of AI, as well as intelligence and other academic phenomena such as psychological well-being and academic achievement [44] or moral judgments [7]. Our primary goal was to determine the hierarchy of personal values of respondents, as in studies [9, 16, 24] to understand their behavior and motivation when deciding to use AI in their main activities, since values motivate behavior, but the connection between values and behavior is partially hidden by norms. We also tried to gain a deeper understanding of the relationship between values and intelligence and the impact on future career achievements, which has also been the subject of constructive discussion over the years [40], although this aspect is not directly related to the research objectives. The analysis of the first question of our questionnaire with the use of quantitative methods allows stating that the vast majority of surveyed students are oriented towards positive (as stated in the questionnaire), or "higher values", which are associated with a higher level of needs (as in Maslow's hierarchy of needs). Namely, this is the need for self-actualization associated with justice, morality, tolerance. Based on the fact that Maslow interprets the emergence of growth needs not as a lack of something, but as a desire to grow as a person, we can explain the priority given to the values of "responsibility" (99.1 – women, 98.3 – men) and "career" in the value choice of students. The highest priority given by both genders to the value of "responsibility" gave hope that the ethical dimension of the AI use would also have a sufficient or high level. Maslow also emphasizes that growth needs are achieved to a greater extent through intellectual (authors' italics) and creative behavior, which can ensure, in our opinion, that at the age of 22–34, a person has a sufficient level of Value Intelligence. This is confirmed by the high assessment given by students to such values as "interaction", "success". The values of "ambition", "prudence", "benefit", and "power" are at the lower positions in the respondents' answers, as it is in other studies [42]. The lowest score, as expected, was given to the negative (as stated in the questionnaire) values of "egocentrism", "egoism", "vanity", and "injustice". The first three values testify to the students' orientation to the collective work, orientation to the traditional values in the Ukrainian society, and to goal setting. When measuring the levels of values, we took into account that they can differ significantly, as can be seen from the results of other studies [29]. However, as in our previous studies conducted with computer science students [34], no noticeable difference in judgments was found.

In general, this result gives grounds to assert that the respondents represented in the sample have an above-average level of value orientations and moral norms, and therefore are able to be guided by high social moral and ethical norms when using AI for educational purposes.

Value Intelligence, being a characteristic of human consciousness, manifests itself in the ability to think and act (considerately and purposefully) taking into account the axiological context of a certain situation and with the simultaneous formation of value experience (assimilation or affirmation of certain values and value orientations) [35]. The results of measuring the level of value intelligence, as far as we know, are presented in this work for the second time and we can only compare them with the results of scientific surveys measuring emotional intelligence [20], which indicate that the vast majority of respondents also had an average level. The age dynamics towards an increase in the level of Value Intelligence with increasing age has already been described in scientific literature [15], is quite understandable and natural and fits into our expected results. Somewhat unexpected was the identification of a significant number of individuals with a sufficient level of Value Intelligence in two "key" age categories [18-21; 22-34]. This may indicate an improvement in selection for master's studies with the introduction of the Unified State Exam in Ukraine.

Regarding measuring the level of a person's Value Intelligence, we want to emphasize that the proposed test is experimental in its nature, like the test for measuring emotional intelligence by N. Hall, and contains subjective judgments (e.g. question: I understand other people's values, even

if they are not expressed openly, and I can recognize values well in people's actions) that cannot be verified without additional tools. These tools (perhaps similar in structure to The MEIS [21] will be implemented and applied in subsequent studies. This can be explained by the fact that the phenomenon of values deals with a multifaceted human nature, which contains many components, and therefore it is subjectivity with its unique hierarchy of values that gives the most accurate answers to questions about the person's Value Intelligence and this requires additional psychological research. Additional conclusions on the issue of determining the level of Value Intelligence can be drawn by analyzing the diagnostic indicators of this phenomenon using 5 scales. This applies to our assumptions that each subsequent age group has a higher level of Value Intelligence (the presence of values and awareness of them) than the previous one; the level of self-motivation increases with age and may indicate that students are people who strive for life perfection; the increase in the level of empathy of the middle and older age groups may indicate the presence of a formed system of values and, on its basis, stable life beliefs and the ability to recognize the value priorities of other people, which were formed as a result of the process of interiorisation of values in student years and during work activity, and were tested over the years by the practice of interpersonal interaction.

The measurement of the level of ethical awareness of using AI, determined according to the second block of the questionnaire, generally met our expectations that the average value would significantly exceed the other values. At this stage, the research also shows that both the initial level and the high level of ethically conscious choice of respondents in all age groups are unchanged. This, in our opinion, may mean in the first case the reluctance to use AI, and in the second – the presence of a clear and rational strategy for using AI in education, for example, as a way to check and evaluate educational tasks more efficiently to achieve "higher quality in own educational activities" [10].

The culmination of the research is establishing a connection between the level of Value Intelligence and the level of ethical awareness of using AI, or more precisely, a possible association between the two constructs. If we assume that a high level of correlation corresponds to $\leq 0.7$ and the lowest to $\geq 0.3$, then we can state that we are dealing with neither convergent validity (Value Intelligence is moderately correlated with the ethics of using AI), nor divergent validity, in which such correlation is minimal. This leads us to believe that, given the presence of even an average correlation between the phenomena under study, we can speak about a certain interdependence between them. Our assumption is also strengthened by the presence of a high level of value orientations in the majority of the subjects, which is the basis of the motivational component (after all, with the correct moral choice of using AI for educational purposes based on the value-motivational factor, the desire to expand the individual educational and scientific trajectory increases).

## 5. Conclusions

Conducted in accordance with our original methodology, which has been applied here for the second time, the study of determining the level of Value Intelligence and its connection with the level of moral and ethical awareness of students in the process of making a decision on the use of generative Artificial Intelligence technology for educational and research purposes proved that, first, the findings provide preliminary empirical support for the proposed concept of Value Intelligence; however, its construct validity requires further investigation; second, Value Intelligence of an individual can be characterized as a complex phenomenon that has a level of manifestation, which is determined by a number of factors (for example, age, gender, psychological, and others); third, the results of this research indicate the presence of a connection between the development of Value Intelligence and the tendency (method) of using generative Artificial Intelligence technology. Regarding the latter, we note that this connection obviously requires additional research, since we realize that the data presented in this article do not record an unambiguous fact of a high level of correlation between the development of Value Intelligence and the ethical level of the use of AI in education and scientific research, but they clearly indicate that a corresponding correlation exists.

Therefore, the results establish the levels of students' value preferences and provide preliminary evidence of a positive descriptive relationship between value intelligence and ethical awareness regarding the use of generative artificial

intelligence. However, the exploratory nature of the questionnaire and the limited internal consistency of the value intelligence scale require cautious interpretation. The results do not establish causality, predictive validity, or the influence of age on development. Further research should validate the measurement instruments, provide full statistics of the findings and effect sizes, and investigate the proposed relationship in larger, culturally diverse samples and in different educational and professional contexts.

Our further research will focus on (1) studying the dynamics of the development of Value Intelligence in relation to age, (2) studying the dependence of the level of correlation between the development of Value Intelligence and the ethical level of using AI for educational and research purposes on the profile of education (specialty), (3) the association between value intelligence and students' perceived career potential.

## Conflicts of interests

The authors declare no conflict of interest.

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