sustainability

MDPI

Article

Will AI Become a Threat to Higher Education Sustainability? A Study of Students' Views

Valery Okulich-Kazarin [1,2,*], Artem Artyukhov [3,4,5], Łukasz Skowron [6], Nadiia Artyukhova [5] and Tomasz Wołowiec [4]

1 Faculty of Social Sciences and Humanities, Humanitas University, 41-200 Sosnowiec, Poland
2 Faculty of Social and Computer Sciences, National Louis University, 33-300 Nowy Sącz, Poland
3 Faculty of Commerce, University of Economics in Bratislava, 852-35 Bratislava, Slovakia; a.artyukhov@pohnp.sumdu.edu.ua
4 Institute of Public Administration and Business, WSEI University, 20-209 Lublin, Poland; tomasz.wolowiec@wsei.lublin.pl
5 Academic and Research Institute of Business, Economics and Management, Sumy State University, 40-007 Sumy, Ukraine; n.artyukhova@pohnp.sumdu.edu.ua
6 Faculty of Management, Lublin University of Technology, 20-618 Lublin, Poland; l.skowron@pollub.pl
* Correspondence: walery.okulicz-kozaryn@humanitas.edu.pl

Abstract: Universities started to use artificial intelligence (AI) tools to improve the quality of higher education services. However, the rapid adoption of AI tools in higher education (HE) may lead to sustainability issues. On the one hand, there are prerequisites for using AI tools to achieve Sustainable Development Goal 4 (SDG 4). On the other hand, as consumers of educational services (stakeholders), students have their own opinions about using AI in the educational process. The purpose of this study was to explore students' opinions on the use of artificial intelligence tools in higher education. The authors analyzed student responses to the question: "Do you think AI threatens higher education in the next five years?" The authors formulated this question based on the definition of "a safe learning environment", which is associated with a "safe" learning environment (SDG 4.3). The authors made use of a literature review, a bibliometric analysis of 5000 sources, a survey of 1104 students from eight universities in Eastern Europe through cloud technologies to host a special electronic questionnaire, statistical processing of questionnaires, and testing of statistical hypotheses. The authors formulated and tested two pairs of competing statistical hypotheses. Finally, the authors obtained three new scientific facts based on the respondents' answers. New scientific facts were obtained using a standard level of statistical hypothesis testing ($\alpha = 0.05$). The main scientific fact is that 10.17% to 35.42% of students think that Artificial Intelligence threatens higher education. According to student opinions, AI may hurt the sustainability of higher education (SDG 4.3). The authors are confident that new scientific facts help conceptualize and promote didactic theory and practice. The study results are needed to predict, plan, and implement organizational, pedagogical, and methodological measures aimed at SDG 4.3 through a "safe" learning environment while further expanding the use of AI in higher education.

Keywords: sustainability; Sustainable Development Goal; SDG 4.3; higher education; threat; safe learning environment; smart education; artificial intelligence; learners; students

Citation: Okulich-Kazarin, V.; Artyukhov, A.; Skowron, Ł.; Artyukhova, N.; Wołowiec, T. Will AI Become a Threat to Higher Education Sustainability? A Study of Students' Views. *Sustainability* **2024**, *16*, 4596. https://doi.org/10.3390/su16114596

Academic Editors: Samo Bobek, Simona Sternad Zabukovsek and Silvia Parusheva

Received: 16 April 2024
Revised: 23 May 2024
Accepted: 27 May 2024
Published: 29 May 2024

1. Introduction

This manuscript continues to publish the results of our research on the East European educational services market [1,2]. The initial study [1] has initiated a series of publications on sustainability and the application of Artificial Intelligence (AI) in higher education services. The following study [2] explained the research interest in higher education research in Eastern European countries. The stimulus for writing our manuscript was the research of S. Parusheva, S. Bobek, and S. Sternad Zabukovšek [3]. The central idea of the paper [3]

links smart education, AI, and sustainability in HE. The research paper's authors [3] raised the controversial issue of sustainability in HE in the context of smart education.

A review of more than 100 sources from the Scopus and Web of Science databases showed that the issue of sustainability in higher education is described mainly in three areas:

- Sustainability of universities and "green" universities [4–10];
- Curriculums for students who form "sustainable" thinking [6,11–15];
- The impact of higher education on sustainability [4,7,11–13,16–20].

These three areas have points of intersection in papers [4,6,7,11–13]. Researchers J. Michel, A. Killion, and E. Smith highlight that higher education for sustainable development is underrepresented in the media [21].

Following the discussion in the paper [3], the manuscript's authors exclude a third area from further detailed study: the impact of higher education on sustainability [4,7,11–13,16–20]. Moreover, the authors noted that more attention should be paid to threat and security issues within the remaining two areas. The authors focus on this aspect since there are papers describing the potential threats that AI can bring to education and its sustainability [22–25].

Interest in the spread of AI has also affected the United Nations. The United Nations published a proper message stating a "challenge in resolving crises in education services" on 26 October 2023 (https://news.un.org/en/story/2023/10/1142867, accessed on 10 April 2024). This task is part of the newly created "AI Advisory Body" scope. This message powerfully emphasizes the importance, practical relevance, and timeliness of the results presented in this manuscript.

As D. Cui and F. Wu showed, according to one of the government initiatives, China should become the main center of innovation in the world in this area by 2030 [26]. Considering this initiative of the State Council of China in AI, adopted in 2017 [26], our research has exceptional practical significance.

This manuscript focuses on sustainability in higher education (SDG 4.3). Its goal is to study student attitudes toward using AI tools in higher education. The research question is: Do students think AI threatens higher education in the next five years?

The manuscript is the logically completed stage of our research. Students from eight Eastern European universities from four countries were surveyed as part of the study. This survey was about students' opinions on using AI tools as a threat to higher education.

This manuscript represents a continuation of the research that began in the initial study [1]. Therefore, it is interesting to compare the data obtained here with the results of a previous study's initial research [1].

The research value is in generating new empirically and statistically sound evidence about AI and higher education sustainability. The need for new data is driven by the rapid adoption of AI tools in higher education, as well as in economics, science, and public life. Based on scientific sources and regulatory documents, the authors examined one of the conditions for achieving SDG 4.3. For the first time, the authors obtained, processed, and analyzed the opinions of 1004 students from eight Eastern European universities on the impact of AI tools on the "safe" learning environment (SDG 4.3).

These results are a starting point for monitoring students' attitudes toward AI tools. This fact allows us to make a mathematical model to predict changes in student attitudes toward using AI tools in higher education.

The authors verified two pairs of statistical hypotheses. Each pair contains two competing hypotheses.

The Research Hypothesis 1: the number of students who think that AI threatens higher education in the next five years is 0.00%. This means that there will be no students who think that AI will be a threat to higher education in the next five years. In other words, all students exclude threats of AI to higher education in the next five years. This means that we do not take random deviations into account.

Alternative Hypothesis 1: the number of students who think that AI is a threat to higher education in the next five years is more than 0.00%. This means that some students

perceive AI as a threat of AI to higher education in the next five years. This means that we do not take random deviations into account.

Briefly, this pair of hypotheses can be represented as follows:

- The Research Hypothesis 1: M(x) = 0.00%.
- The Alternative Hypothesis 1: M(x) > 0.00%.

The Research Hypothesis 2: the difference between the number of students who think that AI threatens higher education and students who are confident that AI will replace university teachers in the next five years is 0.00%. This means that we do not take random deviations into account.

Alternative Hypothesis 2: the difference in the number of students who think that AI threatens higher education and students who are confident that AI will replace university teachers in the next five years is not equal to 0.00%. In this case, the difference can be greater than 0.00% or less than 0.00%. This means that we do not take random deviations into account.

Suppose the number of students who think that AI threatens higher education is equal to the number of students who are confident that AI takes the place of university teachers. In that case, this means that students perceive AI as the only threat to higher education.

Suppose the number of students who think that AI threatens higher education is less than the number of students who are confident that AI takes the place of university teachers. In that case, not all students consider replacing university teachers a threat to higher education.

Suppose the number of students who think AI threatens higher education is greater than the number of students who are confident that AI takes the place of university teachers. In that case, students may see additional threats to higher education.

Briefly, this pair of hypotheses can be represented as follows:

- The Research Hypothesis 2: $M(x_1) - M(x_2) = 0.00\%$.
- The Alternative Hypothesis 2: $M(x_1) - M(x_2) \neq 0.00\%$.

Verifying these hypotheses helps study students' opinions more deeply and obtain new scientific facts.

The research, including a literature review, bibliometric analysis, experiment planning, student survey, and statistical hypothesis testing, led us to these conclusions:

- Achieving SDG 4.3. can be confidently associated with smart education and the use of AI tools.

Here is a list of results linking together smart education, the use of AI in higher education, and SDG 4.3:

(a) According to the student opinions, a significant number of students see a threat to higher education, which does not allow us to talk about a "safe" learning environment. This means that AI may have a negative impact on sustainability in higher education (SDG 4.3).
(b) Such students can range from 10.17% to 35.42%. This figure is relatively high. Using AI in higher education can lead to serious systemic problems requiring management decisions in higher education.
(c) The number of students who think AI threatens higher education is greater than those who are confident that AI will replace university teachers. This means that students can foresee some new additional threats to higher education from AI tools.

- The study results help to conceptualize and move forward with didactic theory and practice.
- The study results are valid for forecasting, planning, and implementing organizational, pedagogical, and methodological measures to achieve SDG 4.3 through a "safe" learning environment. Such a package of activities should be developed in close cooperation with experienced managers, highly qualified scientists, and university leaders, with the administrative support of national governments.

The research results are ensured by (a) the validity of the methodology and source data; (b) reliable and economical modern research methods; (c) using clear instructions when interviewing respondents; (d) eliminating the contact between observer and student through the cloud technologies for the survey; (e) the representativeness of the data obtained; (f) a standard level of statistical testing of experimental data; (g) the consistency of the results with previously published data.

2. Literary Review

2.1. General Theoretical Framework

Since 2000, and especially during the United Nations Decade of Education for Sustainable Development (2005–2014), many universities began to offer educational programs on sustainable development (N. Dan and T. Mino [17]). For example, researchers J. Carey et al. from a private business college in the United States developed a course on sustainability and consumerism in the humanities, physical sciences, and business disciplines [12]. Their course material is presented in the context of five key competencies related to teaching sustainability in higher education [12,13].

At the start of the Decade of Education for Sustainable Development, Halifax (Nova Scotia) brought together 35 experts in the field of Higher Education for Sustainability (HES) from October 27 to 29, 2005 [20]. Experts represented 17 countries. Their meeting represented the first meeting of HES researchers to bring together international researchers. They aimed to understand HES research [20] further, providing new impetus for higher education sustainability research.

The author of the paper [10] noted that the sustainability of higher education requires effective pedagogy that will empower future leaders. This pedagogy should motivate future leaders to ensure the sustainability of their social systems [10].

An article by P. Biberhofer et al. [13] argues that implementing sustainable action strategies requires core competencies and more profound knowledge about values and worldviews. The authors interviewed entrepreneurs and leaders of non-profit organizations and businesses implementing sustainable strategies. According to the author of the paper [10], the following teaching approaches are recommended [13]: "active learning; learner-centered learning; reflective learning; cooperative learning; experiential learning; problem-based learning; interdisciplinary learning, transdisciplinary learning, and transformative learning". This study's respondents were from five European regions: Vienna, Gothenburg, Brno, Bolzano, and Vechte [13]. As we can see in this article and our manuscript, the interviews include respondents from Eastern Europe [2,27].

The authors of the paper [11] devoted their research to developing a curriculum for Indonesian universities. The authors aimed to link educational institutions with the Islamic financial industry. The new curriculum complements the accounting knowledge standards with basic knowledge of Islam and Islamic accounting [11].

In Germany (L. Weh and L. Kinne [6]), students implemented the student project "Students create sustainable universities in North Rhine-Westphalia" as part of an open and massive online course. The transdisciplinary teaching methods that organize the course "encourage creativity and reflective discourse about alternative images of the future of sustainable institutions, processes and education" [6]. Indeed, teachers have the opportunity and desire to implement educational projects on sustainable development and conduct research with students on the sustainability of HE institutions [8]. The students surveyed also expressed interest in presenting their research on sustainable development [19].

The authors of the study [15] observed 20 graduate students from Israel. These students studied social–ecological systems. The authors applied Transformational Sustainable Education (TSE) to teach students. TSE contributed to "the accumulation of knowledge by these students and also encouraged their actions to protect the environment" [15].

An interesting study was conducted in Mexico. The authors examined higher education institutions' impact on students' sustainability orientation [19]. Statistical analysis

showed that university programs and activities did not lead to differences between freshman and senior students [19].

Leaders at one of Oman's leading universities have also taken concrete steps to integrate sustainable development into university life and the University's curriculum [9].

Despite the vast geography and wide range of research areas, the authors of scientific works still need to include the issues of threats and security to the sustainability of higher education [6,8,10–13,15,19]. The authors of the works mentioned above describe educational programs, pedagogical approaches and methods, course projects, and events. Only a researcher from Malaysia argues that the effectiveness of teaching and learning programs needs to be maintained satisfactorily [10]. The initial study [1] describes students' points of view on the possibility of replacing university teachers with AI tools. At the same time, the authors of the paper [7] state "insufficient attention to students' points of view".

The United Nations defines "Sustainable Education" as "an approach to learning that focuses on the environmental, economic and social sustainability of our planet" [28]. This goal is called Sustainable Development Goal 4 (SDG 4) [29]. SDG 4.3 integrates technical, vocational, and higher education [30]. The full description of SDG 4 is "By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and higher education, including university education" [31].

"Smart education" is a complex and interesting educational paradigm related to sustainability and AI [3]. The author K. Demir [32], when defining "Smart education" through a "pedagogical approach," connects smart education with the sustainability of higher education. He writes that "Smart education" is "the effective and consistent use of information and communication technologies to achieve learning outcomes using an appropriate pedagogical approach" [32].

R. Bajaja and V. Sharma [33] take a different approach to the definition of "smart education". They understand "smart education" as providing personalized learning anywhere, anytime, using AI [33].

According to sources [3,33–36], "smart education" is associated with AI tools and contributes to the achievement of SDG 4, including SDG 4.3.

The implementation of SDG 4 is ensured by three means. One of them is an "Effective learning environment" [29]. It involves "building and modernizing educational institutions that are child-, disability- and gender-sensitive, and providing safe, nonviolent, inclusive and effective learning environments for all" [29]. Based on understanding this means of implementing SDG 4, the manuscript's authors will consider the students' opinion about a "safe" learning environment when implementing SDG 4.3. The terms of a "nonviolent, inclusive, and effective learning environment" will be addressed in other manuscripts.

According to modern scientific sources, using AI satisfies the conditions of learning "anywhere, anytime" [37,38]. AI, as a new element of modern digital learning, can already form the necessary skills of learners [39,40]. Source [32] shows that "smart education" includes learners, educational technologies, new approaches to teaching and learning, and educators. The article's authors [34] note that "smart education" includes smart pedagogies as a methodological issue, smart learning environments as a technological issue, and smart learners. So, two scientific sources confirm that "smart education" is associated with "learners" [32,34]. An additional source [41] affirms that smart education is associated with students. At the same time, the authors of the source [7] draw attention to "insufficient attention to students' points of view".

Based on the totality of scientific facts presented in papers [32,34,37–41], the opinions of "learners" about the use of AI in HE services were examined.

The research of students' opinions corresponds to the "service economy" concept. In the "service economy", much attention is paid to studying the opinions of "learners" [42–45]. Some scientific works [2,42–45] emphasize that the opinion of the consumer of educational services (in our case, "learners") is very important for the "service economy". Researchers D. Proctor and L. Rumbley from Australia and the Netherlands noted "insufficient attention to student perspectives" [7]. Therefore, if one accepts that university

students ("learners") are an active part of the service economy, then the importance of this manuscript increases.

Combining data from sources [1,3,33–40,46,47], we can state that AI has become an integral and essential tool for achieving SDG 4.3. Today, AI tools quickly adapt educational programs to the individual needs of "learners". This promotes the personalization of learning for "learners". AI software helps collect and analyze educational data, identify performance trends, identify student knowledge weaknesses, and manage the didactic process. AI tools also make it easier to create interactive learning platforms. Such platforms create individual educational trajectories for developing learners' critical and creative thinking.

In this manuscript, the authors tested whether the use of AI in HE services meets the conditions of a "safe" learning environment (SDG 4.3).

The authors adhere to the following idea: If students see a threat in using AI in HE services and increasingly encounter AI tools in their learning practice [1,3,33–40,46,47], we cannot say that the "safe" environment condition is met. The above literature review showed a "blind spot" in didactic theory and practice.

Indeed, despite the generally positive expectations of the academic and student community from the use of AI in higher education, students may experience concerns such as the following:

1. One of the main concerns is the issue of data security. With the increasing amount of information AI collects for personalized learning comes the risk of data breaches and violations of student privacy. Students may fear their personal information being misused or becoming the target of cyberattacks.
2. Automation of didactic processes may cause a job reduction for teachers and even their complete replacement with AI tools. As the initial study shows [1], 10.85% of respondents living in Eastern European countries are confident such a scenario will be realized within the next five years. Students may need help acquiring new skills and adapting to organizational and didactic conditions.

There may be other reasons why students may perceive AI tools as a threat to higher education.

We need to find out how accurate these fears may be. Considering the relative nature of AI's threats to student life, their assessment is based on a student survey.

After checking the "safe" learning environment, the authors compared the number of students who think AI threatens higher education and students who are confident that AI will replace university teachers in the next five years [1]. This comparison allows us to obtain additional information about the fulfillment of the "safe" learning environment condition of SDG 4.3.

By surveying "learners" (students) in terms of their attitudes toward AI, the authors test the students' opinions about a "safe" learning environment for SDG 4.3 [29].

2.2. Bibliometric Analysis

Higher education is one of the objects of study of the sustainable development paradigm because it combines several SDGs (SDG 4 and others) into one cluster and is also a "bridge" between different SDGs.

The quality of education [48–50], the widespread introduction of open forms of online education [51,52], AI as an element of the educational process [53,54], virtual [55] and experimental learning [56], gamification [57], and other innovative digital educational initiatives [58] make education more focused on modern business needs [59,60], which have a significant impact on the formation of the sustainable development paradigm [61,62].

There are many definitions of what constitutes a safe school, for example [63]. "Safe learning environment" is defined by L. Holley and S. Steiner in [64]. This "safe learning environment is free of the threat of emotional or psychological harm and allows students to risk exploring difficult issues and express their views honestly" [64].

The Universal Declaration of Human Rights enshrines the right to freedom from 'emotional or psychological harm'. This Declaration states that every person has the right

not only to lifelong education but also to a "safe learning environment", expressed through many paragraphs of this Declaration (https://www.un.org/en/about-us/universal-declaration-of-human-rights, accessed on 10 April 2024).

A bibliometric analysis was conducted to find a connection between the term "sustainability" and various aspects of higher education. An array of publications was examined, the dataset (46,870 articles) of which was generated on 12 February 2024 (https://www.scopus.com/) using the query "sustainability". To conduct a bibliometric analysis, the following restrictions were introduced into the search query:

1. Restriction 1. Indexation period—2022-12.02.2024 (period of intensification of AI research).
2. Restriction 2. Field of knowledge—social sciences; business, management, and accounting; economics; econometrics; finance; decision sciences (socio-economic and behavioral components of the sustainability phenomenon).
3. From 46,870 articles, after restrictions 1 and 2, the 5000 most cited articles were selected. Based on this dataset, VOSViewer v. 1.6.19 built a keyword map (Figure 1, https://www.vosviewer.com/, open access software).

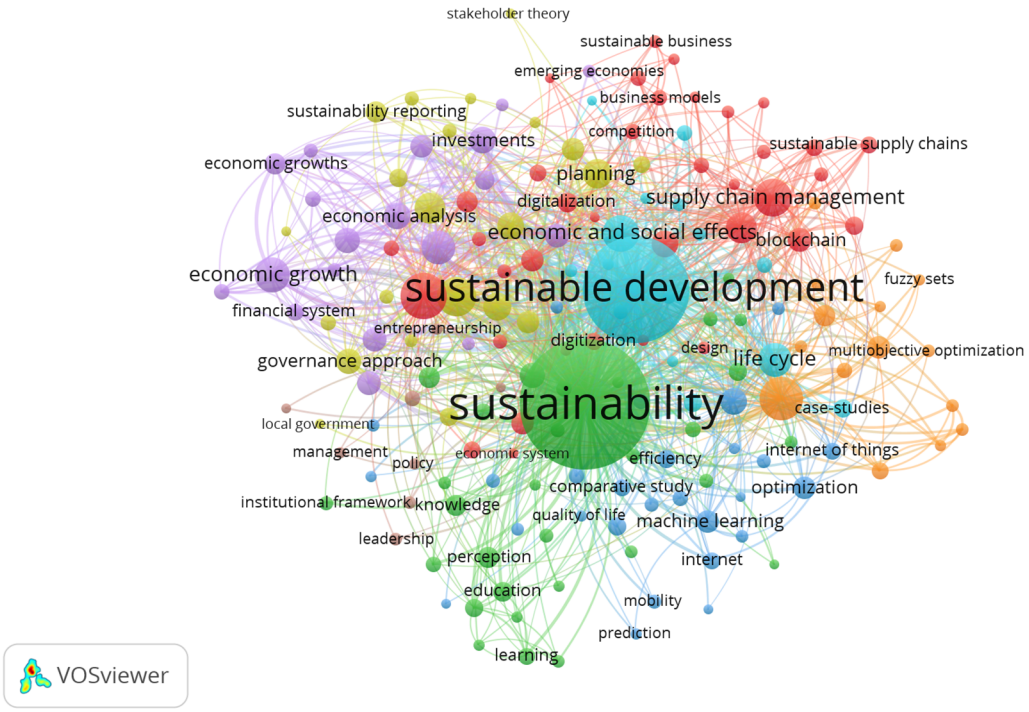

Figure 1. Query "sustainability": Keyword map.

Figure 1 was drawn using the VOSviewer (version 1.6.19) tool. Analysis of the clusters in the map made it possible to identify a set of keywords that "link" sustainability and higher education (from the top 3% keywords by prominence): AI, ICT, knowledge, knowledge management, behavioral research, digitalization, teaching, learning, stakeholder engagement, student, and survey. It should be noted that the "higher education" and "AI" clusters are connected using the keywords "learning" and "student" (Figure 2).

Figure 2 shows key clusters for publications (https://www.scopus.com/, analysis tool—VOSviewer). The analysis of keywords identifies the studies that are associated with challenges when studying the dyad "sustainability—higher education" ("barriers" and "risk assessment"). At the same time, security issues and threats that should be considered when introducing AI into the educational process have been neglected.

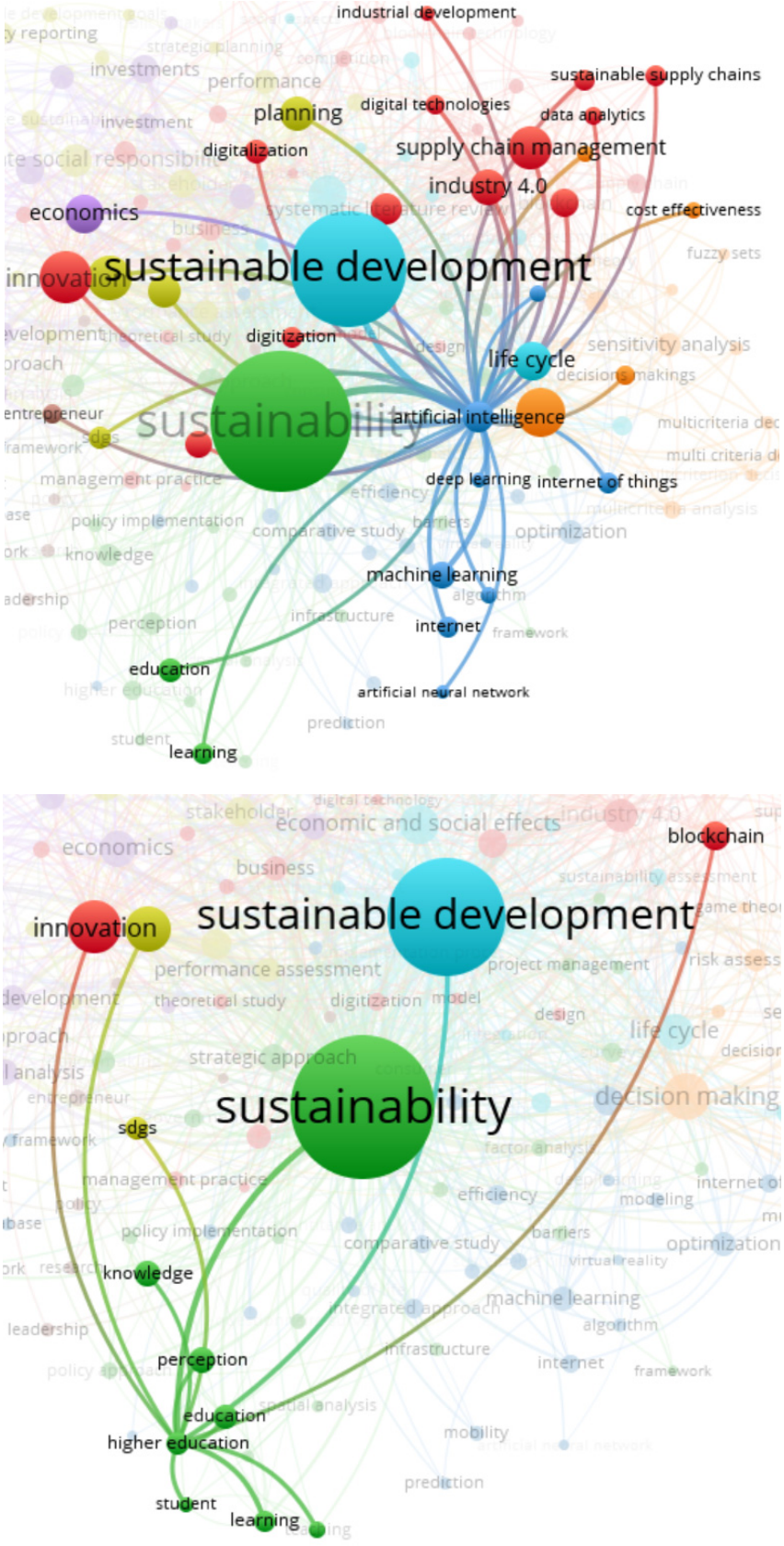

Figure 2. Sustainability, higher education, and AI: key clusters.

2.3. Brief Summary of the Literary Review

The results of the literature review, including bibliometric analysis, showed that the following:

1. Achieving SDG 4.3. can be confidently associated with smart education [3,33–36]. Smart education is associated with AI tools [3,32,34,37–41].
2. The problem of AI as a threat to the educational process in the context of sustainability should have been systematically considered when conducting stakeholder surveys. Bibliometric analysis showed that in those branches of knowledge studied, the terms "security" and "threat" do not describe socio-economic impact on society. Let uss talk about technical branches of knowledge. The terms "security" and "threat" are material (environmental safety, threat to water resources, etc.) and are associated with equipment, not algorithms.
3. The opinion of students regarding the applicability of AI in the daily practice of higher education, taking into account possible reasons for concerns, is essential. A "safe learning environment" is defined as "free of the threat of emotional or psychological harm and allows students to risk exploring difficult issues and express their views honestly" [64].
4. The ultra-fast spread of AI tools in the higher education system has created a "blind spot" in didactic theory and practice. Studying students' opinions about potential threats from using AI will bring new scientific knowledge to didactic theory and practice. This new scientific knowledge concerns the conditions for a "safe" learning environment in achieving SDG 4.3.

The above facts and data form the study's high relevance.

3. Materials and Methods

3.1. Total Data

This manuscript continues to present the results of a regional study on using AI tools in universities in Eastern Europe. The research methodology is described in detail in the papers [1,2,27]. However, the fundamentally important aspects of the technique are described below.

The results presented in the manuscript were obtained from December 2022 to February 2024 in Poland, Kazakhstan, Slovakia, and Ukraine.

The basis of this study is the concepts of sustainable development [65,66] and "service economy" [42–45]. The author's research plan covered both the study of the theoretical framework for the sustainability of higher education and didactic theory, as well as the empirical testing of "blind" spots at the intersection of the sustainability of higher education, the practice of smart education, and the use of AI tools. The conceptual approach consisted of empirical testing in countries with low and medium tertiary education enrollment [67].

Reliable and cost-effective research methods were used by the authors [1,2,27,68,69]:

- Drawing up a concept and formulating hypotheses;
- Drawing up a research methodology;
- Study of scientific sources and documents;
- Bibliometric analysis;
- Survey of students using an electronic questionnaire;
- Primary processing and graphical visualization of survey results based on standard AI tools;
- Statistical analysis based on standard AI tools and verification of statistical hypotheses.

Bibliometric analysis was carried out according to the standard methodology used by the authors previously in the initial study [1].

3.2. Survey

In the initial study, a survey of "learners" was conducted at universities in the Eastern European educational services market [1]. The student survey was conducted from April

2023 to January 2024. The early results of C. Tapia-Fonllem et al. have proven [19] that interaction between students from different cultures improves skills for learning sustainability and problem-solving. Therefore, countries have been selected to ensure maximum social, cultural, and economic diversity. Students from three Eastern European countries (Poland, Slovakia, and Ukraine) and one partially Eastern European (Kazakhstan) were surveyed. Both state- and non-state-owned universities are involved.

The questionnaire includes (a) appeal to respondents, (b) metrics, and (c) body [1,69].

Part (a) informs respondents of voluntary and anonymous participation [1,69].

Part (b) includes four routine metric questions about the country of residence and demographic characteristics [1,69].

Part (c) is the central part of the electronic questionnaire [1,69]. The main issue, which is directly related to the condition of a "safe" learning environment, is as follows:

Question No. 10: Do you think AI will threaten higher education in the next five years?

The authors formulated this question based on the definition that a "safe learning environment is free of threat of emotional or psychological harm" [64]. This question asked students about their perceptions of the threat of emotional and/or psychological harm. If students, as consumers of educational services, think about the potential threat from AI, they cannot talk about the "safe learning environment".

This question has five answers. There are two positives (Definitely yes and rather yes), two negatives (Rather not and definitely not), and one neutral (Hard to say).

Sequential (nested) sampling was used for the empirical part of the study [1,69]. Such sampling is based on the selection of rows or groups of population units [69]. When the authors selected groups of respondents, they also sought to achieve diversity.

A separate questionnaire was created for each group of respondents. The questionnaires were completed in three languages: English, Polish, and Ukrainian. The authors posted the questionnaires on the National Louis University cloud service. This measure made it possible to create separate questionnaires for each group of respondents. Also, this helped eliminate errors in collecting and processing student responses.

All ethical principles were followed.

3.3. Respondent Groups

All respondents were first-level (bachelor) students (Table 1). They studied sciences that were not related to computers and IT technologies. In other words, respondents did not study AI technologies professionally and may have had varying personal experiences in using them.

Table 1. Description of respondents.

Group Number and Country	University	Gender (M/F/Other)	Number of Respondents
1. Slovakia	University of Economics in Bratislava	34/27/0	61
2. Poland	National Louis University	81/283/0	364
3. Poland	WSEI University	12/33/0	45
4. Poland	AS University named after Mieszko I	39/17/0	56
5. Kazakhstan	Karaganda University named after Academician Buketov	29/43/1	73
6. Ukraine	West Ukrainian National University	31/86/1	118
7. Ukraine	Taras Shevchenko National University of Kyiv	54/88/2	144
8. Ukraine	Ternopil National Pedagogical University named after V. Hnatyuk	32/211/0	243
Total	-	312/788/4	1104

So, the empirical part covered 1104 respondents (Table 1). These were surveyed by eight groups of students from four Eastern European countries. Of these, 312 were men

and 788 were women. Only four respondents declared "other" gender. The numerical boundaries of the groups ranged from 45 to 364 participants. Participant age ranges from 18 to 64. Thus, social, cultural, and economic diversity was achieved.

The student survey has resulted in new empirical findings related to higher education sustainability, smart education, and AI tools. The authors obtained an overall picture that allows us to judge the "safe" learning environment using AI tools.

3.4. Verification of Statistical Hypotheses

The authors used two different methods for verifying statistical hypotheses at various stages of processing the new empirical data obtained. Both methods are borrowed from well-known sources [68,69]. Concerning this study, some verification details are described in the papers [1,27].

For the calculation of statistical indicators, a special hint (prompt) for ChatGPT 3.5 was created [70]. The authors verified statistical hypotheses in Sections 4.3–4.5 using a standard procedure borrowed from sources [68,69].

In the first stage, the authors tested the hypothesis of an unknown mean. The essence of this method is to calculate t-statistics [68,69]. Testing hypotheses is to compare the sample mean, $M(x)$, with a given number μ_0 [68]. One-way testing was chosen because the response rate of respondents could not be less than 0.00%.

In the second stage, the authors compare the averages of two independent samples. The essence of this method is to calculate z-statistics [66,67]. Testing hypotheses compares the difference between $M(x_1) - M(x_2)$ and 0.00. In the second stage, two-way verification was adopted because the result can be either more than 0.00% or less than 0.00%.

The authors used a standard verification level [68] of 0.05 ($\alpha = 0.05$) at each verification step.

Having completed the discussion, the authors wrote a conclusion.

4. Results

4.1. Primary Processing of Survey Results: Do You Think AI Threatens Higher Education in the Next Five Years?

The respondents' choices for this research question are shown in Table 2. The number N denotes the number of responses.

Table 2. The answers of respondents.

Group Number and Country	N	Definitely Yes	Rather Yes	Hard to Say	Rather Not	Definitely Not
1. Slovakia	59	2	4	27	24	2
2. Poland	363	21	71	114	121	36
3. Poland	44	6	6	9	20	3
4. Poland	56	4	12	24	13	3
5. Kazakhstan	73	9	14	27	19	4
6. Ukraine	118	10	22	28	40	18
7. Ukraine	144	16	35	24	53	16
8. Ukraine	242	16	46	94	62	24
Total	1099	84	210	347	352	106

Table 2 shows that out of 1104 respondents, 1099 answered the research question. The number of refusals (5) does not affect gender and other diversity (Table 1). Respondents' answers vary across groups (Table 2). At first glance, there are fewer positive choices ("Definitely Yes" and "Rather Yes") than negative choices ("Definitely Not" and "Rather Not"). A minority of students see AI as a threat to higher education in 5 years.

Table 2 shows that the number of students who positively and negatively assess the threat of AI to higher education varies in different groups. For example, approximately the same results were obtained in all groups of Polish respondents (2, 3, and 4) and two groups of Ukrainian respondents (6 and 8).

However, analyzing the data in Table 2 makes it difficult to establish the predominance of positive and negative choices for individual groups of respondents.

4.2. Calculation of Statistical Indicators

The authors showed statistical indicators in Table 3. Positive responses "Rather Yes" and "Definitely Yes" were set to 1.0 to calculate them. The remaining answers were set to 0.0.

Table 3. Statistical indicators for t-statistics and z-statistics [70].

Group of Respondents	N	$M_{(x)}$	δ_x
1. Slovakia	59	10.17	30.22
2. Poland	363	25.34	43.50
3. Poland	44	27.27	44.54
4. Poland	56	28.27	45.18
5. Kazakhstan	73	31.51	46.45
6. Ukraine	118	27.12	44.46
7. Ukraine	144	35.42	47.83
8. Ukraine	242	25.62	43.65
Total	1099	26.75	49.07

Table 3 shows that the sample means, $M(x)$, differ significantly. The difference $M(x)$ ranges from 10.17% to 35.42%. That is, the difference is about 25.00%. So, the magnitude of the difference is 2.5 times greater than the value of the lower limit. At the same time, the standard deviation values for the sample, δ_x, exceed the average $M(x)$ values in all cases. For group 1 from Slovakia, this excess is about three times. Therefore, the answer to the research question is not apparent. A reliable, statistically predictable result can be obtained by verification of statistical hypotheses. Statistical indicators allow us to proceed directly to the verification of statistical hypotheses. In total, $M(x)$ varies between 25.00% and 28.00%. In Slovakia (group 1), the minimum value $M(x)$ = 10.00% was obtained. In one group from Ukraine (7) and a group from Kazakhstan (5), the maximum values of $M(x)$ were obtained. For these two groups, the values vary within the range $M(x)$ = 31.00–35.00% (Table 3).

4.3. Verification of Statistical Hypotheses: The Number of Students Who Think That AI Threatens Higher Education in the Next Five Years Is 0.00%

Table 4 shows data on the verification of statistical hypotheses.

Table 4. T-statistics (one-way verification, μ_0 = 0.00%).

Indicators	Value							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Sample size, N	59	363	44	56	73	118	144	242
The average of the sample, $M_{(x)}$	10.17	25.34	27.27	28.27	31.51	27.12	35.42	25.62
The standard deviation for the sample, δ_x	30.22	43.50	44.54	45.18	46.45	44.46	47.83	43.65
Average error, $\dot{S}_{\bar{X}} = \delta_x/\sqrt{n}$	3.934	2.283	6.715	6.037	5.437	4.093	3.986	2.806
Value $\lvert t_{stat} \rvert$ for μ_0 = 0.00%, $(M_{(x)} - \mu_0)/\dot{S}_{\bar{X}}$	2.585	11.099	4.061	4.682	5.796	6.626	8.886	9.131
Value t_{tabl} for the standard testing level of α (*0.05*)	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645
$\lvert t_{stat} \rvert > t_{tabl}$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4 shows that the t-statistics $\lvert t_{stat} \rvert$ is more than the t_{tabl} for a given number (μ_0 = 0.00%) for all groups of respondents; alternative Hypothesis 1 is accepted for each group of respondents.

Table 4 shows that, in fact, the number of students who think of AI as a threat to higher education can range from 10.17% to 35.42%. This number is high. Statistically, one

in ten (and sometimes one in three) students think that AI threatens higher education. If university leaders, governments, and the teaching community do not accept a set of organizational, pedagogical, and methodological measures, then managing the higher education system may become a problem. Indeed, if 1/3 of the student community thinks of AI as a threat, this is probably only a partially healthy community. In this case, expecting an adequate response from such a community to management decisions takes time.

So, at the standard test level (0.05), the authors obtained a statistically significant difference from zero for each group of respondents.

4.4. Primary Processing of the Results: Comparison of the Number of Students Who Think That AI Threatens Higher Education and Students Who Are Confident That AI Will Take the Place of University Teachers in the Next Five Years

Statistical indicators from these two independent samples are summarized in Table 5.

Table 5. Comparison of statistical indicators from this manuscript (Table 3) and from the paper ([1], Table 4).

Research Problem	$M_{(x)}$	δ_x
Number of students who think that AI threatens higher education in the next five years	26.75	49.07
Number of students who are confident that AI will take the place of university teachers in the next five years ([1], Table 4)	10.85	31.10

Table 5 shows that the average values of two independent samples, $M(x)$, differ. At the same time, the values of the standard deviation for each sample, δ_x, exceed the average values of the sample $M(x)$. This excess is about three times that of the second sample [1]. Therefore, the answer to the research question is not apparent. A reliable, statistically predictable result can be obtained by verifying the statistical hypotheses.

4.5. Verification of Statistical Hypotheses: Comparison of the Averages of Two Independent Samples

Data on the verification of statistical hypotheses for both groups of respondents' answers are shown in Table 6.

Table 6. Comparison of statistical indicators from this manuscript (Table 3) and from the paper [1].

Statistical Indicators	Number of Students Who Think That AI Threatens Higher Education in the Next Five Years (Table 3)		Number of Students Confident that AI Will Take the Place of University Teachers in the Next Five Years [1]
The size of a sample, N	1099		599
The expected value, $M(x)$, %	26.75		10.85
$\lvert M(x_1) - M(x_2) \rvert$		15.90	
$\mu_1 - \mu_2$		0.00	
The standard deviation for the sample, δ_x	49.07		31.10
Average error, $\dot{S}_{\dot{X}} = \delta_x / \sqrt{n}$	1.480		1.271
$\dot{S}_{\dot{X}}{}^2$	2.191		1.615
$\lvert \dot{S}_1{}^2 - \dot{S}_2{}^2 \rvert$		0.576	
$\sqrt{(\dot{S}_1{}^2 - \dot{S}_2{}^2)}$		0.759	
$\lvert z_{stat} \rvert = [M(x_1) - M(x_2) - (\mu_1 - \mu_2)] / \sqrt{(\dot{S}_1{}^2 - \dot{S}_2{}^2)}$		20.950	
Result, $\lvert z_{stat} \rvert > z_{tabl}$		Yes	

Table 6 shows that for the z-statistics $\lvert z_{stat} \rvert$, there is more than the z_{tabl}. In this case, Alternative Hypothesis 2 is accepted. According to Table 5, the number of students who think AI threatens higher education is more significant. This means that students may see some additional threats to higher education. This may become a topic for future research.

So, at the standard verification level (0.05), the authors obtained a statistically significant difference between these two sample means.

5. Discussion

The study of references in the sections "Introduction" and "Literature Review" showed the relevance of this study from five points of view:

(a) The United Nations has shown interest in the spread of AI. The message, published on 26 October 2023, states that there is "the task of resolving crises in the field of educational services".
(b) According to the State Council of China's official initiative in AI, China should become the world's main center of innovation in this field by 2030.
(c) Smart education is related to AI tools, higher education sustainability, and "learners".
(d) University students ("learners") are an active part of the service economy.
(e) Issues of the safety of using AI in educational activities have yet to be the subject of numerous studies and scientific publications.

As shown in the Literature Review section, if students see AI as a threat to higher education and encounter AI tools in their teaching practice, we cannot claim that the condition of a "safe" environment is met. According to the survey (Table 3), the values of M(x) for the number of students who think AI threatens higher education in the next five years range from 10.17% to 35.42%. This means that students can see AI as a threat to higher education.

Alternative Hypothesis 1 was accepted for all groups of respondents (Table 4). At the standard verification level (0.05), there are no groups in which students do not see a threat to higher education from AI. The number of students who think AI threatens higher education in the next five years ranges from 10.17% to 35.42%. Thus, between 10.17% and 35.42% of students think that AI will threaten higher education. The authors emphasize that this is the number of student opinions. Since this number is statistically significantly different from zero, we cannot discuss a "safe" learning environment (SDG 4.3). From the point of view of a "safe" learning environment (SDG 4.3), it is necessary to develop a set of organizational, pedagogical, and methodological measures. It is difficult to say precisely what these measures could be at this research stage. Why is this difficult to say at this stage of the study?

First, at this study stage, the authors did not plan to study what kind of harm the students meant, emotional or psychological.

It has been proven in several studies that emotional problems lead to mental health problems and can even lead to depression [71,72]. M. Dahlin, N. Joneborg, and B. Runeson associated emotional issues with comorbidities such as personality changes [73]. According to a report by S. Ko, E. Kua, and C. Fones [74], about 57% of medical students in Singapore suffer from mental distress. Additionally, approximately 57% of college students in the United States experienced significant emotional distress (T. Mosley et al. [75]). Currently, emotional disorders also make it difficult for young people to maintain appropriate social relationships with peers and adults [72]. In particular, the impact of cyberstalking on mental health was studied in [76]. The consequences of cyberstalking identified in this study [76] highlight that cyberstalking should be a concern for mental health professionals. The authors believe that the results described by J. Worsley et al. [76] and the empirical data obtained can, to some extent, be correlated.

Second, for the authors, as experts in management sciences, it was essential to record the presence or absence of a "threat of emotional or psychological harm" [64]. Once the authors or other scientists empirically determine the type of potential harm (emotional or psychological), we will see what organizational, pedagogical, and methodological measures need to be taken.

Comparison of two independent samples led to the adoption of Alternative Hypothesis 2. The number of students who think AI threatens higher education is more significant (Table 4). This means that students can foresee some additional threats to higher education.

In this manuscript, the number of students who think AI threatens higher education ranges from 10.17% to 35.42%. Thus, the new data obtained are generally consistent with the data previously published in the initial study by [1].

Y. Lee, R. Davis, and J. Ryu [77] examined teachers' perceptions of using artificial intelligence in education. A total of n = 20 school teachers were interviewed in the online survey. Although this paper can provide exciting and valuable suggestions for effective professional learning for teachers using AI, we cannot compare the authors' results with those published in the paper [77].

The study has limitations. First, the authors described the results of a survey of university students from the same four Eastern European countries [1]. Organizing a survey in other countries will also help develop didactic theory and practice. Secondly, the authors decided to analyze demographic characteristics' influence on attitudes toward AI use in higher education in one of the following manuscripts. Thirdly, the authors needed to set their own goals for developing a set of organizational, pedagogical, and methodological measures.

The number of respondents (1104) and the accepted standard level of testing statistical hypotheses (0.05) are necessary and sufficient conditions for obtaining statistically substantiated new scientific facts.

6. Conclusions

Smart education and the use of AI tools contribute to achieving SDG 4.3. Assessing students' (learners) attitudes towards AI and the prospects for its use is essential for organizing the interaction of students with AI and developing didactic theory and practice.

1. A study of student attitudes towards using AI in higher education resulted in three new scientific facts, empirically and statistically substantiated. These three facts link smart education, the use of AI in higher education, and SDG 4.3:

1.1. According to the processing of student opinions, the condition of a "safe" learning environment is not met for a significant part of students. This means that AI may have a negative impact on achieving sustainability in higher education (SDG 4.3).

1.2. Such students can range from 10.17% to 35.42%. This figure is relatively high. Using AI in higher education can lead to serious systemic problems in managing the HE system.

1.3. The number of students who think AI threatens higher education is greater than that of students who are confident that AI takes the place of university teachers. Thus, students can foresee additional threats to higher education from AI tools.

2. This study's facts (empirically and statistically substantiated) help conceptualize and move forward with didactic theory and practice.

3. The facts are the basis for forecasting, planning, and implementing a set of organizational, pedagogical, and methodological measures related to SDG 4.3. Such a package of activities should be developed in close cooperation with experienced managers, highly qualified scientists, and university leaders, with the administrative support of national governments.

4. The goals of the further research stage are the influence of AI tools on the conditions of "non-violence" and "efficiency" of the learning environment, as well as some of the limitations of this study. Finding new potential threats may also be the goal of the further research phase.

Author Contributions: Conceptualization, V.O.-K., A.A. and T.W.; methodology, V.O.-K., T.W. and Ł.S.; software, V.O.-K., A.A. and N.A.; validation, V.O.-K., T.W. and A.A.; formal analysis, V.O.-K., A.A. and N.A.; investigation, V.O.-K., T.W. and A.A.; resources, N.A. and T.W.; data curation, V.O.-K.; writing—original draft preparation, V.O.-K., A.A., N.A. and Ł.S.; writing—review and editing, V.O.-K., Ł.S. and T.W.; visualization, V.O.-K., A.A. and T.W.; supervision, V.O.-K., Ł.S. and T.W.; project administration, V.O.-K., T.W. and Ł.S.; funding acquisition, Ł.S. and T.W. All authors have read and agreed to the published version of the manuscript.

Funding: The International Scientific Program "Quality of Educational Services and Values of European Culture" (Sobornist ZSL 20211204/1), and the grant from the Ministry of Education and Science of Ukraine "Modeling and forecasting of socio-economic consequences of higher education and science reforms in wartime" (reg. n. 0124U000545), as well as the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under project No. 09I03-03-V01-00130 were sources of research funding.

Institutional Review Board Statement: Experimental studies in this article do not require approval from the Review Board (Statement of the Institutional Review Board from 4 February 2022).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are contained within the article.

Acknowledgments: The authors thank all colleagues and students who participated in the paper's research and writing/reviewing.

Conflicts of Interest: There are no conflicts of interest.

References

1. Okulich-Kazarin, V.; Artyukhov, A.; Skowron, Ł.; Artyukhova, N.; Dluhopolskyi, O.; Cwynar, W. Sustainability of Higher Education: Study of Student Opinions about the Possibility of Replacing Teachers with AI Technologies. *Sustainability* **2024**, *16*, 55. [CrossRef]
2. Okulich-Kazarin, V.; Zhurba, M.; Shorobura, I.; Bokhonkova, Y.; Serbin, Y. Three Characteristic Features of the East European Educational Services Market. *Univers. J. Educ. Res.* **2020**, *8*, 1549–1556. [CrossRef]
3. Parusheva, S.; Bobek, S.; Sternad Zabukovšek, S. Sustainable Higher Education: From E-Learning to Smart Education. *Sustainability* **2023**, *15*, 10378. [CrossRef]
4. McCowan, T. Internationalisation and Climate Impacts of Higher Education: Towards an Analytical Framework. *J. Stud. Int. Educ.* **2023**, *27*, 567–585. [CrossRef]
5. Alonso-Cañadas, J.; Saraite-Sariene, L.; Galán-Valdivieso, F.; del Carmen Caba-Pérez, M. Green Tweets or Not? The Sustainable Commitment of Higher Education Institutions. *SAGE Open* **2023**, *13*, 21582440231220097. [CrossRef]
6. Weh, L.; Kinne, L. Images of the Future in a Participatory Online Course—Empowering Student-Driven Projects for Higher Education Sustainability Transformation. *World Futures Rev.* **2023**, *15*, 75–92. [CrossRef]
7. Proctor, D.; Rumbley, L.E. Environmental Sustainability and Internationalization in Higher Education: A New Frontier in Research, Policy and Practice. *J. Stud. Int. Educ.* **2023**, *27*, 559–566. [CrossRef]
8. Collins, D.; Gannon, A. Walking the Eco-Talk Movement: Higher Education Institutions as Sustainability Incubators. *Organ. Environ.* **2014**, *27*, 16–24. [CrossRef]
9. Hussain, S.; Albarwani, T. Leadership for sustainability perceptions in higher education institutions in Oman. *Manag. Educ.* **2015**, *29*, 151–157. [CrossRef]
10. Reza, M.I.H. Sustainability in Higher Education: Perspectives of Malaysian Higher Education System. *SAGE Open* **2016**, *6*, 2158244016665890. [CrossRef]
11. Muhammad, R.; Nugraheni, P. Sustainability of Islamic Banking Human Resources Through the Formulation of an Islamic Accounting Curriculum for Higher Education: Indonesian Perspective. *SAGE Open* **2022**, *12*, 21582440221079838. [CrossRef]
12. Carey, J.C.; Beitelspacher, L.S.; Tosti-Kharas, J.; Swanson, E. A Resource-Efficient Modular Course Design for Co-Teaching Integrated Sustainability in Higher Education: Developing the Next Generation of Entrepreneurial Leaders. *Entrep. Educ. Pedagog.* **2021**, *4*, 169–193. [CrossRef]
13. Biberhofer, P.; Lintner, C.; Bernhardt, J.; Rieckmann, M. Facilitating work performance of sustainability-driven entrepreneurs through higher education: The relevance of competencies, values, worldviews and opportunities. *Int. J. Entrep. Innov.* **2019**, *20*, 21–38. [CrossRef]
14. Michel, J.O.; Buckley, J.; Friedensen, R.; Anderson-Long, M.; Garibay, J. Infusing Sustainability into Graduate Level Higher Education and Student Affairs Coursework. *About Campus* **2023**, *27*, 4–11. [CrossRef]
15. Gal, A.; Gan, D. Transformative Sustainability Education in Higher Education: Activating Environmental Understanding and Active Citizenship Among Professional Studies Learners. *J. Transform. Educ.* **2020**, *18*, 271–292. [CrossRef]
16. Salvador, E.; Comunian, R. Why and how higher education is so important for cultural and creative industries' sustainable development? *Ind. High. Educ.* **2023**, *38*, 3–13. [CrossRef]
17. Dan, N.L.; Mino, T. Student Diversity Augments Studying Sustainability in Higher Education. *J. Educ. Sustain. Dev.* **2016**, *10*, 38–53. [CrossRef]
18. Tamtik, M. Indigenous innovation and organizational change towards equitable higher education systems: The Canadian experience. *AlterNative Int. J. Indig. Peoples* **2023**, *19*, 345–355. [CrossRef]

19. Tapia-Fonllem, C.; Fraijo-Sing, B.; Corral-Verdugo, V.; Ortiz Valdez, A. Education for Sustainable Development in Higher Education Institutions: Its Influence on the Pro-Sustainability Orientation of Mexican Students. *SAGE Open* **2017**, *7*, 2158244016676295. [CrossRef]
20. Wright, T. Higher Education for Sustainability: Developing a Comprehensive Research Agenda. *J. Educ. Sustain. Dev.* **2007**, *1*, 101–106. [CrossRef]
21. Michel, J.O.; Killion, A.; Smith, E.T. Underrepresentation of Higher Education for Sustainability in the Media. *About Campus* **2023**, *28*, 47–52. [CrossRef]
22. Abdelwahab, H.R.; Rauf, A.; Chen, D. Business students' perceptions of Dutch higher educational institutions in preparing them for artificial intelligence work environments. *Ind. High. Educ.* **2023**, *37*, 22–34. [CrossRef]
23. Bissessar, C. To use or not to use ChatGPT and assistive artificial intelligence tools in higher education institutions? The modern-day conundrum—Students' and faculty's perspectives. *Equity Educ. Soc.* **2023**, 27526461231215083. [CrossRef]
24. Geerling, W.; Mateer, G.D.; Wooten, J.; Damodaran, N. ChatGPT has Aced the Test of Understanding in College Economics: Now What? *Am. Econ.* **2023**, *68*, 233–245. [CrossRef]
25. Vicsek, L.; Bokor, T.; Pataki, G. Younger generations' expectations regarding artificial intelligence in the job market: Mapping accounts about the future relationship of automation and work. *J. Sociol.* **2022**, *60*, 21–38. [CrossRef]
26. Cui, D.; Wu, F. The influence of media use on public perceptions of artificial intelligence in China: Evidence from an online survey. *Inf. Dev.* **2021**, *37*, 45–57. [CrossRef]
27. Okulich-Kazarin, V. Are Students of East European Universities Subjects of Educational Services? *Univers. J. Educ. Res.* **2020**, *8*, 3148–3154. [CrossRef]
28. Tripon, C.; Gonța, I.; Bulgac, A. Nurturing Minds and Sustainability: An Exploration of Educational Interactions and Their Impact on Student Well-Being and Assessment in a Sustainable University. *Sustainability* **2023**, *15*, 9349. [CrossRef]
29. SDG 4 and Targets. The Sustainable Development Goal 4. Available online: https://campaignforeducation.org/en/key-frameworks/sdg-4-and-targets?gclid=Cj0KCQjwtZH7BRDzARIsAGjbK2Yh3ZtgAjpVntolB34hIGCedrJynBNgMNVmkCFojBsn6mTgnCS5NJsaAkGEEALw_wcB (accessed on 29 December 2023).
30. Our World in Data Team. Ensure Inclusive and Quality Education for All and Promote Lifelong Learning. Available online: https://ourworldindata.org/sdgs/quality-education (accessed on 20 October 2023).
31. United Nations. *Resolutions Adopted by the General Assembly on 6 July 2017, Work of the Statistical Commission Pertaining to the 2030 Agenda for Sustainable Development*; United Nations: New York, NY, USA, 2017.
32. Demir, K.A. Smart Education Framework. *Smart Learn. Environ.* **2021**, *8*, 29. [CrossRef]
33. Bajaja, R.; Sharma, V. Smart Education with Artificial Intelligence Based Determination of Learning Styles. In Proceedings of the International Conference on Computational Intelligence and Data Science (ICCIDS 2018), Procedia Computer Science, Gurugram, India, 7–8 April 2018; Volume 132, pp. 834–842. [CrossRef]
34. Zhu, Z.; Yu, M.; Riezebos, P. A Research Framework of Smart Education. *Smart Learn. Environ.* **2016**, *3*, 4. [CrossRef]
35. Sunitha, M.; Vijitha, B.; Gunavardhan, E. Artificial Intelligence based Smart Education System. In Proceedings of the 2023 4th International Conference on Electronics and Sustainable Communication Systems (ICESC), Coimbatore, India, 6–8 July 2023; pp. 1346–1350. [CrossRef]
36. Li, L.; Chen, C.P.; Wang, L.; Liang, K.; Bao, W. Exploring Artificial Intelligence in Smart Education: Real-Time Classroom Behavior Analysis with Embedded Devices. *Sustainability* **2023**, *15*, 7940. [CrossRef]
37. Akpoviroro, K.S.; Adeleke, O.A.O. Moderating Influence of E-Learning on Employee Training and Development (A Study of Kwara State University Nigeria). *Socio Econ. Chall.* **2022**, *6*, 83–93. [CrossRef]
38. Onopriienko, I.; Onopriienko, K.; Bourekkadi, S. Immersive Technologies in Adult Learning as an Innovative Marketing Tool in the Educational Market. *Bus. Ethics Leadersh.* **2023**, *7*, 63–72. [CrossRef]
39. Raisiene, A.G.; Rapuano, V.; Raisys, S.J.; Lucinskaite-Sadovskiene, R. Teleworking Experience of Education Professionals vs. Management Staff: Challenges Following Job Innovation. *Mark. Manag. Innov.* **2022**, *2*, 171–183. [CrossRef]
40. Yoshimori, H.; Yoshimori, M. An Education Gift—Integrated Cognitive and Non-Cognitive Skills—For Future Generations to Grow the Economy in the Digital Phase. *Socio Econ. Chall.* **2022**, *6*, 5–18. [CrossRef]
41. Jang, S. Study on Service Models of Digital Textbooks in Cloud Computing Environment for SMART Education. *Int. J. u-e-Serv. Sci. Technol.* **2014**, *7*, 73–82. [CrossRef]
42. Son, J.W. Dynamic Services, District Magnitude, and the Trilemma of the Service Economy. *Econ. Ind. Democr.* **2022**, *43*, 1189–1205. [CrossRef]
43. Okulich-Kazarin, V. What Method of Learning do Media Students Prefer at Lectures: Auditory or Visual? *Univers. J. Educ. Res.* **2020**, *8*, 2660–2667. [CrossRef]
44. Ehret, M.; Wirtz, J. Ownership of Co-creation Assets: Driving B2B Value Propositions in the Service Economy. *J. Creat. Value* **2018**, *4*, 42–60. [CrossRef]
45. Inman, R.P. *Managing the Service Economy: Prospects and Problems*; Cambridge University Press: Cambridge, UK, 1985.
46. Hockly, N. Artificial Intelligence in English Language Teaching: The Good, the Bad and the Ugly. *RELC J.* **2023**, *54*, 445–451. [CrossRef]

47. Yunjiu, L.; Wei, W.; Zheng, Y. Artificial Intelligence-Generated and Human Expert-Designed Vocabulary Tests: A Comparative Study. *SAGE Open* **2022**, *12*, 21582440221082130. [CrossRef]
48. Pozovna, I.; Arhipov, S.; Kuzior, A. Determinants of Leadership in Higher Education in European Countries. *Bus. Ethics Leadersh.* **2023**, *7*, 210–224. [CrossRef]
49. Kharchenko, D. Content and Bibliometric Analysis of Education as a Competitive Advantage of Business. *Bus. Ethics Leadersh.* **2023**, *7*, 99–108. [CrossRef]
50. Yu, Y.; Ruoxi, L.; Tingting, Y.; Xinxin, W. Convergence and Disparities in Higher Education Fiscal Expenditures in China: A Regional Perspective. *Financ. Mark. Inst. Risks* **2023**, *7*, 31–47. [CrossRef]
51. Skrynnyk, O.; Vasilyeva, T. Comparison of open learning forms in organizational education. In Proceedings of the 16th International Conference on ICT in Education, Research and Industrial Applications. Integration, Harmonization and Knowledge Transfer, Kharkiv, Ukraine, 6–10 October 2020; Paper presented at the CEUR Workshop Proceedings. Volume 2732, pp. 1314–1328. Available online: http://ceur-ws.org/ (accessed on 29 March 2024).
52. Barvinok, V.; Pudło, T. Formation of Online Content Patterns of Higher Education Based on Trends to Preserve Intellectual Capital Quality Decreasing in Ukraine During Wartime. *Bus. Ethics Leadersh.* **2023**, *7*, 109–127. [CrossRef]
53. Bilan, S.; Šuleř, P.; Skrynnyk, O.; Krajňáková, E.; Vasilyeva, T. Systematic bibliometric review of artificial intelligence technology in organizational management, development, change and culture. *Bus. Theory Pract.* **2022**, *23*, 1–13. [CrossRef]
54. Skrynnyk, O.; Lyeonov, S.; Lenska, S.; Litvinchuk, S.; Galaieva, L.; Radkevych, O. Artificial intelligence in solving educational problems. *J. Inf. Technol. Manag.* **2022**, *14*, 132–146. [CrossRef]
55. Ogunleye, J.K.; Afolabi, C.S.; Ajayi, S.O.; Omotayo, V.A. Virtual Learning as an Impetus for Business Education Programme in the Midst of COVID-19 in Nigeria. *Health Econ. Manag. Rev.* **2023**, *4*, 83–89. [CrossRef]
56. Kaya, H.; Kwok, J.S.; LaTurner, J. Experiential Learning through the Creation of an Investment Lab. *Financ. Mark. Inst. Risks* **2023**, *7*, 16–25. [CrossRef]
57. Hafez, D.W.A.; Salam, M.A.; Farid, S.; Farouk, M. The impact of gamification intention to use in e-learning through student attitude: Evidence from Egyptian Private Higher Education Institutions (HIEs). *Socioecon. Chall.* **2023**, *7*, 67–77. [CrossRef]
58. Hara, M. Educational reform for middle-income trap under digitalization: Culprits, challenges, and strategies in the Philippines. *Socioecon. Chall.* **2023**, *7*, 200–218. [CrossRef]
59. Habenko, M.; Koibichuk, V.; Krawczyk, D.; Mayboroda, T.; Samoilikova, A. Implementation of knowledge economy and innovation through business education. *Socioecon. Chall.* **2023**, *7*, 211–222. [CrossRef]
60. Koibichuk, V.; Samoilikova, A.; Kharchenko, D.; Fritsak, M. Challenges and opportunities in the 'business-education-science' system in the context of innovation development: Cluster analysis. *Socioecon. Chall.* **2023**, *7*, 142–151. [CrossRef]
61. Kuzior, A.; Didenko, I.; Vorontsova, A.; Lyeonov, S.; Brożek, P. Managing educational determinants of financial inclusion as a key factor of sustainable development: Logit-probit modeling. *Pol. J. Manag. Stud.* **2022**, *26*, 265–279. [CrossRef]
62. Melnyk, M.; Blyznyukov, A.; Cieślik, J. The impact of digital education initiatives. *Socioecon. Chall.* **2023**, *7*, 1–9. [CrossRef]
63. Srichai, P.; Yodmongkol, P.; Sureephong, P.; Meksamoot, K. Managing School Safety in Thailand: Assessing the Implications and Potential of a Lean Thinking Framework. *Sage Open* **2013**, *3*, 2158244013489985. [CrossRef]
64. Holley, L.C.; Steiner, S. Safe space: Student perspectives on classroom environment. *J. Soc. Work. Educ.* **2005**, *41*, 49–64. [CrossRef]
65. Salunkhe, S.A. The Concept of Sustainable Development: Roots, Connotations and Critical Evaluation. *Soc. Chang.* **2003**, *33*, 67–80. [CrossRef]
66. Delgado-Ceballos, J.; Ortiz-De-Mandojana, N.; Antolín-López, R.; Montiel, I. Connecting the Sustainable Development Goals to Firm-Level Sustainability and ESG Factors: The Need for Double Materiality. *BRQ Bus. Res. Q.* **2023**, *26*, 2–10. [CrossRef]
67. Ritchie, R.; Mispy, O.O. Measuring Progress towards the Sustainable Development Goals. 2018. Available online: https://sdg-tracker.org/ (accessed on 29 March 2024).
68. Singpurwalla, D. *A Handbook of Statistics: An Overview of Statistical Methods*; Bookboon: London, UK, 2015.
69. Selvamuthu, D.; Das, D. *Introduction to Statistical Methods, Design of Experiments and Statistical Quality Control*; Springer: Singapore, 2018. [CrossRef]
70. Okulicz-Kozaryn, W.; Kupczyk, T. Management of social systems: Using CHATGPT 3.5 for calculating statistical indicators. In Proceedings of the V International Scientific and Practical Conference "Business Analytics: Models, Tools and Technologies", Kiev, Ukraine, 5–6 March 2024; pp. 18–22.
71. Tomoda, A.; Mori, K.; Kimura, M.; Takahashi, T.; Kitamura, T. One-year prevalence and incidence of depression among first-year university students in Japan: A preliminary study. *Psychiatry Clin. Neurosci.* **2000**, *54*, 583–588. [CrossRef] [PubMed]
72. Tahoon, R. Differences in Cognitive Avoidance, Anger Rumination, and The General Anxiety in Light of The Gender and Emotional Regulation Disturbance Among Undergraduate Students. *Sage Open* **2023**, *13*, 21582440231187281. [CrossRef]
73. Dahlin, M.; Joneborg, N.; Runeson, B. Stress and depression among medical students: A cross-sectional study. *Med. Educ.* **2005**, *39*, 594–604. [CrossRef] [PubMed]
74. Ko, S.M.; Kua, E.H.; Fones, C.S. Stress and the undergraduates. *Singap. Med. J.* **1999**, *40*, 627–630.
75. Mosley, T.H., Jr.; Perrin, S.G.; Neral, S.M.; Dubbert, P.M.; Grothues, C.A.; Pinto, B.M. Stress, coping, and well-being among third-year medical students. *Acad. Med.* **1994**, *69*, 765–767. [CrossRef]

76. Worsley, J.D.; Wheatcroft, J.M.; Short, E.; Corcoran, R. Victims' Voices: Understanding the Emotional Impact of Cyberstalking and Individuals' Coping Responses. *Sage Open* **2017**, *7*, 2158244017710292. [CrossRef]
77. Lee, Y.-J.; Davis, R.O.; Ryu, J. Korean in-Service Teachers' Perceptions of Implementing Artificial Intelligence (AI) Education for Teaching in Schools and Their AI Teacher Training Programs. *Int. J. Inf. Educ. Technol.* **2024**, *14*, 214–219. [CrossRef]