Student Perception of Using Artificial Intelligence in Education

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Abstract—**Rapid artificial intelligence (AI) penetration into university education presents opportunities and challenges. One of the issues is how the study materials and general support correlate with the student's perceptions of AI. Teachers should also know in which aspects (or applications fields) of AI students are uneasy and feel fear or danger. In this regard, a survey has been conducted in three countries, Iceland, Slovakia, and Serbia, covering three different European regions and different but intertwined study programs. Our results in the survey opinion mining are intriguing in several ways. For example, it has been shown that business students are more likely to support mandatory AI courses than business informatics students. Next, students feel the danger of applying AI in medicine, even though AI is usually learning from high-quality medical records. In this work, we explored the statistically significant differences in responses, proposed recommendations, and identified topics for future surveys. For example, why are the recognized application fields problematic from the students' perspective? And handling hesitation in answers because, in a rapidly developing field of AI, it is difficult to express opinions clearly.**

Index Terms—**education management, artificial intelligence challenges, benefits, weaknesses, surveys, students**

I. INTRODUCTION

The emergence of Artificial Intelligence (AI) and its penetration impact various aspects of human activities, including educational processes, where AI influences lectures, seminars, individual creative works, and supporting activities. In addition to benefits, examples of issues are biases [1], ethics [2], e.g., cheating and extensive use of AI in the preparation of essays or seminar works [3]. On the other hand, reasonable use of AI in education [4] supported by clear rules and guidelines adopted in universities [5] could bring benefits to teaching processes (for example, explaining materials by interactive models, translation of interesting articles from non-widely distributed languages into the mother tongue).

We should also focus on AI approaches not directly related to teaching, such as orientation on-premises, managing and filling all relevant entry documents, searching for suitable (mandatory and elective) courses among the list of partner universities for international mobility, etc.

Next, it is relevant to know in which areas students welcome AI and in which they are skeptical or feel that AI might be dangerous. Courses covering AI, theoretical and applied, should reflect these findings. A suitable way to recognize these facts and challenges is by conducting a survey [6].

This work in progress explores the opinions, experiences, and perspectives on AI from the student's point of view using a questionnaire. The questionnaire exploits areas where students welcome the use of AI, areas in which they are concerned about the use of AI, AI approaches that they are familiar with, and their opinions on other related perspectives. This helps in achieving the following goals:

- a better understanding of students' views on AI at universities,
- proposes to which directions teaching of AI (theory and applications in praxis) should be focused,
- proposes the regulation of using diverse AI approaches for different study programs,
- examine AI for indirect support of education,
- recognize promising topics and questions for future surveys.

The questionnaire has been created to cover the areas and goals mentioned above. The survey was launched in three countries: Iceland, known for online teaching; Slovakia and Serbia, where is a lower penetration of these technologies. Next, Icelandic students are in business, Slovak students are in business informatics, and Serbian students are in information systems technologies and management. These fields are traditionally intertwined. The analysis is based on the collected answers.

The article follows with the review of related works in Section II. Section III explains the background of the survey, while Section IV is focused on the results, discussion, and recommendations. Finally, Section V concludes this work.

II. RELATED WORKS

As the Introduction mentions, research from different perspectives is welcome, including evaluating the students' opinions and recognizing the challenges [6].

Adopting AI-generative tools raised concerns about potential threats to academic integrity and the independent work of students. Based on a survey among 337 Australian university students, the work [2] recognized that more than a third of students had used a chatbot to help with essays without noticing this as a breach of academic integrity. The same problem is discussed by [7]. On the other hand, [4] concluded from a survey of 147 teachers that generative AI could be a valuable tool for student assessments. The work [1] stressed that these models are prone to biased content, might provide non-essential or wrong responses, and cannot perform critical analysis. Therefore, universities must react and define appropriate guidelines and policies for AI approaches [5].

Rapid adoption of AI in education can lead to sustainability issues, as these tools require significant energy to evaluate a large amount of data. A survey among students in Slovakia, Ukraine, Poland, and Kazakhstan [8] revealed that approximately one-third of students think AI could violate sustainability in general and especially in higher education.

The study [9] demonstrates a moderate to low level of AI literacy, underscoring the necessity of integrating AI education into universities. That study consisted of 90 students in social sciences and humanities in Greece and Cyprus, indicating that these students particularly lack experience with AI. Next, the study [11] showed that perceived risk significantly negatively influences the attitude of students toward adopting AI approaches in higher education. This risk might be related to AI literacy [9] and concerns recognized in [7]. The same observation is revealed in the measurement of the perception of students towards AI in insurance [10].

The studies examined have not focused on aspects related to supporting education, such as AI that supports orientation in campus space, perceiving social interaction, and evaluating possible universities for mobility.

The literature review revealed that the studies were devoted to similar countries: Greece and Cyprus, or Slovakia, Ukraine, and Poland, while the other studies were carried out in one country. In this work, we focus on three diverse European countries (Nordic, Eastern European and Balkan). To compare similar fields, we selected information systems, business informatics, and business study programs. These programs are traditionally intertwined. An example is the business intelligence course.

The level of acceptance of AI is often correlated with government efforts and the country's development in information technology [12], [13]. The relationship between AI in education and government is two-fold. There are numerous government initiatives aimed at establishing and/or enhancing education in the field of AI. For example, governments and educational institutions have identified a clear need to rethink and redesign the curriculum to prepare students for the growing presence of AI in all areas of human activity [14]. Government employees require significant training in emerging technologies. A positive perception of AI highlights the importance of providing proper education and training to government sector employees, enhancing their understanding, and recognizing risks when adopting AI technologies. Therefore, strengthening AI education is essential for further implementation.

Students should not be mere absorbers of new and innovative educational AI materials. We should explore the opinions, enthusiasm, associated risk, and fear of the students to adjust the content of the study materials accordingly. It is imperative for policymakers to address these themes in order to leverage the advantages of AI while mitigating its associated risks, thus ensuring the preservation of public trust and the safeguarding of democratic values [15] in all fields, including education.

Various indices show that Iceland is significantly ahead of Slovakia and Serbia in developing and accepting AI. For example, the 2023 AI Preparedness Index by the International Monetary Fund [16] ranks Iceland 21st out of 173 countries, while Slovakia and Serbia are ranked 39th and 57th, respectively. However, Slovakia's national AI strategy was issued in 2019, and Serbia followed a year later [17], while Iceland is still developing its AI strategy. It is an open question whether these results were correlated with students' perception and acceptance of AI in these countries. The acceptance level is closely associated with the comfort of the students and the expected results, that is, learning experiences and anticipating

their future performance [18], [19].

The studies mentioned above helped us choose the set of questions for our survey and the evaluation of respondents' answers.

III. QUESTIONNAIRE DESIGN AND SURVEY

This section focuses on general issues and how they are solved in the proposed survey.

A. Survey preparation

Online surveys do not have an interviewer to clarify unclear questions. To avoid this drawback, we follow the rules for creating questions (see, e.g., [20]). For example, avoid presenting double-barrelled questions and only binary answers.

The key aspect of any survey is motivation and pilot test [21]. On the other hand, there is still the question of whether no data is better than insufficient data [23], i.e., whether it is better to keep the survey voluntary to collect only responses from students willing to participate or to get a subset of inconsistent data (quick responses just to meet duty). As this is a rapidly developing field, we decided to keep it voluntary to collect answers from respondents with a clearer opinion.

When avoiding binary answers, the Likert scale is an option. It can be symmetric or asymmetric. In some contexts, asymmetry is relevant, as in medicine, where there are more nuances when expressing health issues. However, in evaluating AI in education, the asymmetry might indicate which direction the survey designer prefers. The next question is whether the scale should have an even or odd (covering midpoint) number of categories. In the study [24], 635 college students described their interpretation of the midpoint: *Neither agree nor disagree*, indicating a large scale of uncertainties from being unaware to being uncertain or confused. The study [25] has recognized almost 50% of the answers in the middle. On the other hand, when a topic is relatively new and is rapidly developing, a midpoint is welcome.

Next, three categories in the Likert scale are insufficient, while more than five might be problematic to some extent, such as how to distinguish between similar categories [26]. Considering the above evaluation, we adopted a symmetric Likert scale with five answers. In addition, we created two open-ended questions and one binary question.

B. Questionnaire design and structure

This survey covers students' attitudes toward AI in different study programs. The same problem was recognized when students' attitudes toward statistics were evaluated for various study programs [22].

Questions that require an answer on the Likert scale are shown in Table I. The open-ended questions ask students to name fields where they oppose AI and fields where they support it. The following section provides a rationale for selecting particular questions.

As the study [9] revealed a lack of AI literacy, we included the following questions:

- Should AI lectures be mandatory in general business study programs?
- Should an AI course be mandatory in business informatics study programs?
- Should AI courses be mandatory in computer science study programs?

For this set of questions, possible answers are *clearly yes*, *weakly yes*, *I do not know*, *weakly no*, and *clearly no*.

We include a question related to the risks proposed in [11]:

- Are you afraid of AI's negative influences and aspects?

For this set of questions, possible answers are *very*, *lightly*, *I cannot judge*, *significantly*, and *not at all*.

The questions about general opinion based on work [2] are:

- Do you think AI can improve university processes and activities?
- Do you think AI can improve education?

For these questions, possible answers are *fully agree*, *weakly agree*, *I do not know*, *weakly disagree*, and *fully disagree*.

As surveys usually do not collect students' opinions about the general or non-educational use of AI [4], [11], we included a section of questions in which participants were asked to rate the benefits of AI in various areas of universities: social interactions, orientation in space, getting to know people and processes, searching for information related to studying, and university marketing. For these questions, possible answers are *very positive*, *positive*, *neutral*, *negative*, and *very negative*.

We also added AI-related questions to the studies: searching for available literature and resources for seminars, essays, and final theses, checking the grammar of essays and final theses, and translating foreign languages into a native language. The possible answers are the same as in the previous paragraph.

The next category of questions is related to students' intention and how much they prefer to use AI approaches in the learning process [27]. In our case, enhanced online discussion boards, specific tools and applications for study programs (e.g., monitoring applications), and virtual assistants for learning complex subjects.

Finally, we created open questions for students to express their opinions on which fields they would like AI to be used and in which fields they oppose its use. The number of questions that require a Likert scale is 29, while the open-ended questions are two, and one is binary.

IV. RESULTS AND DISCUSSION

The survey was carried out in spring 2024. The sample was taken among students of business informatics (62) at the University of Economics in Bratislava, Slovakia, students of information systems and technologies (49) and Management (16) at the University of Belgrade in Serbia, and students of Business (54) at the Bifröst University in Iceland for a total of 181 respondents. This distribution is shown in Fig. 1.

A. Results

In addition to descriptive statistics, a Wilcoxon rank test was performed to determine whether there were significant
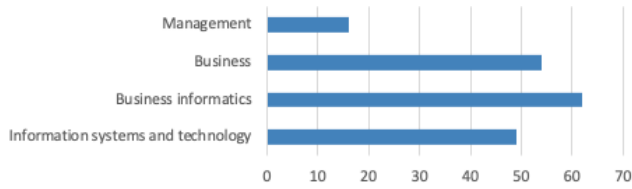
Fig. 1. Respondents by study programs.

statistical differences in student responses depending on the country and the study program.

Based on Table I, which presents the Z-value of the Wilcoxon rank test [28], it can be concluded that there is a statistically significant difference in two-thirds of the questions.

Students from the three countries agree on using AI to improve general university use. Regarding the statement that AI can enhance university processes and activities, 89% of Serbian students, 87.1% of Slovak students, and 72.2% of Icelandic students agree with it. All students agree that AI can help improve education. Slovaks believe the most (87.1%), while Serbs (83%) and Icelanders believe less (77.7%) of AI's helpfulness in learning. No one strongly disagreed with it.

Furthermore, there are still no statistically significant differences in students' responses about the benefits of AI, such as searching for the available literature and resources for seminars, essays, and final theses, checking the grammar of essays and final theses at university, and translating foreign languages into a native language.

Statistically significant differences are observed in using AI in a particular learning environment, e.g., virtual assistants for learning complex subjects, specific tools and applications for study programs, and enhanced online discussion boards. Interestingly, Slovakian students, who use the aforementioned tools the most, use AI the least to search for information about university studies. This may signify easily accessible information for students at the University of Economics in Bratislava, Faculty of Economic Informatics.

Serbian students, unlike Slovak and Icelandic students, believe that AI negatively affects orientation in space and social interactions. Interestingly, the responses of Serbian students are included in all questions where there is a significant statistical difference.

Research [27] has revealed that students tend to rely on AI rather than learn from it. Hence, this additional point supports the survey in the Slovak case, where 33. 9% of the students very intensively support virtual assistants for learning complex subjects, and 50% intensively. But relying only on this assistant is problematic. Although Icelandic students support this option less intensively, as do Serbian students, 41.5% say they rarely use it. In contrast, only 9. 26% of Icelandic students are very afraid of AI influence, while up to 18% of Slovak students and even 23% of Serbian students are. Serbian students are most aware of the consequences of AI and are most concerned about its negative impact, even 71%. The percentage of Slovak students (57%) and Icelandic (40.74%) is much lower. This is

an interesting observation: even those afraid of AI influence are more willing to use it to learn key subjects.

In question: *Does any field in education exist where you find a clear support for AI?* dominant answers are on the Slovak side in self-study and mathematics and on the Serbian side in programming, while in question: *Does any field in education exist where you are clearly against AI?* again, the highest number of answers is on the Slovak and Serbian sides for medicine. These answers might be considered surprising. Firstly, we expected that business students would more significantly prefer AI support in mathematics and self-study. Secondly, AI is widely used in medicine to support the evaluation of images and tests, helping medical doctors under time pressure. In medicine, AI usually learns from high-quality datasets (medical records written by educated practitioners). Furthermore, most students from Serbia also support using AI when writing, while Slovaks are against it. Another example is the creative industry, where Icelanders support the use of AI, and Serbians oppose it.

B. Discussion and lesson learned

Icelandic students strongly support mandatory courses in AI, while only about one-third of Slovak students do. This is a surprising result. We expected that the Business Informatics students in Slovakia would more intensively prefer mandatory courses than Icelandic business students. This indicates that Slovak students use it individually as AI seminars, and subjects where AI is mentioned are marginal. Regarding Serbian students, the situation is interesting, as more than half strongly support AI courses in computer science study programs, while support from other study programs is only one-sixth.

Slovak and Icelandic students agree that the most positive benefits of AI in their universities are reflected in the search for information related to studies, and the least during orientation at universities. Serbian students believe it helps them the most when searching for available literature and the least when translating a foreign language into their native language.

It was emphasized that universities should react and define appropriate guidelines and policies for generative AI [5]. For example, the extensive use of translators from one language to another may be a problematic tool for students of foreign languages. Still, it is also a nice supporting tool for students in the technical fields. In contrast, in the survey, we recorded that Icelandic students see clear support in fields like business intelligence and marketing, while Slovak and Serbian students in programming and mathematics, i.e., in their primary expertise.

Although the students expressed their fear of sustainability in the study [8], the students did not raise this concern in our survey. However, the mentioned study focused, among others, on Slovak students from the same university.

As a recommendation, we propose integrating mandatory lectures on AI for Business Informatics students at the University of Economics in Bratislava and all study programs, as other students might share similar opinions and experiences. The other recommendations and proposals for modifying the

TABLE I
WILCOXON RANK TEST RESULTS

Question	Z - value		
	Iceland vs Slovakia	Iceland vs Serbia	Slovakia vs Serbia
Do you think that AI can improve university processes and activities?	-0.712	-0.731	0.11
Do you think that AI can improve education?	0.194	0.057	-0.11
Rate the benefits of AI to know people and processes at university	-1.199	1.159	2.539*
Rate the benefits of AI for searching for information concerning students' study at university	-2.687*	0.41	3.064*
Rate the benefits of AI for searching for the available literature and resources for seminars, essays, and final theses at university"	-0.286	-0.483	-0.23
Rate the benefits of AI for a grammar check of essays and final theses at university	-0.585	-0.577	-0.172
Rate the benefits of AI for translating foreign languages into a native language at university	-0.792	-0.708	-0.087
Rate the benefits of AI for marketing of the university	1.161	2.834*	1.857
Rate the benefits of AI for orientation in the space	-0.944	2.955*	4.522*
Rate the benefits of AI for social interactions	1.812	4.280*	2.772*
Are you afraid of AI's negative influences and aspects?	-0.312	-2.842*	-2.242*
How intensively do you prefer using the virtual assistant to learn difficult subjects?	-3.725*	3.207**	6.547*
How intensively do you prefer to use specific tools and applications for study programs?	-2.860*	3.053*	6.065*
How intensively do you prefer to use enhanced online discussion boards?	0.715	5.326*	5.719*
Should AI courses be mandatory in computer science study programs?	0.974	0.024	-1.073
Should AI lectures be mandatory in general business study programs?	4.597*	5.376*	0.501
Should an AI course be mandatory in business informatics study programs?	2.227*	4.559*	3.034*

*Statistically significantly different at the $p \leq 0.05$ level.

study materials are the next steps in our work. The answers have created support for the guidelines, and further surveys will clarify surprising answers.

Recommendations and policies should be tailored to areas where statistically significant differences in answers are recorded. A standard recommendation might be adopted where no statistically significant differences are recorded.

It is recorded that even those who are afraid of AI's influence are more willing to use it to learn key subjects. Hence, the problem lies partially in AI literacy, which should be improved.

Students prefer to use AI in their main courses. So, the regulations should be clear to distinguish between the students' fundamental skills rather than relying on AI. In supporting courses, it is not problematic to the same extent. For example, business analytics improved their reports with the support of marketing experts or experts in written language. Nowadays, they might consult AI.

C. A note for the future research

Future research should consider student perceptions on the effects of AI development in replacing or reducing human labor in the fields of law, medicine, psychology, history, linguistics, teaching, etc., as we record the concerns and fears of students in these fields.

Surveys generally miss the evaluation of disabled students [29] and their views on AI. Another issue that has not been considered in this study and was discussed by some other researchers is the impact of AI-supported online learning on student and teacher health [30].

Respondents expressed their feelings on the usual Likert scale in the studied surveys. However, AI in education is a rapidly developing field for students and teachers. Thus, they might not be able to respond precisely or distinguish the difference between similar categorical answers (see, e.g., [26]). Therefore, it is also recommended to allow students to express their feelings to answers in the questionnaire by including hesitance, like: *I'm absolutely sure with my answer*; *I feel a weak hesitance*; *I feel a strong hesitance, and therefore my answer is driven primarily by my feelings* [31]. The recorded hesitance can be a source for further research related to AI in education, that is, whether a significant functional dependency exists between the answers to some questions and hesitance.

V. CONCLUSION

The conducted survey brought several contributions. As for the results, it is quite surprising that business and business informatics students revealed a similar pattern in their responses. Surprisingly there are also several relations like 9.26% of Icelandic students are very afraid of AI influence. In contrast, 18% of Slovak and 23% of Serbian students are very afraid, but 33.9% of Slovak students very intensively (and 50% intensively) support virtual assistants for learning complex

subjects. In contrast, Icelandic students less intensively support it, and Serbian students almost not at all. Next, Icelandic business students support mandatory AI courses more intensively than Slovak business informatics students and Serbian organizational sciences students. Interestingly, even those who are afraid are more willing to use AI to learn key subjects. Hence, literacy in AI should be improved by, for example, mandatory courses (lectures and seminars).

The following message conveyed by this work is that university policymakers need to focus on improving rules for using AI in education and tailor regulations to specific study programs. In addition, supporting activities and orientation to university life are also relevant. The statistical test has revealed answers with and without significant statistical differences. This means that recommendations should be tailored in areas where statistically significant differences in answers are recorded. However, a standard recommendation could be developed where statistically significant differences are not recorded.

Future research should be conducted on students from further study fields to get a better overview, especially at general universities teaching diverse study programs. Students also expressed their concerns about AI. The following survey should reveal the reasons for these concerns. It will help to prepare study materials that focus on the concerns raised.

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