Perception of ChatGPT Usage for Homework Assignments: Students' and Professors' Perspectives

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Abstract

In the context of education, the issues of integrating artificial intelligence (AI) into teaching and maintaining academic integrity in students' use of AI are particularly relevant. This paper empirically examined the issue of ChatGPT usage for writing homework from the perspectives of students and professors. Study research methods included both quantitative and qualitative approaches. In Study 1, an anonymous questionnaire was administered to 350 Croatian students, users of ChatGPT, to investigate their perceptions, attitudes, habits, and intentions regarding ChatGPT usage for homework assignments. In Study 2, twelve faculty members were tested on their accuracy of distinguishing between original students' papers and ChatGPT-generated papers. For this purpose, 25 different versions of papers for 8 different courses were prepared. The results of the students' survey showed that most students still do not use ChatGPT regularly and have neutral attitudes about its usefulness, ease of use, risks, and intentions for future use. In addition, they were moderately concerned about ethical issues around its usage. Differences across gender and field of study were found. Professors, on the other hand, reported having average self-efficacy in appraising authorship, which is in line with their low average accuracy of 53%. Accuracy in distinguishing was lowest when ChatGPT was instructed to write a paper as a student. These results strongly suggest the necessity for clear guidelines, plagiarism detection tools, and educational initiatives to promote ethical use of AI technology.

Keywords: academic integrity, attitudes, ChatGPT ethical considerations, higher education, students' and professors' perspectives

In the dynamic development of higher education, implementing Artificial Intelligence (AI) in the classroom introduces many different opportunities and even more complex challenges. One of the main challenges is how to balance the indisputable advantages of technology with maintaining academic integrity. Academic integrity is the foundation of higher education, encompassing principles such as responsibility, honesty, trust, and fairness. Kiralj (2020) emphasizes that students are the driving force behind the future strength of society. Student honesty is essential, not only for academic success but also for their future work ethics, which is a prerequisite for economic and social development. The question of authorship and originality becomes increasingly complex in an academic environment where AI could significantly contribute to content creation.

Educators play a crucial role in fostering a culture of academic integrity. By adapting pedagogical approaches that emphasize critical thinking and originality, educators can empower students to use technology without compromising academic integrity. However, it also means they should adapt to new circumstances and accept new challenges, continuously improving their digital competencies.

This paper aims to address two important questions:

1. What are the students' habits and attitudes towards the use of ChatGPT in writing homework assignments, with an emphasis on the ethical component of their use?
2. Can educators distinguish between the papers generated by ChatGPT and the ones written by their students?

In the following section, an overview of previous research on the use of AI in education is provided. Subsequently, the methodology of the empirical study conducted with a group of students and professors is described. The results are then presented alongside the discussion, followed by the conclusion with practical guidelines and recommendations.

Literature Review

Many scholars have highlighted multiple benefits of using ChatGPT for students and educators for educational purposes: it could serve as a starting point for personalized learning and provide personalized feedback; support individual and group research, provide ideas and guidance on designing and adapting educational content to make it more appealing and accessible to students; improve writing skills, especially in English; offer various possibilities for disabled students; and improve time efficiency (Dwivedi et al., 2023; Kasneci et al., 2023; Memarian & Doleck, 2023; Rahman et al., 2023; Rasul et al., 2023; Sok & Heng, 2023). This innovative way of learning could improve student's motivation and engagement in acquiring new knowledge and skills, providing educators time to focus on more demanding tasks such as developing students' critical thinking, complex problem-solving, responsible decision-making, communication skills, and so on, and give students emotional support in their progress.

Rasul and colleagues (2023) summarized five main challenges of using GPT in an academic context: academic integrity, reliability, inability to evaluate and reinforce graduate skill sets, limitations in assessing learning outcomes, and potential biases and falsified information in information processing. Further, using GPT could lead to an unfair disadvantage for students who do not have access to it (Dwivedi et al., 2023).

Previous research shows that both professors and students have a positive attitude towards using ChatGPT for educational purposes, albeit with concerns, predominantly centered on the accuracy of the generated data (Chan & Hu, 2023; Kiryakova & Angelova, 2024; Lozano & Blanco Fontao, 2023). Simultaneously, professors have a more negative attitude toward using ChatGPT, considering cheating and plagiarism as a major challenge (Iqbal et al., 2022; Nguyen, 2023; Waltzer et al., 2023). The assessment of students' work in the form of essays, projects, research papers, or similar tasks, often conducted remotely, is a pivotal component of higher education. These assignments serve to evaluate a broad spectrum of learning outcomes, including the ability to locate, summarize, and paraphrase relevant literature, critical analysis skills, creativity, innovation, and attitudes. In achieving educational outcomes maintaining academic integrity despite the easily accessible online tools that can complete most of the work becomes a great challenge. Although research indicates that online cheating is more prevalent than traditional offline cheating, studies on online academic dishonesty are still in the early stage (Chiang et al., 2022). Despite the prevailing belief among most students that cheating is ethically wrong, they frequently rationalize their engagement in academic cheating (Majstorović, 2016; Waltzer & Dahl, 2023). Prior research suggests that various motivational factors significantly influence students' decision to cheat (Miles et al., 2022; Sozon et al., 2024; Waltzer & Dahl, 2023). For example, lack of understanding of what academic misconduct is, increased pressure on students, fear of failure, time pressure, lack of motivation, lack of institutional policy, perceived risk and penalties, and peer influence. According to Zhao and colleagues (2022) perceived peer cheating is significantly stronger than other factors and plays a crucial role in students' academic cheating behavior. Considering all these factors that influence attitudes toward academic dishonesty, it is essential to also consider perspectives on technology use to gain a more comprehensive understanding of attitudes toward the use of AI in academic settings. Measuring attitudes toward ChatGPT usage for homework assignments serves as the initial step towards understanding present behaviors and forecasting future conduct.

In this paper the Technology Acceptance Model (TAM; Davis, 1989) was used as the fundamental theoretical framework. TAM emerged as a modification of the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (TPB; Ajzen, 1985), both cited in Ajzen 1991 and is frequently employed to examine how users interact with various technologies. According to TAM, two factors determine whether a new technology will be embraced by its potential users: (1) perceived usefulness and (2) perceived ease of use. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" while perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). If a new technology is considered easy to use, there is an increased

likelihood that it will also be perceived as useful, thereby enhancing its acceptance. Over time, TAM has evolved to become the key model in understanding the potential acceptance or rejection of technology, which is of special importance for educational challenges in a digital environment. Although the application of TAM has confirmed its robustness, the model's simplicity and the limited understanding of the antecedents of technology acceptance led to the development of extended versions such as TAM 2 (Venkatesh & Davis, 2000) and TAM 3 (Venkatesh & Bala, 2008). Despite these models, numerous scholars continue to use the original TAM, extending it with variables and theories relevant to their specific study contexts (Sukackė, 2019).

Numerous studies have confirmed TAM in the field of education (Abdullah & Ward, 2016; Granić & Maragunić, 2019; Sherer et al., 2019) showing the significance of perceived usefulness and perceived ease of use in understanding students' attitudes towards using ChatGPT for learning (Obenza et al. 2024; Rahman et al., 2023; Shaengchart, 2023). Also, several studies have shown that AI can produce high-quality materials in different disciplines (Herbold et al., 2023; Susnjak, 2022; Yeadon et al., 2023) and the educators can hardly distinguish students' work from the work written by ChatGPT (Busch & Hausvik, 2023; Fleckenstein et al., 2024; Liu et al., 2023; Waltzer et al., 2023). Bašić and colleagues (2023) highlighted that ChatGPT-assisted writing quality is highly connected with previous knowledge and skills, and inexperienced students could show poorer essay writing performance with its usage. To make use of all the advantages of AI, students need a solid base of knowledge to ask proper and relevant questions.

However, there is still a lack of empirical examination of attitudes toward using ChatGPT as a shortcut for writing homework assignments. Most investigations have been conducted within the domain of English as a Second Language (ESL) instructional essays, with comparatively fewer studies in other disciplinary contexts. This opens numerous possibilities for further research into tailoring home essay instructions across diverse subjects, particularly in the social sciences and humanities, where essay writing constitutes a significant component of the pedagogical process. Additionally, it is crucial to explore the materials produced by ChatGPT in languages other than English, to understand its suitability and potential limitations in multilingual educational settings. This topic is especially important to educational institutions considering the importance of academic integrity preservation. Furthermore, while previous literature strongly suggests that AI (namely ChatGPT) can produce convincing "student works", there is a lack of objective empirical evidence on how proficient professors are in distinguishing between student work from AI-generated content in various courses.

Methodology

Goals

This research has two main goals, first, to empirically examine students' attitudinal components of cognition, emotions, and behaviors related to the use of ChatGPT in homework

assignments. Second, to determine professors' level of accuracy in distinguishing students' own writing from AI generated homework assignments.

The following research questions were formulated for this purpose:

1. What attitudes, habits, and intentions do students have when utilizing ChatGPT for writing homework assignments, with a particular emphasis on the ethical dimension of their usage?
2. Are there significant differences in ChatGPT usage perceptions, attitudes, and habits between students of different gender and field of study?
3. Can professors accurately discriminate between homework assignments written by students and those generated by ChatGPT?

An online survey of 350 students from various Croatian universities (Study 1) and a workshop with 12 professors from VERN' University[1] (Study 2) were conducted in December 2023 to answer the research questions. This included both quantitative and mixed (quantitative-qualitative) approaches. The studies adhered to key ethical considerations, including voluntary participation, informed consent, and the maintenance of anonymity and confidentiality. Participants were fully informed about the research purpose, procedures, and their right to withdraw at any time without negative consequences. Ethical approval was obtained from the institution's ethics committee.

To ensure clarity, we first present the method, findings, and discussion of the results of the students' survey, followed by the same information for the sample of professors. Finally, the paper addresses limitations of the research and provides a common conclusion.

Study 1: Students' Survey

Method

The questionnaire for students about their perceptions, attitudes, habits, and ethical issues related to ChatGPT usage was constructed based on the TAM model (perceived usefulness, perceived ease of use and intentions) and research questions. Some items were created resulting from student-led debate (organized for this purpose with 40 students) on the use of ChatGPT in homework assignments[2]. Clarity of the items was pilot tested on another group of 15 students. Besides sociodemographic questions, the final version of the questionnaire contained items about ChatGPT usage in completing homework assignments: (1) habits, (2) level of

[1] Two of the three authors are employed at VERN', which was chosen for the research due to practical reasons. Most of the initial students' sample are from VERN' (N=227). When the desired sample size was not achieved, the call for participants was extended to other Croatian students through the private and professional networks of the authors.

[2] The debate was conducted as part of regular psychology classes with two groups of students from the VERN' University (Cyber communication and network sciences (N=25) and Business IT (N=15)). The professor who conducted the debate is also an author of this paper.

acceptability, (3) attitudes, (4) ethical issues, and (5) perception of professors' knowledge of ChatGPT.

Habits were measured by *frequency* of ChatGPT usage for completing homework assignments on the scale of five (1 - *few times only*, 2 - *few times a month*, 3 - *once or twice a week*, 4 - *several times a week*, 5 - *every day*), and a multiple choice-multiple select question about the purpose of using ChatGPT, offering 16 *purposes*.

Level of acceptability to use ChatGPT when writing homework was measured by one item on a 10-point scale, ranging from 1 (*to give me some initial information or serve as inspiration*) through 5 and 6 (*to take over half of the written content, and shape and complete the rest myself*) to 10 (*to completely write a paper or task for me, which I will then hand over to the teacher without changes*).

Attitude Towards ChatGPT Usage *in Completing Homework Assignments scale* contained 16 items rated on a 5-point Likert-type scale, ranging from 1 (*absolutely disagree*) to 5 (*absolutely agree*). Exploratory factor analysis (EFA) extracted a four-factor solution and accounted for 63.5% of the total variance. Each factor consisted of four statements about ChatGPT usage for writing homework assignments. *Intention (F1)* measured planned behavior of utilizing ChatGPT for tasks deemed too challenging, tedious, time-consuming, and so on, for the students; *Risk of Use (F2)* referred to students' diminishing learning adaptability, critical thinking abilities, and academic skills; *Easy and Reliable Use (F3)* measured trust in the accuracy of the given information and the ease of ChatGPT use*; Usefulness (F4)* was about fostering the development of students' computer skills, creativity, interest, and enjoyment (See Appendix A). The obtained factors supported both TAM (Shaengchart, 2023; perceived usefulness, ease of use and intentions to use ChatGPT) and TAME-ChatGPT (Abdaljaleel et al., 2024; perceived usefulness, behavioral/cognitive factors, perceived risk of use, perceived ease of use) models and scales. Subscales showed adequate reliability (α) as follows: .85, .80, .76, .80.

Ethical Issues of ChatGPT Usage in Completing Homework Assignments Scale consists of four-items describing the potential implications ChatGPT usage may have on academic integrity. Items were rated on a 5-point Likert-type scale, ranging from 1 (*absolutely disagree*) to 5 (*absolutely agree*). EFA extracted a one-factor solution (Appendix B) and accounted for 63.5% of the total variance. Ethical Issues as separate scale is in line with Farhi and colleagues. (2023) who highlighted concerns regarding ethics of the potential over-reliance on ChatGPT for educational tasks. The scale showed adequate reliability (α=.77).

Perception of Professors' Knowledge of ChatGPT were measured with four items focusing on how students perceive professors' abilities to detect ChatGPT papers. Items were rated on a 5-point Likert-type scale, ranging from 1 (*absolutely disagree*) to 5 (*absolutely agree*).

Snowball sampling was used to recruit Croatian students. Along with a link to the questionnaire, participants were informed about research's core components and that their

involvement was voluntary and anonymous, with no credits awarded for participation. The final sample, consisting of 350 students, was selected based on the criteria of having personal experience in using ChatGPT for study purposes. 61.1% were females and the total sample ranged in age from 18 to 46 with a mean age of 23 years (M=22.75, SD=5.52). Students were at the undergraduate (68.3%) and graduate (31.7%) levels of education from different fields of study: 58% of students were majoring in social sciences, 34.3% in science and technology, 6.3% in humanities, 1.1% in medical sciences, and 0.3% in arts.

Results

Data were analyzed using the Statistical Package for Social Sciences, version 26.0 (SPSS Inc., IL). For most variables, the values of skewness and kurtosis were between +1 and -1, except for the variable *purposes*. Nonparametric statistics were used for skewed and ordinal variables and parametric for interval variables with normal distribution. Therefore, with Mann-Whitney (M-W) U test and two-way analysis of variance (ANOVA) we tested the effect of gender and field of study differences (Cohen *d* and partial eta squared ηp^2) on items and scales of ChatGPT usage. The level of statistical significance was p=.05.

Students Habits and Acceptability to Use ChatGPT in Completing Homework Assignments

Our analysis (Table 1) showed that most students have not developed the habit of using ChatGPT in completing their homework assignments. Half of them used it only a few times by now (50.6%) and the rest of them use it few times a month (24.3%), or on the weekly basis (22.5%), and only few admitted using it daily (2.6%). It was more often used by male than female students (d=0.63), and by science and technology students than social sciences students (d=0.58).

On a 10-point acceptability scale almost one third (29.4%) of students considered ChatGPT usage as acceptable tool for getting some initial information or serving as inspiration (level 1). Most students (74.8%) found it unacceptable to take over half of the written content, and shape and complete the rest themselves (level 5 and 6) while the rest found it acceptable. The usage of ChatGPT to completely write a paper or task (level 10) was considered acceptable by one percent of the students. The median indicated that the average acceptability level was 3 (Table 1). Male students rated its usage as more acceptable than female students did (d=0.24).

Table 1

Gender and Field of Study Differences in Experiences of ChatGPT Usage in Completing Homework Assignments

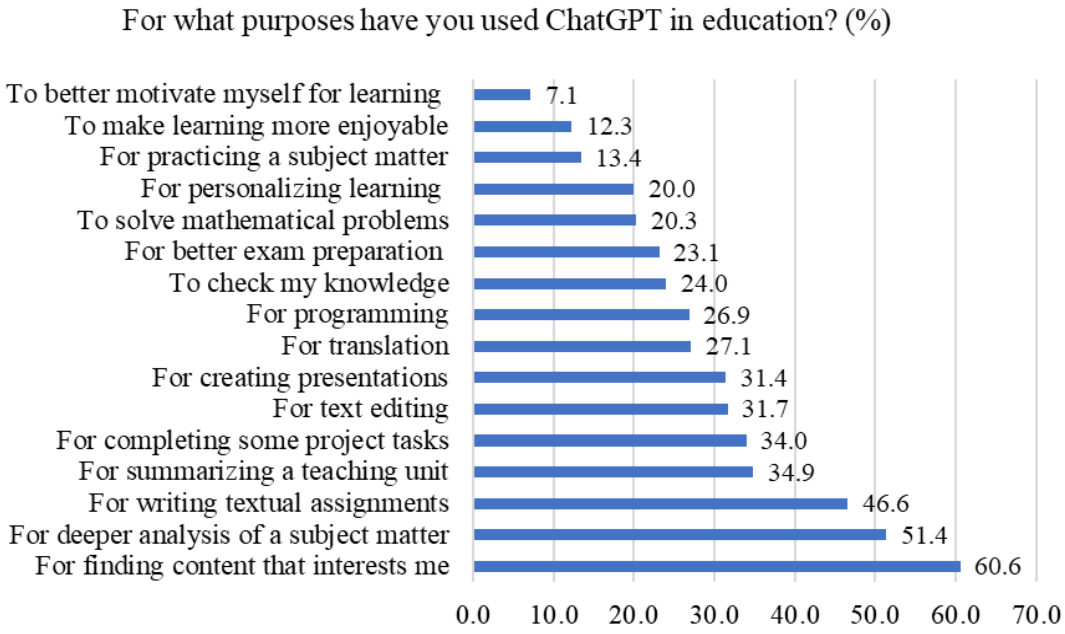
Variables	Groups	Median	Mean Rank	M-W U test	Z	p
Frequency	Male	2	213.75	9350	-6.10	.000
	Female	1	151.19			
	Soc. Sci.	1	142.03	8127.0	-5.39	.000
	Sci. Tech.	2	195.78			
Purpose	Male	5	210.49	9793.5	-5.20	.000
	Female	4	153.26			
	Soc. Sci.	4	146.24	8981.0	-3.98	.000
	Sci. Tech.	5	188.66			
Acceptability	Male	3	190.74	12479.5	-2.30	.022
	Female	3	165.82			
	Soc. Sci.	3	163.12	11952.5	-0.29	.774
	Sci. Tech.	3	160.10			

Note. Soc.Sci.=Social Science, Sci.Tech.=Science and Technology

On average, students chose four purposes (*Median*=4) of using ChatGPT in completing their homework assignments, and as Figure 1 presents, mostly for finding content that interests them, deeper analysis of a subject matter and for writing textual assignments (essays, seminars, reviews, etc.). Male students (d=0.58) and those studying technical sciences (d=0.39) had more reasons for its usage (Table 1), which is in line with the previously mentioned higher frequency of use within these subsamples.

Figure 1

Reasons for Utilizing ChatGPT in Completing Homework Assignments (%)



Attitudes and Ethical Issues Regarding ChatGPT Usage in Completing Homework Assignments

As evident in Table 2, average ratings of 3 (neutral opinion) were obtained on all scales, with standard deviations suggesting not much variation. Two-way ANOVAs were conducted on the scales to determine potential differences between male (*N*=130) and female students (*N*=193), as well as students majoring in social sciences (*N*=203) and science and engineering (*N*=120). The subsamples for testing interaction effects consisted of males majoring in social sciences (*N*=50) and in science and engineering (*N*=80), and females majoring in social sciences (*N*=153) and in science and engineering (*N*=40).

Results of ANOVA showed that male students perceived more usefulness (ηp^2=.022), and less risks (ηp^2=.013) in using ChatGPT than female students. They are also intended to use it more than female students (ηp^2=.018). Field of study also showed significant effect on intention and reliability. Social science students had more confidence in ChatGPT (ηp^2=.028) and higher intention to use it for future assignments (ηp^2=.027) in comparison to science and technology students.

Table 2

Gender and Field of Study Differences in Attitudes Towards ChatGPT Usage in Completing Homework Assignments

	Descriptive statistics M (SD					*ANOVA*		
Scales	M	F	Soc.Sci.	Sci.Tech.	Total	F_{gender}	F_{field}	$F_{Interaction}$
Risks	3.13 (1.06)	3.42 (0.97)	3.34 (0.98)	3.24 (1.06)	3.31 (1.01)	4.14*	0.03	2.26
Usefulness	3.42 (0.98)	3.13 (0.91)	3.25 (0.96)	3.23 (0.93)	3.24 (0.95)	7.34**	2.05	2.99
Easy & Reliable	3.13 (0.81)	3.18 (0.80)	3.26 (0.78)	2.99 (0.76)	3.16 (0.79)	.46	9.31**	0.01
Use Intention	2.88 (1.13)	2.71 (0.99)	2.87 (1.04)	2.62 (1.05)	2.78 (1.05)	5.95*	8.73**	0.35
Ethical Issues	2.70 (1.03)	2.95 (0.92)	2.87 (0.98)	2.82 (0.97)	2.85 (0.97)	3.23	0.42	8.92**

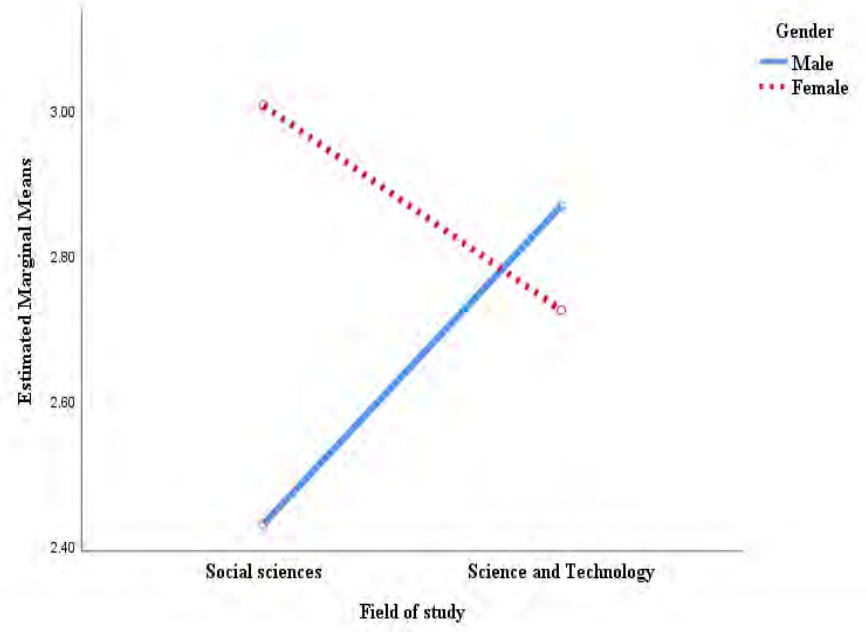
Note. * p<.05, **p<.01; Soc.Sci.=Social Science, Sci.Tech.=Science and Technology.

The results revealed statistically significant interaction effect of gender and field of study on perceived ethical issues on ChatGPT usage when doing homework assignments (ηp^2=.027). In

social sciences female students were most concerned about potential implications on academic integrity while male students had least ethical doubt (Figure 2).

Figure 2

Interaction Effect of Gender and Field of Study on Perceived Ethical Issues on ChatGPT Usage When Doing Homework Assignments



Perception of Professors' Knowledge of ChatGPT

Table 3 shows the students mostly had a neutral opinion on professors' knowledge of ChatGPT. Nearly half of the students (42.7% and 46.5% answered *absolutely or mostly disagree* on the five-point scale for first two items) were completely or mostly convinced in professors' efficacy of appraising authenticity of student papers, even though nearly equal percentage of the students expressed concern about objectivity of the assessment practices (39.4% answered 4-*mostly agree* or 5-*absolutely agree*). Twenty-two percent of students agreed that it is up to the students to manage their assignments, while it is the professors' responsibility to identify any misuse.

Table 3
Students' perceptions of professors' knowledge of ChatGPT (%)

Items/Scale	1	2	3	4	5	M	SD
Most professors do not verify the authenticity of student papers.	14.0	28.7	30.9	15.8	10.6	2.80	1.18
Teachers cannot detect whether homework assignments were written by ChatGPT or the student.	22.8	23.7	30.6	15.9	6.9	2.60	1.20
It is up to us students to 'get by' with the help of ChatGPT, and it is up to the professors to try to catch us in that.	31.7	20.6	25.7	12.0	10.0	2.48	1.31
Due to ChatGPT, homework assignments cannot be objectively evaluated.	10.4	15.6	34.6	25.6	13.8	3.17	1.16

Discussion

As seen in our sample of Croatian students, male students use ChatGPT more than female, consistent with previous studies (Draxler et al., 2023; Siregar et al., 2023). Similarly, in Germany male students and students of engineering sciences, mathematics and natural sciences used AI-based tools most frequently (von Garrel & Mayer, 2023). According to Bouzar et al. (2024) males reported longer usage times, indicating a potentially deeper engagement with the tool, while females demonstrated higher usage frequency, suggesting more frequent interactions but possibly for shorter durations.

The unethical usage of ChatGPT (to completely write a paper or task) was considered acceptable by only one percent of the students, with male students rating it more acceptable than female. Such findings come as no surprise, as many previous studies suggest that male participants are more prone to unethical academic behavior than female participants (Zhang et al. 2017).

Furthermore, results of ANOVA showed that male students perceived more usefulness and less risks in using ChatGPT than female students. They also intend to use it more than female students. Yilmaz and colleagues' (2023) findings that male students found ChatGPT easier to use then female students, similarly, sheds light on the gender-specific responses to the user-friendliness of ChatGPT. The authors observed that understanding these gender-specific responses is crucial for designing AI systems that are inclusive and accessible to all users, regardless of gender. In our sample we can assume that both genders have equal access to ChatGPT; therefore, it is crucial to explore why female students exhibit less interest in technological innovations and have not fully explored the benefits of using this tool.

Field of study also has a significant effect on intention and reliability. Social science students had more confidence in ChatGPT and higher intention to use it for future assignments in comparison to science and technology students. This is somewhat surprising as we have previously seen that they use it less. We can assume that they are just discovering its possibilities, as opposed to science and technology students who might have a better knowledge and steadier dynamic of ChatGPT usage.

Additionally, two-way ANOVA indicated a statistically significant interaction between gender and field of study on perceived ethical issues related to ChatGPT usage. Female students in social sciences were the most concerned about the potential impact on academic integrity, whereas male students in social sciences had the least ethical concern. These results are in line with recent research showing that chatbots are perceived by students as a valuable tool for extensive research and analysis, often required in disciplines such as social sciences (Chan, 2023; Jowarder, 2023), however, women have more negative attitudes towards academic dishonesty (Witmer & Johansson, 2015).

Finally, students mostly held a neutral view on professors' knowledge of ChatGPT. Nearly half of them were completely or mostly confident in professors' ability to appraise the authenticity of student papers, although a nearly equal percentage expressed concern about the objectivity of future assessment practices. Additionally, 22% of students agreed that it is the students' responsibility to find their own way in doing assignments and the professors' role to catch any misconduct. Given this attitude, if students are made aware that the consequences for committing academic dishonesty were little to non-existent, then students are likely to commit such acts (DiPietro, 2010). According to San Jose (2022), students interpreted teachers' leniency during the pandemic as implicit consent to cheat on exams and even plagiarize their submitted outputs. This lack of action or tolerance from teachers is likely to lead to an increase in academic dishonesty.

Study 2: Professors' Survey

Method

Main goal of the professor's survey was to estimate their (subjective) self-efficacy and actual (objective) efficacy in determining the authorship of student homework. Also, the aim was to raise awareness about possibilities and ease of utilization of AI for unethical purposes among students, encourage mutual discussion and to initiate certain steps at the institutional level to effectively address this challenge.

For practical reasons, focus of recruitment was all full-time faculty members of VERN' University. They were sent an invitation to participate in "the workshop related to the use of artificial intelligence". Although initially more of them applied, the final workshop had 12 professors from various disciplines. Among them 2 were males and 10 females, and majority of them have at least 15 years of teaching experience at the same institution (besides one younger male professor with "only" 8 years of teaching experience).

Weeks before the study, professors were requested to provide homework instructions from their courses, contributing to the final grade. They were also asked to submit several examples of student homework of varying quality, focusing on assignments submitted before November 2022 (when ChatGPT became widely used). Based on their contributions, materials for the survey were created.

The following eight courses were selected for the study: Academic Writing, Basics of Marketing, Organizational Psychology, Management, Research Methodology, ICT in Hospitality, Transmedia Storytelling, and Basics of Entrepreneurship. For each course, 2 to 5 variants of assignments were created (25 in total), including both original student work and assignments written by ChatGPT. The proportion of ChatGPT-generated papers ranged from 50% to 66% per course. Most ChatGPT papers were created using the free 3.5 version, with the instructions from the professors directly copied as a prompt. More complex papers, including graphical displays of fictitious results or summaries of scientific papers, were crafted with a prepaid version 4. In some cases, ChatGPT was instructed to write poorly to simulate a struggling student's work.

The workshop began with an overview of the survey results conducted on students (described earlier), with the aim of raising awareness of the presence of AI use and discussion about its threats to academic integrity. The main part of it was professors' evaluation of the authorship of different course papers. Each professor received a folder containing mixed (student and AI-generated) papers written for a particular course. All texts were formatted uniformly (font, size, alignment), and professors were instructed not to judge based on these elements.

For each paper professors answered three questions:

1) Who wrote the text (AI or student)?
2) How confident are they (on a scale from 1 to 5) in their appraisal?
3) How did they determine (open-ended question) the papers' authorship?

After reviewing and grading all the papers in the folder, they took another folder, with a different course, and passed their folder to the next evaluator. Professors were instructed to keep their grades sealed in a closed folder to avoid influencing the subsequent assessors. They evaluated the texts at their own pace and were not required to review all 8 courses but were encouraged to select courses related to their teaching area. After about 45 minutes it was deemed that the professors were saturated, and the exercise concluded, with each course being evaluated by at least 5 professors, and up to 9 in some cases.

Results

Before being provided with materials to assess assignments authorship, professors self-appraised (using the Curi.live platform) their efficacy in this task, on one question with answers ranging from 1 (very low) to 5 (very high). The average score obtained from 12 teachers was 3, indicating a medium level of self-efficacy.

A review of the completed evaluation sheets revealed that the accuracy of the assessed paper's originality varied significantly, ranging from 17% to 100% across the 8 courses and 25 papers. The average overall accuracy rate was 53.75% which is akin to a *roll of the dice*. The average confidence in one's assessment also fluctuates, ranging from 3 to 4.33 per individual task; however, as evident, this confidence is not accompanied by corresponding accuracy. Table 4 presents the main findings.

Table 4.
Results of Professors' Evaluation of Authorship

Course (task description)	Tasks (author)	Accurately / Total assessed	Average certainty
Academic Writing (5 paragraph essays of different types in English)	AW1 (student)	4/6	3,17
	AW2 (student)	3/6	3,33
	AW3 (AI)	6/6	3,67
	AW4 (AI as poor student)	2/6	4,17
	AW5 (AI)	6/6	3,67
	Average accuracy / certainty	**70%**	**3,6**
Basics of Marketing (1 page, survey questions for different survey topics)	BM 1 (student)	3/5	4,2
	BM 2 (AI)	2/5	3,75
	BM 3 (AI as poor student)	1/5	3,5
	Average accuracy / certainty	**40%**	**3,82**
Organizational psychology (2 pages; parts of research seminar with results section, e.g., graphs on different survey questions)	OP 1 (student)	6/6	3,33
	OP 2 (AI)	3/6	3,4
	OP 3 (AI, asked to write about known Croatian company)	2/5	3,33
	Average accuracy / certainty	**63%**	**3,35**
Management (1 page; movies reviews written to show a clear association to management)	MAN 1 (student)	4/6	4
	MAN 2 (AI)	2/6	3
	MAN 3 (student)	1/6	3,5
	MAN 4 (AI)	1/6	3,33
	Average accuracy / certainty	**33%**	**3,82**
Methodology (Research outline - problems, goals, hypothesis, method, sources- in PPT on 10 slides)	MET 1 (student)	4/6	3,86
	MET 2 (AI, as poor student)	1/6	4
	MET 3 (AI)	6/6	4,29
	Average accuracy / certainty	**61%**	**4,05**

ICT in hospitality (2 pages of a larger seminar; ex of ICT in hospitality found in scientific papers)	ICT 1 (student)	4/8	3,63
	ICT 2 (AI)	4/8	3
	Average accuracy / certainty	**50%**	**3,32**
Transmedia storytelling (1 page; 2 narrative extensions of the same Croatian movie)	TMS 1 (AI)	5/6	4
	TMS 2 (AI)	2/5	4
	TMS 3 (student)	4/6	4,33
	Average accuracy / certainty	**63%**	**4,11**
Basics of entrepreneurship (1 page; part of a larger paper - an interview with an entrepreneur)	BE 1 (student)	6/9	4,2
	BE 2 (AI, asked to write emotionally)	3/9	3,78
	Average accuracy / certainty	**50%**	**3,99**

For the Academic Writing course, the average accuracy is the highest among all courses at 70%. Moreover, one person appraised the authorship of all four essays correctly. On the other hand, if the AI is instructed to write a poorly crafted paper, professors most frequently misjudge the originality, confidently assuming it to be a student's work. This finding is significant, as students can easily direct AI to produce a paper resembling a student's work, specifying the desired educational level and quality.

In the Basics of Marketing, the accuracy of assessment was 40%, worse than guessing by chance. It might be because, when instructed to mimic a poor student's work, ChatGPT produced highly convincing texts. However, one person (not teaching that course) appraised all three papers correctly. There was a clear correlation between the accuracy of assessment and the confidence in these judgments. The highest average certainty corresponded with the most accurately assessed work, and vice versa.

For Organizational Psychology, the accuracy was high, but certainty in judgments was low. All teachers accurately identified the original student work, likely due to numerous typos. One person (professor of the same course) appraised all three papers correctly. The poorest estimation was for work where AI was instructed to fabricate research on employees of a specific Croatian company, leading professors to believe it was genuine student work. The low certainty in judgments might also stem from ChatGPT 4 creating graphs based on fictional data, a feature unfamiliar to many professors (since it is not available in the free 3.5 version).
In the Management course, the lowest accuracy in total was observed (33%) and no one correctly appraised all four papers. ChatGPT convincingly wrote film reviews, drawing clear parallels with the requested topic and choosing films akin to typical student selections, leading teachers to believe these were authentic student works.

In Methodology, assessment accuracy was among the highest (61%), but no one appraised all the papers correctly. Also, the poorest accuracy was, once again, visible, when ChatGPT was instructed to write a paper as a bad student.

For the ICT in Hospitality course, the average accuracy was 50%, equivalent to guessing, and three professors (not lecturers of the same course) were correct for both papers. Interestingly, professors used nearly identical arguments to classify a work as either student or AI-created. Transmedia Storytelling was evaluated with the highest certainty, and its accuracy was among the better ones (63%), however only one professor (not of the same course) appraised all the three papers correctly. A few of the professors noticed that all the nouns in the text were capitalized, leading them to correctly conclude that the text was AI-generated.

Finally, for the Basics of Entrepreneurship, appraised by most professors (N=9), the average accuracy was 50%, not any better than guessing. Three professors appraised both papers accurately (two of them not lecturing the same course, the third one being anonymous). The AI's capability to write emotional and personal texts misled professors into believing these were student papers, which reflected in a high average certainty of 3.99 in these appraisals.

In Table 5, accurate and inaccurate arguments used by professors to assess the authorship of papers are collectively presented. Arguments employed in the evaluation of genuine student work and ChatGPT-generated work are shown separately. It is evident that professors' assessment criteria are inconsistent, with identical arguments sometimes used to declare something as original student work or to reject its originality.

Table 5

Correct and Incorrect Professors' Arguments for Assessing the Papers' Authorship

Arguments / Author	Correct Arguments	Incorrect Arguments
Student	*Content:* personal details; realistic; childish; shortcomings in the description of results; expression; illogical; imprecise; typical student mistakes; unrelated; it refers to examples; specific details; it sounds authentic; expected work for the student; own opinion. *Form:* spelling; spelling errors; grammar; minor text errors; first-person writing; writing style; simple language; typos; mistakes; I form; short sentences; no numbered tables; formatting tables;	*Content:* no emotions; too professional; no feelings. *Form:* language; sentence structure; no structure, spelling; no source; a lot of foreign terms; style; non-standard Croatian language; advanced language; too good wording for a student; good English.
ChatGPT	*Content:* Arguments; no sources; stereotypically; too professional; it is not the level of students; too good and advanced; complex expressions; great photos; too general; too poetically retold; impeccable. *Form:* brief; writing style; flawless; very neat; technical elements; style and language; eloquently; school template; 1st letter capitalized; uppercase and lowercase letter; colon then enumeration; pictures; ChatGPT style; ornate literary style	*Content:* seems naive; a personal perspective; gut feeling; as expected for a student; too realistic for GPT; like a song; modest; too casual; passionate with own opinion; short and personal; emotional expressions *Form:* style as a student; writing style; strange constructions; sentence structure; spelling; language, style;

Discussion

Before the emergence of ChatGPT and other similar AI tools, various graphic elements – such as different fonts within the same text or differently colored backgrounds of text paragraphs – were used by professors for quick detection of texts that were copy-pasted directly from the internet. However, that "old" plagiarism detection argument in AI simply "doesn't hold water." As seen, our professors have a medium level of self-efficacy (M=3) in assessing the authorship of student assignments versus AI-generated papers. As the sample consisted of 12 highly motivated professors who voluntarily joined the research it is reasonable to presume that these professors may have been more critically oriented and had a lower level of confidence in their judgments compared to other professors who did not respond to the invitation to the workshop, considering that they did not need it. On the other hand, their self-criticism is justified since the objective assessment accuracy is low (53.75%). In a similar research Busch and Hausvik (2023) found that the authors were correctly identified in 60% percent of both the ChatGPT-generated and student-written exam answers. However, as they tested the accuracy in rating exam questions, their results are not fully comparable with ours, as we tested various homework assignments, that usually produce higher quality and quantity variance among students. We therefore assume that in more complex tasks the authorship will be less detectable, and with AI development this problem will only get bigger.

Busch and Hausvik (2023) also suggested that teaching experience correlates with higher accuracy rates. In our sample (although small) we only had experienced professors, so we can speculate whether the accuracy rate would be lower on a more heterogeneous sample or whether it is impossible to go below the random guessing rate. Similarly, Liu et al. (2023) suggest that training (previous exposure) can enhance participants' ability to distinguish between student essays and machine-generated text. Likewise, our results indicate (Table 5) that some AI work is more easily noticeable to (some) professors, e.g., the one that follows the typical format of ChatGPT output, with headings, subheadings, and bullets. This kind of observation can only be drawn from personal experience with ChatGPT, which suggests that professors need to familiarize themselves with the AI tools that their students use. Some professors do not have any experience with ChatGPT and are still surprised with its capabilities and are therefore easier to deceive. Anyone who experiments with it a little can ascertain its capability to produce emotional, creative, personal, and witty content, not to mention the capabilities of premium ChatGPT 4.0 version. Over time, professors will hopefully learn the typical style of texts generated by ChatGPT (or similar popular tools) and will be able to detect at least those who have not made the effort to even format the text independently, let alone write it.

Fleckenstein and colleagues (2024) found that professors were overconfident in their judgments, particularly when they thought a text was written by a student and when the text was of low quality. Likewise, in this research, professors overall tend to label papers that are "too good" as plagiarism, while those showing errors, writing clumsiness, or emotional connotations are deemed original student work. As shown in Table 4, when ChatGPT is instructed to write papers from the perspective of a student, a poor student, or emotionally,

professors exhibit the lowest detection accuracy. In other words, it only takes minimal modification to ChatGPT prompt to make its output almost undetectable. Therefore, it is essential for professors to remain vigilant and continuously update detection methods.

Limitations

This research has a few limitations that need to be considered. Firstly, the sample size of professors was relatively small and consisted mainly of experienced middle-aged individuals. Although the invitation to participate in the research was sent to all professors from the chosen university (33), only 12 responded. This suggests those who participated were particularly motivated and interested in AI in higher education. Additionally, while the student sample was moderately large, it may not fully represent the wider student population as students of social sciences (58%) and females (61.1%) dominated the sample. To address these limitations, future research should aim for larger and more diverse samples.

Secondly, while e-survey questionnaires are convenient, cost-effective, and eco-friendly, they can introduce biases such as self-selection. Students who are more interested or motivated may be more inclined to participate, skewing the results. Furthermore, there is a risk of social desirability bias, particularly considering the potential for using ChatGPT as an academic cheating tool. To delve deeper into this issue, future research should employ a combination of qualitative and quantitative methods for both students and professors.

Lastly, the rapid evolution of technology may render some findings less relevant over time. Currently, many students and professors may not fully grasp the possibilities offered by AI, and institutions may lack comprehensive strategies for addressing academic integrity concerns related to AI. However, AI will become more integrated into higher education as an additional educational tool. Therefore, conducting longitudinal research at regular intervals is recommended to track changes in attitudes and technology usage in higher education.

Conclusion, Implications, and Recommendations

Throughout history, the emergence of new technologies has consistently elicited both enthusiasm and resistance, from various, and sometimes the same, individuals. The latter seems to especially apply to the emergence of language models like ChatGPT, which many perceive as the greatest technological breakthrough since the advent of the internet.

Kelly, Sullivan, and McLaughlan (2023) examined news articles about the influence of ChatGPT on higher education and highlighted that the media focus was on academic integrity issues more frequently than educational opportunities. As the authors suggested, reading about ChatGPT mainly as a new tool for better cheating, more often than a possibility for better learning, can influence students' attitudes and behavior. A similar hype occurred in Croatian media. However, our findings suggest, most Croatian students still do not regularly use ChatGPT to complete their homework assignments, although, by the time of publication of this paper, we certainly expect an increase in its usage.

Currently, among regular users there are more male than female students, and more science and technology students compared to social sciences students. On average, students cite four main reasons for using ChatGPT in completing their homework assignments, among which the predominant ones are finding content that interests them, deeper analysis of a subject matter, and, in third place (with almost 50% frequency of selection), for writing textual assignments (essays, seminars, reviews, etc.). The latter can be considered unethical usage, especially if it involves uncritical copy-pasting. However, there is some hope in the findings, on the level of acceptability of using this tool in homework assignments, with the majority considering it to be unacceptable to literally copy more than half content (with gender differences once again noted in the same direction). Hopefully students mostly perceive it as an auxiliary tool, as it should be, and not a complete replacement for their own effort.

Our research shows that professors are almost powerless against such content, that is, they cannot accurately assess the authorship of the work – with the average accuracy rate of 53%. Even the fact that a particular professor teaches the course he/she is evaluating is not a guarantee of accuracy.

A mitigating circumstance for professors is that there will always be a proportion of easily detectable students, who are investing minimal effort even into plagiarism, delivering papers they did not edit or even read. Unfortunately, even they can easily be taught how to create highly convincing papers, just by slightly adjusting the prompt (e.g. “write a paper as if you were an average student”).

A major institutional challenge here will be managing the damage caused by all of those who consider plagiarism evidence of their resourcefulness, see no ethical problem in it, and even boast about it. When this becomes a common occurrence in a system, conscientious individuals perceive “distributive organizational injustice”. This becomes demotivating and leads to feelings of injustice, frustration, and loss of trust in the assessment system. Furthermore, it undermines fundamental principles of education such as honesty, integrity, and effort.

Professors play a significant role in how they will handle this relatively new situation – whether to deny the existence of a freely available version of the program that can produce work in seconds, which would otherwise take students days, or to clearly communicate to students the "elephant in the room" and institutionally formalize procedures for this.

The fact that students are mostly unsure of what professors know and can do regarding AI plagiarism detection (as seen in our data) leaves room for educational institutions to manipulate fear, at least until adequate software is developed that can more accurately detect plagiarism in AI-generated papers. Of course, a more ethical and sustainable solution in the long run is to focus on education and nurture, for example, the development of internalized beliefs that such behavior is inappropriate and unsustainable. Fostering a culture of integrity and respect for academic rules should be encouraged. Educational institutions need to have clear policies and procedures for detecting and penalizing academic dishonesty to ensure fair and equal

assessment of all students. This includes the necessity for clear guidelines, plagiarism detection tools, and educational initiatives to promote the ethical use of technology, specifically AI tools.

Acknowledgement

We would like to thank all the participants, especially the professors of VERN' University who participated in the workshop, and the students of the same institution, whose constructive contributions helped to compose the questionnaire used in the research. Acknowledgement should also be given to ChatGPT, which was used for creating materials for professors' survey, and for proofreading the text to improve its grammatical and linguistic accuracy.

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Appendix A

Exploratory Factor Analysis of Attitude Towards ChatGPT Usage in Education Scale

Items	F1	F2	F3	F4
For tasks I don't have time for, I plan to use ChatGPT to do them for me.	.85			
For tasks that are too difficult for me, I plan to use ChatGPT to do them for me.	.79			
For tasks that I find uninteresting or don't feel like doing, I plan to use ChatGPT to do them for me.	.76			
It's pointless to invest hours and days in writing a paper or assignment when ChatGPT can write it in seconds.	.73			
With frequent use of ChatGPT in seminar preparation, students will not be able to develop academic skills such as paraphrasing text, compiling various sources, or summarizing text.		.82		
With frequent use of ChatGPT, students will not be able to develop digital literacy skills (skills for finding, evaluating, and using information found on the internet).		.75		
By using ChatGPT for homework assignments, we negatively impact the development of critical thinking skills on the assignment topic.		.75		
If students don't invest time and effort in attempting to solve their assignments themselves, but instead simply rely on ChatGPT to do it for them, they won't be able to learn the material well.	-.33	.73		
ChatGPT is a reliable source of information for writing most homework assignments.			.81	
I trust the accuracy of the information provided by ChatGPT.			.75	
ChatGPT is easy to use for most student tasks.			.75	
It's easy to get ChatGPT to do what I want it to do.			.71	
Using ChatGPT for homework assignments promotes the development of students' computer literacy skills.				.80
Using ChatGPT for homework assignments fosters creativity.				.77
Using ChatGPT for homework tasks is fun and interesting.				.65
If ChatGPT is already freely available, I don't see why I wouldn't use it to help me write a paper or solve a task.				.54
Extraction Sums of Squared Loadings	5.19	2.70	1.35	1.22
% of Variance	32.44	16.86	8.42	7.59

Note. Principal Component Analysis, Oblimin with Kaiser Normalization. KMO=.85, Bartlett's Test of Sphericity (X^2=2285.61, p <.001).

Factor 1: Intention, Factor 2: Risks of Use Factor 3: Easy Reliable Use, Factor 4: Usefulness.

Appendix B

Exploratory Factor Analysis of Ethical Issues of Chatgpt Usage in Writing Assignments

Items	Factor loading
Using ChatGPT to complete homework assignments is ethically unacceptable to me.	0.85
The use of ChatGPT in writing assignments should be prohibited.	0.86
By using ChatGPT to write homework assignments, we compromise the ethical principles of studying.	0.82
I don't see an ethical issue in submitting to the professor a paper that was entirely or mostly written by ChatGPT.	-0.54
Extraction Sums of Squared Loadings	2.42
% of Variance	60.39

Note. Principal Component Analysis. KMO=.75, Bartlett's Test of Sphericity (X^2=430.82, p <.001).