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From assistance to misconduct: unpacking the complex role of generative AI in student learning.

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From Assistance to Misconduct: Unpacking the Complex Role of Generative AI in Student Learning

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***Abstract*—This research-to-practice full paper discusses students' views on the role of generative artificial intelligence (GenAI) in their learning. The rapid integration of GenAI in educational settings has prompted significant interest in its implications for learning and academic integrity. This study investigates the adoption and impact of GenAI tools among computing students at a university, focusing on how they are utilized for educational purposes and their ethical implications. Semi-structured interviews with nine computing students were used to examine GenAI's specific use and timing. Additionally, it explores students' perceptions of the trustworthiness of GenAI outputs and identifies the students' ethical boundaries concerning its use in academic work. The findings reveal that while GenAI tools might enhance learning efficiency and provide substantial educational support, they raise significant ethical concerns, particularly regarding academic misconduct. The study highlights the need for educational strategies to navigate the challenges posed by GenAI technologies. Finally, three recommendations for computing education are outlined. This research contributes to the ongoing discourse on GenAI in education by describing the student's reflections on GenAI.**

Keywords—Generative AI, Student learning, Cheating, Motivation, Misconduct

I. INTRODUCTION

Generative Artificial Intelligence in educational environments marks a significant paradigm shift, particularly within computing [1]. Tools like ChatGPT have swiftly evolved from experimental innovations to indispensable components of educational toolkit, offering a range from generating text and coding assistance to complex problem-solving capabilities. This transition represents a critical evolution in the toolkit available for educational engagement and curriculum delivery, providing opportunities and challenges previously unanticipated in traditional learning settings.

GenAI tools offer substantial benefits as they become increasingly integrated into educational frameworks. These technologies can tailor educational content to diverse learning approaches and speeds, potentially overcoming the constraints of conventional one-size-fits-all teaching methods [2]. Moreover, GenAI's capability to provide immediate feedback makes learning a dynamic process that extends beyond traditional classrooms' spatial and temporal limits.

However, the swift adoption of GenAI tools also introduces significant pedagogical and ethical challenges that necessitate careful consideration [3]. These technologies disrupt traditional educational models concerning assessment integrity and feedback mechanisms [4]. While GenAI can facilitate innovative teaching and learning strategies by generating sophisticated, context-aware endeavors, it also raises the risk of plagiarism and the potential erosion of learning objectives [5]. Such issues highlight the dual aspects of GenAI as both a facilitator of enriched educational experiences and a potential vector for academic dishonesty.

Moreover, the deeper integration of these tools into educational processes underscores the need to assess their impact on academic integrity critically. The ease with which high-quality content can be generated may tempt students to substitute GenAI outputs for their own analytical and creative efforts, thereby shifting the role of GenAI tools from assisting enhanced learning to facilitating ethical misconduct and diminishing learning.

Addressing these complexities requires a nuanced understanding of how students utilize GenAI within their educational endeavors —an area currently characterized by sparse research as is evident in a recent literature review [6]. Hence, this study aims to bridge this gap by providing detailed insights into the patterns of GenAI utilization among computing students, exploring their perceptions of the technology's reliability, and defining the ethical boundaries of its use in academic settings.

This study aims to address these research gaps by exploring four key questions:

Q1. How do university computing students use GenAI in their educational activities?

Q2. When do they use GenAI tools in their educational process?

Q3. How trustworthy do CS students think the output from GenAI is?

Q4. What usage of GenAI do the students think is academic misconduct?

This paper addresses the practical and ethical dimensions of GenAI utilization by computing students at Uppsala University. By exploring how these tools are integrated into their academic practices, the study offers insights that could help educators adapt their methodologies to harness the risks in order to reap benefits of GenAI in educational settings.

II. BACKGROUND

A. Generative AI (GenAI)

GenAI encompasses a variety of technologies capable of autonomously producing content across different media, including text, images, and videos. At its core, GenAI utilizes algorithms to learn from vast datasets, enabling it to generate realistic outputs that mimic human-created content. Notable examples include tools like GPT (text generation), DALL-E (image generation), and various audio synthesis models. These technologies harness machine learning techniques, particularly deep learning networks such as convolutional and recurrent neural networks, to interpret, predict, and generate data outputs that find applications in diverse fields, including entertainment, media, education, and autonomous systems [7].

GenAI can potentially boost software engineering productivity, and its usage has been called "prompt engineering" [8]. In software engineering practice, GenAI has been used to enhance creativity, summarize documentation, problem-solve and automate tasks such as debugging, testing and deployment [8]. This is an example of how GenAI has an impact on core computing competence.

Indeed, GenAI transforms jobs in the IT sector, and some of the work tasks are automated. According to research by McKinsey, businesses are actively integrating AI into various functions, particularly in IT/Tech, operations, and marketing. While the demand for traditional software engineers may decrease, there is a rising need for roles like prompt engineers and AI data scientists. This shift reflects transitioning from traditional IT roles to those specialized in GenAI (e.g., maintaining and optimizing AI models) [9].

Moreover, a survey by the multinational consulting firm KPMG suggests that despite concerns over AI replacing existing jobs, many businesses remain optimistic about its overall impact on employment. Most surveyed business leaders believe GenAI will expand their workforce while enhancing productivity. They anticipate its disruptive yet positive influence across industries, with IT remaining one of the most affected areas [10].

B. Student Perceptions of GenAI in Higher Education

Research indicates that students, despite having limited current knowledge due to insufficient training, are eager to enhance their education in AI [11]. There is a consensus among students that incorporating AI into their education would be advantageous for their future careers [11], [12]. This positive attitude towards AI is further supported by findings that students are enthusiastic about acquiring AI competencies during their undergraduate education [13], [14].

Some research also suggests that the utilization of AI in teaching and learning can have a positive impact on student performance, motivation, and attitude toward learning, particularly in STEM areas [15]. Indeed, as more students turn to online platforms, there's a growing demand for quality educational content. Students rated peer produced learning material and GenAI generated material similarly in correctness and helpfulness. This suggests AI-generated resources can supplement learning [16].

Students also express concerns about accuracy, privacy, ethical issues, and the impact of Generative AI on personal development, career prospects, and societal values [14].

Notably, there are few studies specifically focused on computing education students in higher education and their perspectives on GenAI.

C. GenAI in Computing Education in Higher Education

GenAI is increasingly being used in higher education, particularly within computing education [1]. With tools like ChatGPT, traditional assessment methods are being re-evaluated. In a survey involving students and educators, the majority were concerned about academic integrity and favored adapted assessments that assume GenAI usage while encouraging critical thinking [4].

Recent research argues that shifting the focus to comprehensive understanding rather than factual memorization can reduce academic dishonesty with GenAI [17]. When assessments prioritize holistic knowledge over recalling specific facts, cheating becomes more challenging since understanding requires deeper learning. By fostering a more engaging learning environment and emphasizing meaningful retention, students can gain knowledge that is applicable beyond the classroom.

Other studies have investigated the introductory programming sequence, a long-standing focal point in computing education research. The emergence of AI-driven code-generation tools presents immediate opportunities and challenges [18]. Also, studies have shown that code generated by AI outscores the performance of most students, posing challenges on the educational system [19].

D. Ethical Challenges of GenAI in Higher Education

Ethical challenges in using GenAI in higher education have become a significant concern [20]. Technologies like ChatGPT raise various ethical considerations in educational settings, including privacy, bias, transparency, security, intellectual property rights, and the potential impact on academic integrity [21], [22], [23].

In mentoring processes, using GenAI necessitates strict adherence to laws, regulations, and ethical norms to maintain data integrity, system safety, confidentiality, and algorithmic transparency [21]. Moreover, implementing GenAI in education must address societal and ethical concerns to ensure the responsible use of these technologies [24].

Recognizing these challenges, scholars emphasize developing frameworks and guidelines to govern GenAI's ethical use in education [16]. The World Economic Forum's 'RESET' framework, though tailored for healthcare, provides adaptable principles for managing GenAI ethics in academic settings, and some researchers think it is suitable for higher education as well [25].

Educators and institutions must proactively address ethical concerns by understanding the implications of GenAI, managing privacy issues, and preparing for the integration of GenAI tools in education [26]. This approach will ensure

responsible GenAI use that aligns with educational goals and societal values.

E. The Case Setting

The study was conducted at a leading university that has established itself as a hub for research and education in computing and information technology (IT). The full university has around 60,000 students and around 7000 staff members. It offers around 50 international master's programs and many undergraduate courses. The computing and IT programs are structured to provide a comprehensive understanding of the theoretical and practical aspects of computing at both the undergraduate and graduate levels. The academic programs cover various specializations, including software engineering, data science, artificial intelligence, and cybersecurity. The curriculum promotes interdisciplinary collaboration and emphasizes integrating theoretical concepts with practical applications. This structure aims to prepare students for the evolving demands of the technology industry while fostering an environment conducive to learning and experimentation.

The Computing and IT programs have a diverse student population encompassing various academic backgrounds and levels of experience with emerging technologies. Bachelor's and Master's students are immersed in a collaborative educational environment encouraging knowledge sharing and interdisciplinary interaction.

The program upholds strict policies to maintain academic integrity and ethical conduct in educational activities. These guidelines clearly define expectations for technology usage and differentiate legitimate collaboration from academic misconduct. They are presented at the start of most of the courses students take.

III. METHODOLOGY

This research explores the usage of GenAI among bachelor and master students in computing programs at Uppsala University. The study investigates how these students use GenAI, focusing on patterns and ethical considerations related to academic integrity.

Nine participants were recruited from the Bachelor's and Master's computing programs at Uppsala University. A snowball sampling strategy [27] included students from different academic years and specializations. Recruitment involved in-person campus outreach and targeted communications through the university's digital networks. Semi-structured interviews were conducted to capture detailed insights into how students engage with GenAI tools in their academic activities. The interview guide contained pre-determined, open-ended questions designed to elicit nuanced responses about their usage patterns and ethical considerations. The areas of the interview template were elicited from previous research and the researchers' reflections and experiences. The flexible structure of the interviews allowed for in-depth exploration of emergent themes while still providing consistency across participants. All interviews were recorded and transcribed verbatim for subsequent analysis.

The data were analyzed using a combination of deductive and inductive approaches to identify critical patterns and themes inspired by Braun and Clarke [28]. The deductive coding was guided by an initial framework based on the interview guide, ensuring alignment with the research questions. Inductive analysis then followed, enabling the identification of new themes not previously anticipated. The analysis was more Little q than Big Q, and the results are more a summary of the interviewee's reflections than an interpretation [28].

IV. RESULTS

Table I illustrates four general themes identified and how they are broken down into key categories

A. GenAI Usage Patterns

The study identified several key ways computing students utilize GenAI to enhance their educational activities. Students use GenAI tools for a variety of tasks. The most common purposes appeared to be for debugging and understanding concepts. The students' views on how useful they found GenAI tools were varied. One interesting finding was a student who said that since they have started using ChatGPT for school tasks they have been getting the highest grade in every exam. They used ChatGPT to quiz themselves on the course material among other things. Another student who said they use ChatGPT almost every coding session and found it very useful overall, mentioned that they had found a technique online for asking ChatGPT questions. Now, the question arises of whether the students who had a less favorable view on the usefulness of GenAI tools simply don't know how to utilize them in a helpful manner. These findings are presented thematically below, answering the research question: How do computing students use GenAI in their educational activities?

1) Content Creation

It is found that students use GenAI to create and improve content, particularly in developing programming code and writing text. Students reported using GenAI to construct data structures or libraries, such as implementing a queue and library in C, demonstrating its application in practical programming tasks. One student expressed, "I've used it to make like a data structure library. I did this to make a queue library in C." Additionally, another student described using GenAI to rewrite paragraphs to gain new perspectives or enhance clarity, illustrating its utility in both coding and writing tasks, stating, "I write a paragraph. Then I will use ChatGPT to rewrite it, and I can get some inspiration."

2) Debugging, Problem-Solving, and Assistance in Assignments

Students frequently employ GenAI tools for debugging purposes. These tools help them understand and resolve errors in their code by clarifying error messages. This usage highlights GenAI's role in helping students identify problems in their code and suggest possible solutions. For example, one student noted, "Sometimes I can ask about error messages if I don't understand them," indicating reliance on GenAI for understanding complex error feedback. Another remarked, "I use it primarily for debugging."

A significant application of GenAI is in solving problems related to academic assignments. Students integrate these tools into their workflow to develop solutions or write code more effectively. As one student explained, "Okay, so when I'm programming I would say that I use it almost at least once every session." This indicates the integration of GenAI into regular academic routines.

TABLE I. A Overview general themes and associated categories

General theme	Category
GenAI usage patterns	Content creation
	Debugging, Problem solving, and Assistance in assignments
	Conceptual understanding and Exam preparation
Timing of GenAI usage in Education process	When stuck
	When time is finite
	When motivation is low
Trustworthiness of GenAI outputs among computing students	Reliability in problem-solving
	Efficiency and Speed
	Motivation and Task automation
Perceptions of academic misconduct involving GenAI	GenAI as author
	GenAI as tutor
	GenAI as an inspirational source

Beyond problem-solving, GenAI aids in brainstorming and overcoming creative blocks during assignments. Students use GenAI to generate ideas or alternatives when they need help progressing. The sentiment, "Around when you get assignments and stuff like that. So when you feel like you're not really getting anywhere. You're a bit stuck in a step of an assignment or whatever it may be and like to get help," captures the utility of GenAI in navigating academic challenges.

3) Conceptual Understanding and Exam Preparation

Students leverage GenAI for exam preparation, using these tools to quiz themselves on the material or simulate practice problems. This is an effective way to prepare for exams, with students actively seeking feedback on their knowledge and understanding. One student mentioned, "With the help of sending in my course plan to ChatGPT. So I have always been able. That it gives a quiz to me. That this is the topic to relate to. Ask me questions, correct my answers, give me feedback."

GenAI is crucial in helping students grasp complex concepts and enhance their understanding. By explaining concepts in varied ways, GenAI assists students needing help with traditional explanations. This is particularly helpful for students who spend a lot of time on concepts without clear understanding, as one student remarked, "When I have difficulty understanding a concept, or if I have spent quite a long time with a code and I don't know why it doesn't work."

B. Timing of GenAI Usage in Educational Processes

The study delineates specific scenarios when computing students will most likely use GenAI tools during their educational activities. The most common motivation for using GenAI tools emerges when they get stuck. The students are unsure of how to progress in their tasks so they turn to GenAI tools. One student mentioned that they use ChatGPT when they are home alone and another mentioned that they use ChatGPT when they previously would have asked a classmate since they did not know many people in the same courses. Although it is positive that students can get help in a new way this may affect people's social skills negatively. These instances are categorized based on particular needs and situations that prompt GenAI tool usage:

1) When Stuck

Students turn to GenAI when encountering obstacles in their coursework or projects. The GenAI tools diagnose problems, provide explanations, or suggest solutions that help them overcome these hurdles. As one student put it, "When I get stuck." They elaborate, "when I have difficulty understanding a concept, or if I have spent quite a long time with a code and I don't know why it doesn't work." This utility is particularly valued for its immediacy, which contrasts with potentially slower responses from human counterparts, such as peers or instructors. Students appreciate this quick assistance, noting, "if you know someone taking the same course, you can ask them maybe and discuss things. But I can't always do that because nowadays I don't know many people I take courses with nowadays."

2) When Time is Finite

Efficiency is a crucial motivator for using GenAI, especially when students are pressed for time and need to manage their schedules more effectively. The tools allow for quicker solutions, avoiding lengthy searches through traditional resources. Students expressed this sentiment: "Yes, but it saves time instead of maybe finding information on Google so you can ask right away." Moreover, for specific coding issues, students prefer asking GenAI for direct code syntax help, "It's just so much quicker to ask like, Oh, how

do you write like this, this function in Python or whatever." Another student reflects on their preference for GenAI due to response times: "If I have spent quite a long time with a code and I don't know why it doesn't work. I get a faster response if I ask ChatGPT than if I email on a Friday evening and wait two days for an answer."

3) When Motivation is Low

GenAI also serves as a means to navigate low motivation periods, particularly for mundane or less engaging tasks. Students use GenAI to handle routine or tiresome activities, allowing them to focus on more exciting aspects of their work. The sentiment, "If you want a quick... if you don't feel like searching yourself," encapsulates AI's convenience. This reliance is further emphasized in tasks perceived as dull: "I do not like to go in and read documentation for example. It is as boring as hell." Similarly, for routine lookups that require effort, one student noted, "Like instead of looking up stuff on like, Stack Exchange just ask ChatGPT and especially like, syntax or code."

C. Trustworthiness of GenAI Outputs Among Computing Students

This section explores computing students' perceptions regarding the trustworthiness of outputs generated by GenAI tools in their academic activities. The findings indicate varying levels of trust based on the context of use and the type of task for which the GenAI is employed. We observed limited variation in how interviewees perceived the trustworthiness of the generative AI tool's output. While participants expressed varying degrees of trust, they generally found the output more reliable for specific tasks and less for others.

One noteworthy finding was that one interviewee expressed uncertainty about the trustworthiness but still found it helpful to get another take on an answer helpful. This indicates that it can still be helpful even when incorrect.

1) Reliability in Problem-Solving

Students generally find GenAI tools reliable when stuck and need immediate assistance understanding or resolving academic problems. GenAI's ability to quickly explain concepts or debug code is highly valued. One student expressed, "When I get stuck," and elaborated that GenAI helps by providing insights when they have difficulty understanding a concept or encounter persistent issues with code, stating, "When I have difficulty understanding a concept, or if I have spent quite a long time with a code and I don't know why it doesn't work." This suggests a high level of trust in AI's capacity to offer accurate information and practical solutions in real-time.

2) Efficiency and Speed

When time is constrained, students trust GenAI to provide quick answers that help them manage their tasks more efficiently. The speed of GenAI in delivering solutions is particularly appreciated, as one student noted, "Yes, but it saves time instead of maybe finding information on Google so you can ask right away." Another student highlighted the comparative speed of GenAI over traditional methods, "It's just so much quicker to ask like, Oh, how do you write like this, this function in Python or whatever." This reliance on GenAI for rapid responses underlines trust in its ability to provide timely and correct information.

3) Motivation and Task Automation

When motivation is low, students turn to GenAI to automate mundane tasks, trusting it to handle less engaging or repetitive aspects of their work. This usage reflects a nuanced trust that GenAI will perform adequately for routine tasks viewed as boring or tedious. One student explained their preference for using GenAI over manual methods, stating, "I do not like to go in and read the documentation for example. It is as boring as hell." Moreover, the trust extends to using GenAI for syntax assistance rather than consulting traditional resources like Stack Exchange, as indicated by the comment, "Like instead of looking up stuff on like, Stack Exchange just ask ChatGPT and especially like, syntax or code."

D. Perceptions of Academic Misconduct Involving GenAI

The section explores how computing students perceive using GenAI in contexts that might constitute academic misconduct. One of the interviewees who did not find a need to use ChatGPT for assignments also mentioned that they did not want to risk cheating due to the ethical ambiguity of using it. Another student who used it to create SQL queries needed clarification on whether it was cheating or not. Students' views on acceptable and unethical uses of GenAI tools in their academic work are categorized into distinct themes:

1) GenAI as the Author

Students consider it academic misconduct when GenAI tools are used to provide answers directly, which are then copied verbatim into assignments without modification. The unanimous sentiment is that using GenAI in such a way equates to cheating. One student succinctly explained, "If you take its answer and put it directly in your assignment, then it's definitely cheating." Another noted, "Eh, when you use it to write for you rather than to use it as a tool. Copying very wrong code."

Similarly, using GenAI to write entire code portions is also considered cheating. The boundary of misconduct is crossed when students do not engage in the coding process themselves but rather use GenAI-generated code as their own. This is reflected in comments like, "But if you just like to use it, you give it instructions, you copy-paste the code. Even if you understand, I might take back what I said. Even if you understand it, I would classify it as cheating."

2) GenAI as a Tutor

Using GenAI to understand or clarify material without directly copying answers is seen as a legitimate use. As one student remarked, "If you just take the answers directly without reflecting on it or coming up with it yourself," this perspective aligns with the view that GenAI can be an educational tool that enhances learning when used correctly. There is, however, a blurred line since students see using GenAI tools as a tutoring aid and then use the suggestions as cheating.

3) GenAI as an Inspirational Source

Students also differentiate between using GenAI for inspiration and copying its outputs. They believe using GenAI to generate ideas and enhance understanding is acceptable as long as the final work is theirs. One student stated, "It's quite good at generating text, so if you have a writing assignment then it would probably easily spew something reasonable. But that does not... But then you haven't understood it." Another added, "If I take its answer and put it directly in my assignment, then it's definitely

cheating. I guess it gets a bit grey if you get inspired by the question, but... Yes."

V. DISCUSSION

A. Summary of Results

The findings from this study elucidate the multifaceted role of GenAI in the educational endeavors of computing students at Uppsala University. Students predominantly leverage these tools for debugging and problem-solving within coding projects, appreciating GenAI's quick interpretation and resolution suggestions. This utility extends to content creation and assignment assistance, where GenAI aids in overcoming creative blocks and enhancing productivity. Additionally, GenAI supports exam preparation and deepens understanding of complex topics through tailored quizzes and diverse explanatory approaches.

Specific needs dictate the timing of GenAI tool usage: students resort to GenAI when they encounter challenges in understanding, when time constraints demand efficiency, or when a lack of motivation hinders their progress on tedious tasks. The trustworthiness of GenAI outputs is perceived variably. At the same time, students rely on GenAI for immediate problem resolution and routine task management, there remains a cautious approach to its outputs, mainly when a deep understanding or originality is crucial.

Students are acutely aware of the ethical boundaries concerning GenAI use — the direct appropriation of AI-generated content, whether code or text, is universally recognized as academic misconduct. Conversely, employing GenAI as an educational tool for inspiration or conceptual understanding is deemed acceptable, provided the integrity of the learning process is maintained through genuine personal effort and comprehension.

B. Alignment with Previous Research

The results of this study align with and contribute to the growing body of literature on the use of GenAI in education, revealing nuanced perspectives on its application and implications.

Both this study and Chan's [29] investigation delve into the complexities of student perceptions surrounding the use of GenAI in academic contexts, particularly focusing on what constitutes academic misconduct, or AI-giarism. A critical consensus across both studies is that students recognize direct utilization of AI-generated content in assignments without proper attribution as a violation of academic integrity.

Our study on GenAI in education also intersects with existing plagiarism research by highlighting technological challenges and ethical considerations. For instance, Brown and Hammond [30] discuss the increased risk of plagiarism due to easy access to digital resources, a challenge compounded by GenAI's ability to generate original content, which complicates detection and definitions of academic dishonesty.

These findings highlight the critical need for educational institutions to establish clear guidelines for GenAI use within academic settings. To manage the rising integration of GenAI tools effectively, policy adjustments and educational practices must be adapted accordingly. We agree with Hloniphani Ndebele, who emphasizes the importance of adopting educational rather than punitive measures to address plagiarism generally [31]. This approach is particularly vital as we consider how GenAI is incorporated into education. Ndebele's advocacy for a proactive educational strategy suggests that students should be thoroughly educated on the responsible use of GenAI tools. Such education can enhance their learning experience while upholding academic integrity.

C. Implications for Teaching in Computing Education

This study gives rise to some implications related to misconduct and learning that are of value to educators when adjusting to using GenAI tools.

1) Reduce Excessive Pressure to Prevent Misuse

The results indicate that students often turn to GenAI for content creation when under significant pressure to meet deadlines or manage heavy workloads. To mitigate this, educators should consider designing coursework and schedules that allow more profound engagement with the material without forcing students to rely excessively on GenAI for quick content generation. This involves balancing workloads and providing adequate time for students to explore topics thoroughly, which can reduce the inclination to use GenAI as a shortcut.

2) Promote GAI as a Tutoring Tool

Encouraging GenAI as a tutoring aid can leverage its potential to enhance learning while maintaining academic integrity. Educators should guide students on how to use GenAI tools to clarify doubts, explain complex concepts, and provide practice problems without directly giving out the answers. Workshops or training sessions can be organized to demonstrate effective strategies for integrating GenAI into learning processes, ensuring students benefit from these technologies.

3) Foster Critical Thinking and Independent Verification

A crucial recommendation is to instill a habit of critical thinking and independent verification among students using GenAI. Teachers should emphasize the importance of cross-verifying GenAI-generated solutions with credible sources and encourage students not just to accept GenAI outputs at face value. Incorporating assignments that require students to critique or improve upon AI suggestions can help cultivate a more discerning approach to GenAI use, enhancing their analytical skills and reducing uncritical reliance on automated tools.

D. Implications for Learning Environments

Moreover, in line with the findings presented in the study "Collaborative Technologies in Global Engineering: New Competencies and Challenges" by Clear et al., [32] it is apparent that the emergence of new technologies such as GenAI will necessitate the development of novel competencies. As Clear et al. discuss the evolving landscape of global engineering facilitated by collaborative technologies, we can draw parallels to the integration of GenAI in various sectors. This integration highlights the need for competencies that not only encompass technical proficiency but also include skills in ethical decision-making, critical thinking, and interdisciplinary collaboration. The dynamic capabilities of GenAI require professionals to adapt to rapid technological changes and to effectively address the complex challenges that accompany these advancements. Moreover, drawing insights from Isomöttönen's study we argue that Problem-Based Learning (PBL) actively engages students in solving real-world problems [33]. This

pedagogical approach fosters essential technical, analytical, critical and creative skills critical for GenAI applications—skills that are increasingly valued in the global job market. Therefore, adapting educational frameworks such as PBL is a possible way forward. PBL can effectively equip individuals with these new competencies, ensuring they are prepared to leverage GenAI responsibly and innovatively.

VI. Limitations

While this study provides valuable insights into using GenAI within computing education, several limitations should be considered when interpreting the findings. The research was conducted with a relatively small sample of nine participants from the same university. This limited sample size and lack of geographic and institutional diversity may restrict the generalizability of the findings. The experiences and perceptions of students from a single institution may not accurately represent those of students from other universities or countries with different educational cultures and technological access.

The study targets explicitly computing students, who may have a more nuanced understanding and familiarity with GenAI tools than students from other disciplines. This focus narrows the scope of the research and its applicability, as students in other fields might use GenAI tools differently or perceive their ethical implications in other ways.

The data collection was conducted over a short period, which may not fully capture the evolving nature of GenAI tool usage and students' perceptions over time. The rapid development of GenAI technologies and their integration into educational settings mean that findings might become outdated quickly, necessitating ongoing research to track changes in usage patterns and attitudes.

VII. Future Work

Building on the findings and acknowledging the current study's limitations, several areas of future research are recommended to deepen understanding and expand the knowledge base concerning the use of GenAI in education.

Future studies should include a more diverse and more extensive sample of participants. Research should be extended to various educational institutions from different geographical regions and academic disciplines. This expansion would enhance the generalizability of the results and provide a broader perspective on how GenAI is used across different educational cultures and settings.

Conducting longitudinal studies could provide valuable insights into how the use of GenAI evolves as students progress through their academic careers and as GenAI technology advances. This approach also helps in understanding the long-term impacts of GenAI on learning outcomes, student engagement, and academic integrity.

Integrating quantitative research methods would complement the qualitative insights from this study. Quantitative data could provide a statistical basis for understanding the frequency, intensity, and outcomes of GenAI usage in educational settings, allowing for more objective analysis and comparison.

Further studies should explore how integrating GenAI tools in education impacts teachers' roles and shifts pedagogical strategies. Understanding these changes can aid in developing training programs for educators to incorporate GenAI effectively into their teaching practices.

VIII. Conclusions

In conclusion, our paper "From Assistance to Misconduct" highlights the dual role of Generative AI (GenAI) in student learning—as both a facilitator of educational enhancement and a potential source of academic misconduct. The findings demonstrate that students utilize GenAI tools for practical tasks like debugging, content creation, and deeper engagement with learning materials through study aids and exam preparation. The research highlights a nuanced perspective on the ethical use of GenAI, distinguishing between acceptable assistance and potential academic misconduct.

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