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Title and Abstract:

Title: The Matrix has arrived: How the boundaries of Artificial Intelligence in education and beyond have been Terminated

Abstract: Artificial Intelligence has made significant strides in recent years and is now being implemented in various fields, including education. This paper explores the current state of AI in education, its benefits, and challenges. AI can help personalize learning, identify knowledge gaps, and provide immediate feedback to students. However, its implementation also raises concerns such as the potential loss of human interaction and the need for data privacy. This paper concludes by discussing the importance of striking a balance between AI and human involvement in education to maximize its benefits while addressing the challenges.

Introduction and Background:

The topic of choice for our group, "The Warlords," was the implementation of AI in education. Now, this is a very diverse topic because as you may know, AI has become more advanced than ever, technology as a whole has grown tenfold. We decided to choose this topic because it seemed to be the topic of relevance. You are starting to see AI becoming more and more implemented in college life and sometimes even in personal life. Another reason we decided to choose this topic was because we knew there were going to be many different perspectives and overall experiences with the use of AI, in terms of education.

The research topic of implementing AI in education is important and significant because of the growing use of technology in our daily lives, including education. With AI becoming more advanced than ever, it has the potential to revolutionize the way we learn and teach. This topic is novel because it brings together multiple different perspectives and ideas with the use of AI in education, which can then lead to a

much better understanding of its benefits and drawbacks. Overall, this research topic has the potential to shape the future of education and is an exciting and timely idea of study.

Collection Methodology:

Our group decided to collect our data by conducting in-depth and sophisticated interviews that allow us to collect beneficial information to get the answers we need. We decided to ask questions revolving around the use of AI in classrooms, questions involving the experiences the interviewees had with AI, how they feel AI can help or even have drawbacks, etc. We decided to use 4 research questions to answer using the interviews we have conducted. These research questions are as follows:

- "What are students' perspectives on AI in the classroom?"
- "How have you utilized AI tools and what have been the outcomes of your experiences?"
- "What are your perspectives on the ethics of using AI as part of your education?"
- "How do students believe AI tools will impact their education and learning outcomes in the long term?"

We wanted to ensure that our participant recruitment methods were ethical and following appropriate guidelines. Therefore, we decided to use three different types of recruitment channels, these being Discord, Email and In-Person recruitment. We made sure to obtain informed consent from participants and explained the purpose of the study. We also provided participants with an opportunity to ask questions and ensured that our recruitment methods resulted in a very diverse and representative sample of participants that more accurately reflected the population we were studying.

Data Description:

In terms of how much data was collected, we, "The Warlords," conducted a total of 17 individual interviews, with a total of 17 participants. Each interview lasted approximately 30-45 minutes. Each ranging from multiple different viewpoints and ideas on the topic at hand. The type of data that was collected from these interviews were more qualitative based. As we have obtained a more wide-variety of

data and different perspectives and experiences from this data. All of the 17 individual interviews were semi-structured interviews, meaning that we had a set of premeditated questions, which also allowed participants to provide additional information and insights.

We, as a group, collected in-depth interviews to gain valuable insights into the implementation of AI in education. Our dataset consisted of 17 total interviews with diverse participants, which were conducted through various channels such as discord, email and in-person recruitment. Again, each interview lasted between 30-45 minutes, and we asked questions related to the use of AI in the classrooms, participants' experiences with AI tools, their perspectives on the ethics and use of AI in education, and the overall long-term impact of AI tools on learning outcomes. Overall, our dataset provided us with a rich and diverse set to analyze and draw conclusions regarding the implementation of AI in education.

Analysis:

Some methods that we used to conduct this analysis was to individually split up the research questions amongst one another and code all 17 interviews based on each research question. Now, I know what you're thinking, wouldn't that be much longer. No, it wasn't, as a matter of fact it was more effective in terms of information gathered and efficient in terms of time management. We spent less time working and ended up gathering much more themes/codes and overall findings to help us shape our analysis.

What are students' perspectives on AI in the classroom?

After analyzing the various interviews, it is clear that students have a positive outlook on the potential of AI in education. They believe that AI has the capacity to positively affect their productivity and understanding of complex concepts while also providing practical, real-world simulation experiences.

Also, AI tools like chatbots and natural language processing can make learning more engaging and interactive. However, students also have concerns about the impact of AI on their learning outcomes.

One of the main concerns that was stressed by students is the potential for bias in AI algorithms. Students worry that AI algorithms may perpetuate existing biases and lead to unfair outcomes, particularly for underrepresented groups. In order for these concerns to be properly addressed, students felt the need to suggest regularly testing and training AI algorithms on unbiased data. They also want accountability to be held and ethical decision-making in the decision-making process.

Another concern stressed by students is the possibility of job displacement due to automation. Students acknowledge the potential for AI to replace some professors and job positions, but they believe that AI cannot replace the personal connection between students and teachers. They emphasize that AI cannot provide the same level of personalization and individual attention as a human teacher. Overall, students need a hint of human intelligence in order for a classroom to run accordingly.

Students also stressed about frustration with the lack of involvement from professors in integrating AI into their coursework. They believe that professors should understand the potential of AI and not see it as a source of plagiarism all the time. Students feel that the incorporation of AI into education represents both opportunities and challenges, as they navigate the ever-evolving landscape of technology-enhanced learning.

Overall, students recognize the potential benefits of AI in education and view it as a useful tool for learning. However, they also recognize the limitations of AI in encouraging critical thinking and creative problem-solving. They believe that AI has the potential to personalize their learning experiences, provide unlimited patience and support, and improve accessibility for learners with different needs. Nonetheless, students need to be prepared to adapt to new technologies and incorporate AI into their learning strategies to take advantage of its potential. Rather than use it as a substitute for their educational life, use it as an aid to help you pass those boundaries.

Discoveries (Insights):

These were more valuable insights that were taken into consideration. Personally, I (Devendra) found that there was one interviewee in particular who couldn't stop stressing about personalized learning plans for those who have difficulty processing information and or people with disabilities. I found this very interesting to see that AI can't only help the people of the ordinary but also the people of the unordinary.

How have you utilized AI tools and what have been the outcomes of your experiences?

AI Tools Usage

Participants in the study displayed varying patterns. Most participants reported using ChatGPT frequently, while a subset of participants expressed strong opposition to AI, specifically chatbots. Interestingly, these participants seemed more inclined to utilize AI for recreational purposes, particularly in the context of image generation. Furthermore, some participants reported using AI tools sparingly, while one participant had only used ChatGPT once. For a detailed analysis of participants' experiences and usage of ChatGPT and other AI tools, please refer to the experience sections.

AI Image

Participants demonstrated diverse usage and feedback concerning AI image generation. Some participants expressed disappointment with the results, characterizing AI-generated art as lacking quality and soul. In contrast, others found it to be adequate for personal use or for entertainment purposes. Additionally, a group of participants considered AI image generation to be the most fascinating and enjoyable aspect of the current AI tools offered on the market.

Grammar

The majority of participants acknowledged using AI tools for grammar assistance in their academic and research writing. The most common tools included Grammarly and ChatGPT. Surprisingly, contrary to expectations, some participants preferred Grammarly over ChatGPT. The preference for Grammarly was attributed to the ease of use offered by the Grammarly browser plugin.

Coding / Code Reviews

The views of participants regarding AI tools for coding and code reviews were diverse. Some programmers (possibly advanced or more senior programmers) expressed negative opinions, perceiving AI tools as unsuitable for code analysis. Conversely, some programmers (potentially junior-level) found AI tools to be valuable for coding purposes.

Expectations

Participants in the study held diverse expectations regarding AI tools. Their expectations ranged widely, with some users anticipating AI to deliver more comprehensive and detailed answers, while others held a contrasting perception, considering AI to be inherently limited or lacking intelligence. Participants expressed that their expectations were either unmet, partially met, fully met, or exceeded by the performance of AI tools.

Worst Experiences

Among the participants, encountering incorrect answers/information was frequently reported as their worst experience when using AI tools. To enhance the study, a supplementary question could be included to assess users' understanding of the significance of training AI models and their familiarity with training techniques. This investigation may reveal a relationship between the accuracy of AI-generated responses and the user's proficiency in model training. Furthermore, participants expressed dissatisfaction with waiting times associated with AI tools. The waiting experience can be further categorized into two aspects: (1) waiting room issues observed in earlier versions of ChatGPT, and (2) extended delays in receiving results or answers.

Best Experiences

The participants in the study shared valuable insights regarding their best experiences with AI tools, offering a rich dataset for analysis. A substantial number of participants reported finding these tools highly beneficial in various areas. Common applications and positive experiences included brainstorming,

ideation, enhancing writing skills, boosting productivity, optimizing code and algorithm performance, and identifying solutions to complex problems. Moreover, participants highlighted the utilization of AI tools in research, finance, as well as aiding with math and physics formulas. These experiences provide valuable insights into the versatile and effective utilization of AI tools across various disciplines, expanding our understanding of their potential applications.

Most Bizarre.

Certain bizarre applications of AI were uncovered, such as Biden and Trump voice overs, as well as encounters with “crazy” content online, which participants chose not to elaborate on. However, the most remarkable instances involved two participants discussing the use of AI porn. We will just leave that there as further analysis on this area is outside this researcher’s skillset and any additional commentary on this topic is beyond the scope of this paper.

Pay for AI.

Remarkably, a significant number of participants expressed a willingness to pay for AI tools. I was interested in the substantial amounts they indicated they would be willing to pay. While some participants were not inclined to pay at present, they expressed the possibility of considering payment in the future, contingent upon factors such as features, capabilities, and pricing. However, there were participants who adamantly stated that they would not pay for AI, now or in the future. The majority of participants are willing to pay between $10 and $50 per month. It is noteworthy that individuals who currently do not use AI expressed a readiness to pay, while some current AI users remained firm in their stance against payment for AI.

Features of AI Tools.

The insights provided by participants regarding the characteristics of AI tools were intriguing. It raises the question of whether a correlation exists between participants' limited knowledge or inability to articulate the features of AI tools and their experience in using them. Moreover, it prompts us to consider the

influence of such knowledge on the educational impact of AI tools. These are questions that could have been explored further given additional time or opportunity for future research.

Responses from participants encompassed a range of aspects, including the standard user interface for chatbots, such as the presence of a textbox, the capability to specify parameters, limitations like character count, and feedback mechanisms like thumbs up or thumbs down for rating the results.

Key Findings / Implications.

To summarize student's AI usage & experiences, limitations have been identified, including AI's inability to replace human writing, conduct fact-checks, and perform advanced code review. Participants' experiences and expectations varied greatly, with some finding AI tools highly beneficial while others were disappointed with the outcomes. Analyzing the data uncovered prevailing themes and patterns that offer valuable insights for improving future AI tools and enhancing their usability.

To gain a more comprehensive understanding of students' experiences and the current use of AI tools, further in-depth analysis is necessary. Allocating additional research efforts and time is crucial for exploring this subject in greater detail.

What are your perspectives on the ethics of using AI as part of your education?

The ethical divides between students on the ethics of using AI for schoolwork really comes through in the third research question. Immediately the divide between using it for different classes created many different responses. Those who were opposed to AI were unsurprisingly in agreement by saying that the use of any AI in any class is wrong. Those who have used AI before for school work had a bigger variety of answers. The main divide came in the form of writing compared to mathematics, mainly that mathematics is viewed as acceptable by all whereas writing was more divisive. The answers ranged from letting the AI write everything to using it only for quick outlines or research questions but felt uncomfortable using it to produce work that would be submitted. Some possible reasons for this hesitation

for using AI in writing could be that it is easier to detect AI written text then mathematical calculations or that they simply view it as another calculator, something that is already somewhat controversial in the mathematics department. One of the participants even states that they were able to detect when a fellow peer used AI on a project without the use of software. This may also be because of the current state of AI being more regurgitative than creating anything new, something that multiple participants have mentioned. One participant, from the design school, said that due to current AI models working on averages the result was never good enough to consider building off of or using. This lack of creativity seems to be a major limiting factor in using AI for schoolwork.

Most students are not concerned with getting caught using AI tools for their school work. This could be due to the fact that many of the students are already being assisted by software in one way or another. Sites like Google, Wikipedia, and Chegg have been mentioned by participants and have been around for a long time. The common consensus is that people who will cheat will use these sites or others to do so and will not be stopped by professors' pleas. Other students are not concerned because they never copy directly from the AI but will use the technology to gather information but will write the paper themselves. Even those who did not use AI were open to the idea of using the technology as a tool, but stressed the importance of intent. Those students who are using the AI with the specific intention to educate themselves will be virtuous with or without clear stated rules. AI tools were found to save the students time, so a possibility is that, to the students, the perceived benefits of using the AI outweighs the potential risks of getting caught. Those who are less trustful of AI also mentioned that the lack of sources and verification of facts leads them to trust the outputs less and make them more fearful of potentially getting caught. Critics mentioned that since the AI draws in from the internet, even from potentially outdated or purposefully misconstrued information, the risk dissuades them from using AI for assignments.

Participants were also divided on the subject of discrimination against the student body by the administration. Few were able to come up with an idea on how AI could be used to manipulate or control the student population but were more open to the idea about potential biases that the AI could possess.

Training the AI on old data or data that was collected in an unethical or unreliable way was the most common fear of AI discrimination. Participants also mentioned that the implementation of the AI is important when considering discrimination. If the administration uses it to do menial tasks then the AI is in no position to discriminate while putting it in charge of hiring and student recruitment could lead to discrimination much faster. One participant was adamant that AI usage would lead to discrimination sooner rather than later. Students that were pro AI were more likely to dismiss these concerns for a variety of potential reasons such as being more trusting of the AI, not having enough knowledge on the subject, or that by the time AI is implemented in such a way it will be so advanced compared to current implementations it might as well be indistinguishable.

How do students believe AI tools will impact their education and learning outcomes in the long term?

The analysis of all interviews using the transcript codes of creativity, career impact, problem-solving, and ethics, provides valuable insights into students' beliefs regarding the long-term impact of AI tools on their education and learning outcomes.

In terms of creativity, the majority of participants recognize the potential of AI to enhance creativity. Participants' perspective aligns with the code of creativity as they suggest that AI can stimulate students' creativity by providing AI-generated ideas as a starting point for their own solutions. Similarly, some participants believe in the positive role of AI in fostering creativity, and their emphasis on moderation and combining AI with critical thinking skills correspond to the code of creativity.

Considering career impact, participants acknowledge the transformative potential of AI, which corresponds to the code of career impact. Some participants suggest that AI may replace specific jobs but also create new opportunities, particularly in fields like engineering and game sciences. This perspective aligns with the career impact code, indicating an awareness of the potential impact on future job prospects

and career opportunities. Another participant's emphasis on AI's ability to increase efficiency and reduce human error in tasks involving repetitive calculations also corresponds to the career impact code.

In terms of problem-solving, participants believe that AI can aid students in solving problems effectively, which corresponds to the problem-solving code. One participant expresses agreement with the notion that AI can enhance problem-solving capabilities. Similarly, one participant mentioned the advantages of AI in asking follow-up questions and exploring related topics aligns with the problem-solving code.

Ethical considerations are also highlighted by the participants, corresponding to the code of ethics. They agree that schools and universities have a responsibility to address the ethical and social implications of AI. Some participants emphasized the importance of responsible AI use, highlighting concerns about over-reliance on AI and potential negative impacts on critical thinking skills. One participant suggests an open-minded approach towards AI while also stressing the need for education on proper AI usage, reflecting their recognition of the ethical considerations associated with AI.

Overall, the analysis reveals that students hold diverse perspectives regarding the impact of AI tools on their education and learning outcomes in the long term. The interview transcripts coded with creativity, career impact, problem-solving, and ethics highlight these perspectives. While there is recognition of the potential benefits of AI, concerns are also raised, indicating the importance of responsible use and addressing ethical considerations. This analysis underscores the significance of educators and institutions navigating the integration of AI tools in education to maximize the positive impact on students' creativity, problem-solving abilities, and future career prospects while ensuring ethical and responsible AI usage.

Limitations and Reflections:

As “The Warlords,” we learned multiple different things such as:

- The implementation of AI is a relevant and timely topic that brings together multiple different perspectives and ideas
- In-depth and sophisticated interviews are an effective way to collect beneficial information for research
- Participant recruitment methods should be ethical and follow appropriate guidelines, such as obtaining informed consent and ensuring diversity in the sample.
- Semi-structured interviews allow a wide variety of data and different perspectives to be and experiences to be obtained
- Unitizing and coding is an effective process for analyzing interview data and finding diverse ideas to enlighten the topic of choice, in our case it would be, AI implementation in education.
- The inclusion of educators, administrators, and students should have been expanded upon in the study. By not doing so, our research was limited in perspective and lacked a comprehensive understanding.
- Despite initially considering myself neutral and unbiased towards AI, I found myself becoming frustrated with participants who strongly opposed AI, without understanding the reason behind my emotional response.
    - I also noticed a tendency to give more weight to answers that aligned with my own opinions. If a participant reported successful AI tool usage in a way that resonated with my personal experience, I mentally prioritized it. Conversely, I disregarded answers that described successful usage in ways I hadn't encountered or disagreed with as less important.
- I realized that I made assumptions about participants' coding abilities. I wrongly associated positive feedback on ChatGPT's usefulness in coding and code reviews with junior-level programmers, while perceiving negative feedback as coming from more experienced or senior programmers. However, it is unreasonable to judge their coding proficiency based solely on a

short interview about AI tools. Some participants might have been more skilled at training the model and obtaining better results.

- Some interviewers consistently probed for detailed answers, especially when participants provided simple yes/no responses. However, others did not follow up with necessary follow-up questions like "how...," "can you explain...," or "can you give an example...". Our professor warned us about the importance of careful questioning to elicit more expansive responses. Given more time, we would have revised the questions to minimize yes/no answers and incorporated appropriate follow-up questions using who, what, when, where, why, and how, when appropriate.

As a group, some things we could have done differently is perhaps more recruitment channels to ensure even more diversity in the sample. The group could have used a mixed-methods approach to obtain both qualitative and quantitative data to provide a more complete understanding of the topic. While I am not saying what we have can't be both, it could have been executed a bit better.

The obstacles faced were the fact that some participants didn't have time to do interviews, which sort of led some team members to find new participants. Another obstacle that was faced was the premeditated questions, follow-up questions, sometimes these questions were just off rip. You didn't know when or when not an interviewee was going to give a one-word answer. And if done so, a follow up question would have been asked.

Tips to overcome these challenges:

- Plan ahead more next time: Maybe ask a little more questions to yourself on whether or not this can be answered in one-word, etc.

- Be flexible: Recognize the fact that unexpected situations can occur during interviews, and be prepared to adapt accordingly. (For example: one interview was cut short due to emergency situation for a participant, so I had to pick up where we left off some other time through discord)

Overall, with good planning and communication, effective questioning techniques and much more, you can overcome these obstacles in conducting interviews. The study was fun and interesting. Some questions remain unanswered. Will AI be a benefit to education or detriment? Only time will tell …. Or just ask ChatGPT!