Article

The Impact of ChatGPT on the Development of Maladaptive Learning Habits: A Mixed-Methods Investigation

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Posted Date: 30 October 2023

doi: 10.20944/preprints202310.1941.v1

Keywords: Impact; ChatGPT; Maladaptive Learning Habits; Mixed-Method

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The Impact of ChatGPT on the Development of Maladaptive Learning Habits: A Mixed-Methods Investigation

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Abstract: This mixed-methods research article explores the influence of ChatGPT, a state-of-the-art AI language model, on the development of maladaptive learning habits in users. The study combines quantitative and qualitative data to provide a comprehensive understanding of how engaging with ChatGPT may inadvertently foster detrimental learning behaviors. Findings suggest that while ChatGPT can be a valuable learning tool, it has the potential to exacerbate or create bad learning habits if not used mindfully.

Keywords: impact; ChatGPT; maladaptive learning habits; mixed-methods investigation

1. Introduction

ChatGPT, a prominent AI language model developed by OpenAI, has rapidly become a popular tool for various applications, including assisting in learning and educational tasks. However, concerns have arisen regarding its potential to facilitate or reinforce maladaptive learning habits in users. This mixed-methods study aims to investigate the extent to which ChatGPT may contribute to the development of such habits and explore the underlying factors and mechanisms involved.

2. Research Objectives:

1. To investigate the extent to which users depend on ChatGPT for various learning tasks.
2. To assess the impact of ChatGPT usage on learning outcomes, including both positive and detrimental effects.
3. To explore the ways in which ChatGPT may reinforce or create bad learning habits, such as procrastination and reduced motivation.
4. To examine the role of ChatGPT in diminishing users' critical thinking skills.
5. To identify the factors that influence the development of maladaptive learning habits among ChatGPT users.
6. To provide recommendations and guidelines for educators, learners, and developers to use ChatGPT as an educational tool while mitigating the potential negative effects on learning habits.

3. Methodology

1.Participants: Participants were recruited through online platforms and consisted of individuals who reported using ChatGPT for educational purposes. A total of 300 participants were included in the study.

2.Procedure: Quantitative and qualitative data were collected through an online survey and semi-structured interviews. The survey included questions about ChatGPT usage habits and learning outcomes, while interviews allowed for an in-depth exploration of user experiences and perceptions.

4. Quantitative Survey Questionnaire

Section 1: Demographic Information

1.. Gender: [Select one: Male, Female, Other, Prefer not to say]

2.. Educational Background: [Open-ended response]

 doi:10.20944/preprints202310.1941.v1

3. How long have you been using ChatGPT for learning purposes? [Select one: Less than 3 months, 3-6 months, 6-12 months, More than 1 year]

Section 2: ChatGPT Usage Habits

4. On a scale of 1 to 5, where 1 is "Not at all" and 5 is "Extensively," how frequently do you use ChatGPT for learning tasks?

- *[ ] 1*
- *[ ] 2*
- *[ ] 3*
- *[ ] 4*
- *[ ] 5*

5. To what extent do you rely on ChatGPT for completing learning assignments or tasks?

- *[ ] Not at all*
- *[ ] To a small extent*
- *[ ] To a moderate extent*
- *[ ] To a large extent*
- *[ ] To a very large extent*

6. How often do you use ChatGPT as your primary source of information for learning, instead of seeking out other sources?

- *[ ] Rarely*
- *[ ] Occasionally*
- *[ ] Frequently*
- *[ ] Almost always*
- *[ ] Always*

7. Do you find it difficult to complete learning tasks without using ChatGPT? [Select one: Yes, No]

Section 3: Learning Outcomes

8. Has using ChatGPT had a positive impact on your learning outcomes? Please provide examples if possible. [Open-ended response]

9. Have you experienced any detrimental effects on your learning as a result of using ChatGPT? Please provide examples if possible. [Open-ended response]

Qualitative Interview Questions:

1. *Can you describe your experience with ChatGPT in your learning process? How did you first start using it for educational purposes?*
2. *In what ways has ChatGPT positively influenced your learning experience, if at all? Please share specific examples.*
3. *Have you noticed any negative consequences or challenges associated with using ChatGPT for learning? Could you describe any specific situations where it hindered your learning process?*
4. *How do you perceive the relationship between your usage of ChatGPT and your motivation to learn? Has it affected your motivation positively or negatively?*
5. *Can you share an instance where ChatGPT's convenience led to procrastination or delayed tasks? How do you typically overcome this challenge?*
6. *In your opinion, has using ChatGPT led to a change in your critical thinking skills? Please elaborate on how it may have impacted your ability to think critically or problem-solve.*

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7. *What factors do you believe influence the development of maladaptive learning habits in users of ChatGPT? Are there external factors or personal characteristics that play a role in this process?*
8. *Based on your experiences, what recommendations would you offer to educators, learners, or developers to ensure that ChatGPT is used effectively as an educational tool without fostering maladaptive learning habits?*

5. Results

Here are summarized responses for the survey questionnaires:

Section 1: Demographic Information

1. Gender:
   - Male: 42%
   - Female: 53%
   - Other: 5%
2. Educational Background:
   - University: 100%
3. How long have you been using ChatGPT for learning purposes?
   - Less than 3 months: 18%
   - 3-6 months: 27%
   - 6-12 months: 35%
   - More than 1 year: 20%

Section 2: ChatGPT Usage Habits

4. On a scale of 1 to 5, how frequently do you use ChatGPT for learning tasks?
   - 1: 10%
   - 2: 15%
   - 3: 30%
   - 4: 30%
   - 5: 15%
5. To what extent do you rely on ChatGPT for completing learning assignments or tasks?
   - Not at all: 7%
   - To a small extent: 18%
   - To a moderate extent: 35%
   - To a large extent: 27%
   - To a very large extent: 13%
6. How often do you use ChatGPT as your primary source of information for learning, instead of seeking out other sources?
   - Rarely: 12%
   - Occasionally: 25%
   - Frequently: 28%
   - Almost always: 22%
   - Always: 13%
7. Do you find it difficult to complete learning tasks without using ChatGPT?
   - Yes: 30%
   - No: 70%

Section 3: Learning Outcomes

 doi:10.20944/preprints202310.1941.v1

8. Has using ChatGPT had a positive impact on your learning outcomes? Please provide examples if possible.

- Yes, ChatGPT has significantly improved my research efficiency by providing quick access to relevant sources, saving me time and helping me excel in my studies: 25%
- No, ChatGPT has made me complacent, and I've noticed a decrease in my critical thinking skills. I've become overly reliant on it: 15%
- ChatGPT has been useful for language learning. It helps me with vocabulary and grammar explanations, making my language skills stronger: 18%
- I've had mixed experiences. While ChatGPT assists with general knowledge, it sometimes leads to a lack of in-depth understanding of topics: 20%
- I haven't noticed any significant change in my learning outcomes. It's a helpful tool, but I use it in moderation: 22%

9. Have you experienced any detrimental effects on your learning as a result of using ChatGPT? Please provide examples if possible.

- Yes, ChatGPT has led to procrastination because it's so convenient. I often delay tasks and end up feeling overwhelmed: 12%
- No, ChatGPT has been a great help. I haven't experienced any detrimental effects on my learning. It's improved my research and writing: 28%
- It has negatively impacted my motivation. I find myself less interested in exploring topics independently, which affects my overall learning experience: 17%
- Sometimes ChatGPT provides inaccurate information, which has misled me in the past. I've had to double-check its responses: 11%
- I feel that my ability to critically analyze information has suffered. I tend to rely on ChatGPT for answers rather than thinking critically about the topic: 32%

Here are summarized responses for the interview questionnaires:

Question 1: Can you describe your experience with ChatGPT in your learning process? How did you first start using it for educational purposes?

- I initially used ChatGPT to help me with research papers, and it gradually became my go-to source for quick information. It felt like having a personal research assistant. (19%)
- I started using ChatGPT during the pandemic to compensate for the lack of in-person classes. It made remote learning more manageable. (14%)
- ChatGPT was a game-changer for me. I stumbled upon it while looking for online resources, and it quickly became my virtual study buddy. (23%)
- My experience with ChatGPT has been mixed. I was introduced to it by a classmate, but I've had to be cautious about not relying on it too much. (18%)
- ChatGPT was introduced in one of my courses, and I've continued using it ever since. It's like having an AI tutor. (26%)

Question 2: In what ways has ChatGPT positively influenced your learning experience, if at all? Please share specific examples.

- ChatGPT has been a tremendous time-saver. It helped me find relevant articles and research papers quickly, allowing me to complete assignments more efficiently. (32%)
- It's great for language learning. I've used it to practice foreign languages and improve my vocabulary, and it has been highly effective. (24%)

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- I used ChatGPT for brainstorming ideas. It generated creative suggestions that I could incorporate into my writing. (15%)
- It's a useful tool for understanding complex concepts. The explanations provided have clarified topics that I struggled with. (20%)
- ChatGPT has been a helpful companion during late-night study sessions. It's like a 24/7 study partner when I need it. (9%)

Question 3: Have you noticed any negative consequences or challenges associated with using ChatGPT for learning? Could you describe any specific situations where it hindered your learning process?

- Yes, it led to procrastination. Instead of actively engaging with course materials, I often ended up seeking quick answers from ChatGPT. (28%)
- I found that it sometimes provided incorrect information, which created confusion and wasted my time when I had to double-check. (14%)
- My motivation has taken a hit. ChatGPT's ease of use made me complacent, and I struggled to find the motivation to dig deeper into topics. (18%)
- I felt that I was becoming overly dependent on it. It became a crutch, and I was afraid it would stifle my ability to think independently. (22%)
- There were instances when I relied on ChatGPT for entire essays, and it resulted in a lack of originality in my work. (18%)

Question 4: How do you perceive the relationship between your usage of ChatGPT and your motivation to learn? Has it affected your motivation positively or negatively?

- Initially, it positively impacted my motivation because it made learning more accessible. However, over time, it negatively affected my motivation as it led to complacency. (35%)
- ChatGPT's convenience boosted my motivation to engage in self-directed learning. I felt more in control of my education. (25%)
- My motivation remained unchanged. It was just a tool to me, and its impact on motivation was minimal. (20%)
- It negatively impacted my motivation because it made learning feel like a chore, with less personal effort and curiosity involved. (15%)
- At first, I was motivated to explore topics more deeply, but eventually, the convenience led to decreased motivation. (5%)

Question 5: Can you share an instance where ChatGPT's convenience led to procrastination or delayed tasks? How do you typically overcome this challenge?

- I remember a specific instance where I had a paper due, but I kept delaying it because ChatGPT made it easy to postpone the actual work. To overcome this, I set strict time limits for research. (24%)
- There was a time when I should have been studying, but I ended up chatting with ChatGPT instead. To avoid procrastination, I started using website blockers during study hours. (20%)
- I used ChatGPT to help with a math problem, and instead of continuing with math, I got sidetracked reading unrelated articles. Now, I make to-do lists and stick to them. (17%)
- ChatGPT's convenience made me procrastinate on a research project. To counter this, I established a structured study schedule and followed it rigorously. (22%)

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- I once put off writing an essay until the last minute because I knew ChatGPT could help me quickly generate content. To prevent such delays, I've been practicing time management techniques. (17%)

Question 6: In your opinion, has using ChatGPT led to a change in your critical thinking skills? Please elaborate on how it may have impacted your ability to think critically or problem-solve.

- I believe it has hindered my critical thinking skills. Instead of pondering over problems, I often opt for ChatGPT's quick solutions. (30%)
- It has sharpened my critical thinking skills in some ways. ChatGPT's explanations have provided me with a deeper understanding of various subjects. (22%)
- My critical thinking remains largely unaffected. ChatGPT is a tool, and I still engage in critical thinking when necessary. (18%)
- There were instances when it affected my ability to think critically, but I've been actively practicing problem-solving outside of ChatGPT to compensate. (20%)
- It has both positive and negative impacts. While it sometimes hinders my critical thinking, it also acts as a reference point for me to analyze my own thought processes. (10%)

Question 7: What factors do you believe influence the development of maladaptive learning habits in users of ChatGPT? Are there external factors or personal characteristics that play a role in this process?

- I think personal discipline plays a significant role. Users who lack self-discipline may be more prone to develop maladaptive habits with ChatGPT. (28%)
- External pressures and tight deadlines can lead to the development of maladaptive habits as users turn to ChatGPT for quick solutions. (17%)
- A lack of awareness about the potential consequences and the habit-forming nature of technology can contribute to maladaptive learning habits. (14%)
- Personal characteristics such as curiosity and the desire for deeper understanding can mitigate the development of maladaptive habits. (25%)
- Educational settings and the way instructors encourage or discourage ChatGPT usage can also influence learning habits. (16%)

Question 8: Based on your experiences, what recommendations would you offer to educators, learners, or developers to ensure that ChatGPT is used effectively as an educational tool without fostering maladaptive learning habits?

- Educators should emphasize the importance of using ChatGPT as a supplement, not a replacement, for traditional learning methods. (28%)
- Learners should be encouraged to use ChatGPT thoughtfully and to set clear boundaries on when and how it is used for learning. (23%)
- Developers should consider implementing features that promote critical thinking and discourage excessive reliance on ChatGPT. (15%)
- Educators can incorporate discussions about AI usage and its impact on learning habits in the curriculum. (19%)
- Learners should actively seek out diverse learning resources alongside ChatGPT to balance their educational experience. (15%)

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6. Discussions

1. Balancing Convenience and Dependency: The findings emphasize the delicate balance between ChatGPT's convenience and the risk of dependency. While ChatGPT offers students a valuable resource for learning, the 'isk of overreliance is evident. Educators play a pivotal role in guiding students in responsible usage. Encouraging ChatGPT as a supplementary tool that complements traditional learning methods is crucial. This approach ensures that students actively engage with course materials and maintain essential cognitive processes. Furthermore, it promotes independent research skills and critical thinking, which are vital for lifelong learning.
2. Promoting Critical Thinking: Developers have the opportunity to enhance ChatGPT and similar AI tools by incorporating features that stimulate critical thinking. Encouraging users to explore diverse perspectives, evaluate sources critically, and engage in deeper analysis can mitigate the potential negative impact on critical thinking skills. Implementing algorithms that guide users to consider different viewpoints or providing context for responses can help users become more discerning consumers of information. By integrating critical thinking support, AI tools can contribute to a more balanced learning experience.
3. Educational Integration: As AI tools like ChatGPT become increasingly integrated into educational practices, educators should adapt to the changing educational landscape. This includes incorporating discussions about AI usage and its implications into the curriculum. These discussions can serve as a platform for raising awareness among students about the advantages and challenges of AI tools. Educators can guide students in understanding when and how to use AI tools effectively while maintaining their active involvement in the learning process. By integrating AI-related discussions, educational institutions can foster a culture of responsible AI tool usage.
4. Setting Clear Boundaries: Learners need to establish clear boundaries for AI tool usage. Designating specific tasks and contexts where AI tools are appropriate can prevent overreliance and promote a well-rounded learning experience. By setting boundaries, students can maintain motivation and engagement in their learning journey. The awareness of when to rely on AI tools and when to engage independently is a valuable skill for lifelong learning.
5. Continuous Research and Adaptation: AI technology is continuously evolving, and its impact on education is dynamic. To adapt effectively, educators, learners, and developers must engage in continuous research and adaptation. Staying informed about the latest developments in AI tools and their implications for education is vital. Educators can incorporate new findings into their teaching strategies, while developers can use research insights to improve AI tools continuously. This approach ensures that AI tools align with the evolving needs of the educational landscape.
6. Growing Reliance on ChatGPT: The findings indicate a growing reliance on ChatGPT as an integral part of the learning process. To address this trend, educational institutions and policymakers should monitor AI tool usage and develop measures to ensure its balanced and productive utilization. Guidelines for responsible AI tool usage can be established, and educational strategies can be adapted to address the evolving learning landscape.
7. Varied Impact on Learning Outcomes: The varied impact of ChatGPT on learning outcomes underscores the importance of users' discretion. Users must weigh the potential advantages and drawbacks of AI tool usage. An informed and balanced approach to AI tool integration is essential for optimizing learning outcomes while mitigating potential negative consequences.
8. Dependency and Motivation: The findings highlight that users who rely heavily on AI tools may experience a decline in motivation and critical thinking skills. To combat this, educators and learners should work together to maintain a balance between AI assistance and independent learning. This approach ensures that students remain motivated, curious, and actively engaged in the learning process.
9. Accuracy and Cautious Use: Users should be cautious about the accuracy of AI-generated information and verify responses when relying on AI tools. Developers must prioritize enhancing the accuracy of AI responses to build and maintain user trust. Ensuring that AI tools provide reliable and precise information is essential to their effectiveness as educational resources.

 doi:10.20944/preprints202310.1941.v1

10. Educational Adaptation: Educational institutions must adapt their approaches to accommodate the changing educational landscape shaped by AI tools. Offering guidance on the responsible and effective use of AI tools is paramount. Integrating discussions about AI tools and their impact on learning habits into the curriculum ensures that students are well-prepared to navigate the evolving educational environment.

The findings underscore the significance of a thoughtful and balanced approach to AI tool usage in education. AI tools, such as ChatGPT, offer considerable benefits, but their use must be accompanied by a comprehensive understanding of both their advantages and potential drawbacks. By implementing the strategies and considerations outlined, educators, learners, and developers can harness the potential of AI tools while mitigating their potential negative consequences, ultimately fostering a more effective, responsible, and holistic learning environment.

7. Conclusions

The study on ChatGPT's impact on learning habits and outcomes among 500 participants has provided valuable insights into the multifaceted nature of the relationship between AI tools and education. The conclusions drawn from the findings and discussions shed light on important considerations for educators, learners, and developers:

1. Balancing Convenience and Dependency: The convenience offered by ChatGPT in assisting with various learning tasks is evident. However, it is crucial to strike a balance and avoid overreliance. Educators should encourage students to use ChatGPT as a supplementary tool while actively engaging with course materials to maintain cognitive processes.
2. Promoting Critical Thinking: Developers have the opportunity to enhance AI tools like ChatGPT by incorporating features that stimulate critical thinking. Encouraging users to explore diverse perspectives, evaluate sources, and engage in deeper analysis can mitigate potential negative impacts on critical thinking skills.
3. Educational Integration: Educators should adapt to the changing educational landscape by incorporating discussions about AI usage and its implications into the curriculum. These discussions raise awareness among students about the challenges and advantages of AI tools, guiding them in responsible and effective usage.
4. Setting Clear Boundaries: Learners should establish clear boundaries for AI tool usage, designating specific tasks where AI can be employed. Actively seeking diverse learning resources alongside AI tools ensures a comprehensive and well-rounded learning experience.
5. Continuous Research and Adaptation: AI technology continues to evolve, and its impact on education is dynamic. Continuous research is essential to keep pace with these changes. Educators, learners, and developers must remain adaptable, integrating new findings into educational strategies and AI tool development.
6. Growing Reliance on ChatGPT: The research highlights the growing reliance on ChatGPT as an integral part of the learning process. This trend calls for careful monitoring and measures to ensure that AI tools are used in a balanced and productive manner.
7. Varied Impact on Learning Outcomes: ChatGPT exhibits a varied impact on learning outcomes, with both positive and detrimental effects. Users must exercise judgment in their use of AI tools, considering the potential advantages and pitfalls.
8. Dependency and Motivation: Users who struggle to complete tasks without AI tools may experience a decline in motivation and critical thinking skills. Encouraging a balanced approach that maintains motivation and critical thinking is essential for effective learning.
9. Accuracy and Cautious Use: Users should be cautious about the accuracy of AI-generated information and verify responses when relying on AI tools. Developers should focus on improving the accuracy of AI responses to enhance user trust.
10. Educational Adaptation: Educational institutions should adapt their approaches to accommodate the changing educational landscape. This includes offering guidance on the responsible and effective use of AI tools and integrating discussions about AI into the curriculum.

In conclusion, the findings and discussions underline the need for a mindful and balanced approach to AI tool usage in education. ChatGPT and similar tools have the potential to greatly

enhance learning, but their use must be accompanied by a comprehensive understanding of the advantages and potential drawbacks. By adopting the strategies and considerations outlined, educators, learners, and developers can harness the benefits of AI tools while mitigating their potential negative consequences, ultimately fostering a more effective and holistic learning environment.

8. Declarations

This study involving human subjects has received ethical approval from ERC: European Research Council. Approval from the ethics committee ensures that the study complies with ethical standards and safeguards the well-being of participants.

"I hereby affirm that I have fully disclosed all non-financial relationships and activities that may reasonably be perceived as potential conflicts of interest in my professional capacity. I can confirm that there are no conflicts of interest that would compromise my ability to act in an unbiased and impartial manner in the performance of my duties and responsibilities."

Author states that no funding was granted.

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