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FROM THINKING TO PROMPTING: HOW GENERATIVE AI IS CHANGING STUDENTS' LEARNING AND PROBLEM-SOLVING BEHAVIOUR

A Survey-Based Study of Students' Learning and Problem-Solving Behaviour

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ABSTRACT - *Generative Artificial Intelligence (AI) tools are increasingly being used by students for understanding concepts, generating ideas, solving assignments, writing, coding, and preparing for examinations. These tools provide quick academic support, but their growing use has also raised concerns about overdependence and reduced independent thinking. This study aims to understand how students use Generative AI in their academic activities and how they perceive its impact on learning and problem-solving behaviour. A survey was conducted among 101 students to collect information about their familiarity with Generative AI, frequency of use, academic purposes, perceived impact, and major concerns. The results show that 57% of respondents frequently use Generative AI for academic purposes. Additionally, 69% of respondents reported a positive impact on learning and problem-solving. However, overdependence on AI (38.6%) and reduced independent thinking (21.8%) were the most commonly reported concerns. The findings highlight the importance of using Generative AI as a learning support tool with proper guidance rather than depending entirely on AI-generated answers.*

Keywords: Generative AI, Student Learning, Prompting, Independent Thinking, Problem-Solving Behaviour, AI Dependence, Academic Activities.

1. INTRODUCTION

Generative Artificial Intelligence (AI) has become an important part of students' academic lives. Conversational AI tools are increasingly used to explain new concepts, summarise study materials, provide examples, generate ideas, assist with essay writing, support coding, and solve academic problems. These tools can help students understand difficult topics and receive quick academic support. However, their increasing use has also raised concerns about whether students are putting enough effort into independent thinking, developing their own ideas, verifying information, and solving problems on their own.

An important factor is how students use Generative AI in their learning process. When students first attempt a problem and then use AI to understand their mistakes or explore alternative solutions, it can support learning. However, when students directly ask AI to provide complete answers without trying to solve the problem themselves, they may miss important learning opportunities. The effect of Generative AI may depend on the type of academic task, the student's existing knowledge, the quality of the prompts, and the ability to evaluate the information provided.

This study focuses on understanding how students use Generative AI for academic activities and how they perceive its influence on their learning and problem-solving behaviour. Although Generative AI offers several benefits, such as explaining concepts, generating ideas, and providing academic assistance, it also creates concerns about overdependence, reduced independent thinking, incorrect information, and reduced creativity.

Learning involves several activities, including identifying problems, selecting suitable methods, developing ideas, monitoring progress, and learning from mistakes. Self-regulated learning requires students to plan their work, evaluate their understanding, and decide when external support is needed. Generative AI can assist students during these activities, but depending entirely on AI-generated answers may reduce their involvement in the learning process.

Students can obtain answers and explanations from Generative AI within a short time. However, frequent use without proper understanding or verification may create dependence on these tools. Therefore, it is important to understand how often students use Generative AI, the academic activities for which they use it, and their opinions about its impact on independent thinking and problem-solving. This study uses survey responses to examine

students' experiences, perceived benefits, and concerns regarding the growing use of Generative AI in education.

2. OBJECTIVES

The main aim of this research is to study and analyse how Generative AI is changing students' learning and problem-solving behaviour.

The objectives of this study are:

1. To understand how frequently students use Generative AI for academic purposes and how familiar they are with these tools.
2. To identify the different academic activities for which students use Generative AI, such as understanding concepts, solving assignments, coding, writing, and exam preparation.
3. To examine students' perceptions of the impact of Generative AI on their learning and problem-solving behaviour.
4. To identify students' concerns regarding overdependence on Generative AI, reduced independent thinking, and other possible disadvantages.
5. To understand students' opinions about the importance of guided and responsible use of Generative AI in education.

3. LITERATURE REVIEW

Kasneci et al. (2023) explained how Generative AI can be useful in education. According to their study, AI tools can help students understand difficult topics, get explanations, and receive learning support. However, they also discussed some problems, such as incorrect information, bias, and misuse of AI in academic work. They also mentioned that students and teachers need proper guidance while using these tools [1].

UNESCO has also discussed the use of Generative AI in education and research. It explained that AI should be used carefully and responsibly. Students should check the information given by AI and should not depend on it without understanding the answers. UNESCO also highlighted the importance of protecting personal information and keeping humans involved in the learning process [2].

Noy and Zhang (2023) studied how Generative AI can help people with writing tasks. Their study found that AI tools helped participants complete writing work faster and improve the quality of their work [3]. Although this research was not directly about students, it shows that AI can make some tasks easier and save time. However, finishing work quickly does not always mean that a person has fully understood the topic.

Bastani et al. (2025) studied the use of AI support in mathematics learning. Their research showed that the way students use AI can affect their learning. AI can be helpful when it guides students and helps them understand how to solve problems. However, simply depending on AI for answers may not support proper learning [4].

Students learn better when they try to understand a topic, think about possible answers, solve problems, and learn from their mistakes. Generative AI can help in this process by giving explanations, examples, hints, and suggestions. But if students use AI to get every answer without trying themselves, they may become too dependent on it. This makes it important to understand how students are actually using Generative AI in their studies.

Previous studies have explained both the benefits and problems of using Generative AI in education. However, students may use these tools differently depending on their subject, knowledge, and academic needs. Therefore, this study focuses on students' use of Generative AI and their opinions about its impact on learning and problem-solving behaviour. It also looks at their concerns about overdependence and independent thinking. The study is based on survey responses and focuses on students' experiences and opinions. It does not directly test their actual problem-solving ability or prove that AI causes changes in their learning.

[1] Research Questions

RQ1: How familiar are students with Generative AI tools, and how often do they use them for their studies?

RQ2: For which academic activities do students commonly use Generative AI?

RQ3: What do students think about the impact of Generative AI on their learning and problem-solving?

RQ4: What are the main concerns students have about depending too much on Generative AI and reduced independent thinking?

RQ5: Do students think Generative AI should be used in education with proper guidance?

4. RESEARCH METHODOLOGY

Research Design

This study uses a quantitative and descriptive research method to understand how students use Generative AI in their academic activities. It focuses on students' familiarity with AI tools, how often they use them, the purposes for which they use them, and their opinions about the impact of AI on learning and problem-solving behaviour.

The study is based on a survey and follows a cross-sectional approach, which means that responses were collected at a particular point in time. The purpose is to understand students' experiences and opinions rather than to prove that Generative AI directly causes changes in their learning behaviour.

Population and Sample Size

The study focuses on students pursuing undergraduate, postgraduate, and diploma-level courses. A total of 101 responses were collected through the survey.

The survey responses were collected online. The study uses the responses received from participating students. If convenience sampling was used, the findings may not represent all students or the entire student population.

Data Collection

Data was collected through an online questionnaire using Google Forms. Students were asked to participate voluntarily and provide their responses based on their experience with Generative AI tools.

The questionnaire contained 10 multiple-choice questions. It was designed to collect information about students' educational backgrounds, familiarity with Generative AI, frequency of use, academic activities, overall opinions, and concerns about these tools.

Questionnaire Structure

The questionnaire was divided into two main sections.

Section A: General Information and Use of Generative AI

This section collected information about students' education level, field of study, familiarity with Generative AI, tools they use, frequency of use, and the academic activities for which they use these tools.

Section B: Opinions and Concerns

This section focused on students' opinions about the overall impact of Generative AI on learning and problem-solving, their biggest concerns about using these tools, and whether they support the use of Generative AI with proper guidance.

Data Analysis

The collected responses were analysed using frequencies and percentages. These were used to understand the number of students selecting each answer and to identify the most common responses.

For questions where students could select more than one option, the percentage was calculated based on the valid number of responses to that question. Therefore, the total percentage for these questions may be more than 100%.

The results are presented using charts and descriptive explanations to make the findings easier to understand.

Hypotheses

The following hypotheses were proposed to study possible relationships between students' use of Generative AI and their learning experiences.

H1: Frequency and Reliance

H01: There is no association between the frequency of Generative AI use and students' reliance on AI for solving academic problems.

H11: There is an association between the frequency of Generative AI use and students' reliance on AI for solving academic problems.

H2: Attempting Problems First and Learning Support

H02: There is no association between attempting an academic problem before using AI and students' opinions about AI as a learning support tool.

H12: There is an association between attempting an academic problem before using AI and students' opinions about AI as a learning support tool.

H3: Familiarity and Perceived Impact

H03: There is no association between students' familiarity with Generative AI and their perceived impact of AI on learning and problem-solving.

H13: There is an association between students' familiarity with Generative AI and their perceived impact of AI on learning and problem-solving.

H4: Frequency and Perceived Impact

H04: There is no association between the frequency of Generative AI use and its perceived impact on learning and problem-solving.

H14: There is an association between the frequency of Generative AI use and its perceived impact on learning and problem-solving.

Limitations of Hypothesis Testing

The current questionnaire does not directly ask students whether they attempt a problem before using AI or how much they rely on AI-generated answers. Therefore, H1 and H2 cannot be properly tested using the existing survey questions.

H3 and H4 may be tested if the individual response spreadsheet is available, because it is necessary to compare the answers given by the same respondents to both questions. The overall Google Forms summary alone is not enough to perform these tests.

A Chi-square test can be used to check whether two categorical variables are associated. Cramér's V can help measure the strength of the association. Fisher's exact test may be used when the expected cell counts are too small for the Chi-square test.

Since the current study mainly focuses on survey responses, the findings are presented through descriptive analysis. No hypothesis decision or statistical relationship is claimed without the required respondent-level data.

Ethical Considerations

Students were asked to participate voluntarily in the survey. The responses were collected for academic research purposes. Personal information that was not required for the study should be avoided, and the collected responses should be handled carefully.

The study aims to present the responses honestly and use the information only for the stated academic purpose. Any additional approval required by the college or institution should be followed.

5. DATA ANALYSIS AND INTERPRETATION

The survey received 101 responses. The data were analysed using the response summaries available from Google Forms. The number of valid responses differs across questions because some participants did not answer every question. Therefore, the valid response count for each question is reported separately.

For single-choice questions, frequencies and percentages are calculated using the valid responses for that question. For multiple-response questions, participants could select more than one option, so the total percentage may exceed 100%.

Education level: Out of 101 responses, 71 respondents (70.3%) were postgraduate students, 24 (23.8%) were undergraduate students, and 6 (5.9%) had a diploma-level education.

Field of study: This question received 99 valid responses. Among them, 40 respondents (40.4%) belonged to Computer Science/Information Technology, 26 (26.3%) to Engineering, 11 (11.1%) to Commerce/Management, 8 (8.1%) to Arts/Humanities, 7 (7.1%) to Science, and 7 (7.1%) to MCA.

Familiarity with Generative AI: Out of 101 respondents, 57 (56.4%) reported being very familiar with Generative AI tools, while 27 (26.7%) were somewhat familiar. Another 15 respondents (14.9%) were slightly familiar, and 2 (2.0%) were not familiar at all.

Use for academic purposes: This question received 100 valid responses. A total of 57 respondents (57%) reported using Generative AI frequently for academic purposes, while 26 (26%) used it occasionally. Fourteen respondents (14%) had tried it once or twice, and 3 (3%) had never used it for academic purposes.

Frequency of use: Out of 101 respondents, 45 (44.6%) used Generative AI several times a day, 19 (18.8%) used it daily, and 20 (19.8%) used it several times a week. Twelve respondents (11.9%) used it rarely, while 5 (5.0%) never used it. These results show that most respondents reported using Generative AI regularly.

Overall impact on learning and problem-solving: This question received 100 valid responses. Fifty respondents (50%) described the impact as very positive, and 19 (19%) described it as somewhat positive. Seventeen respondents (17%) selected neither positive nor negative, while 9 (9%) reported a somewhat negative impact and 4 (4%) a very negative impact. One respondent (1%) was not sure. Overall, 69% reported a positive impact.

Biggest concerns about Generative AI: Out of 101 respondents, 39 (38.6%) selected overdependence on AI as their biggest concern. Reduced independent thinking was selected by 22 respondents (21.8%), followed by incorrect or misleading information by 17 (16.8%). Reduced creativity was selected by 13 respondents (12.9%), privacy concerns by 5 (5.0%), no major concerns by 4 (4.0%), and other concerns by 1 respondent (1.0%).

The following figures present the three main findings from the survey.

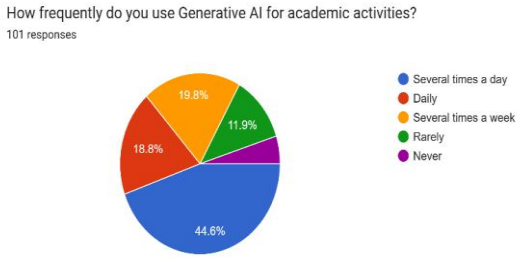

Fig. 1. Frequency of Generative AI use for academic activities (n = 101).

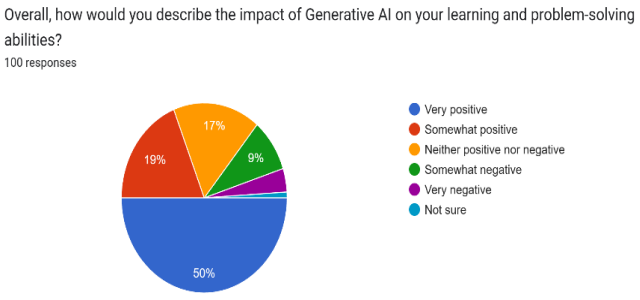

Fig. 2. Students' opinions on the overall impact of Generative AI on learning and problem-solving (n = 100).

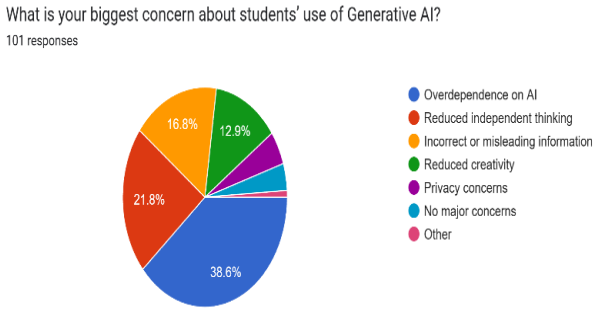

Fig. 3. Students' biggest concerns about the use of Generative AI (n = 101).

The results indicate that Generative AI has become a regular part of academic activities for many respondents. Most respondents reported a positive impact on their learning and problem-solving. However, overdependence on AI and reduced independent thinking were the two most frequently selected concerns. This shows that students recognise the usefulness of these tools while also being aware of possible disadvantages.

Generative AI can support learning by providing explanations, suggesting ideas, helping with assignments, and assisting with problem-solving. However, its usefulness depends on how students use it. If students depend entirely on AI-generated answers without understanding or checking them, it may reduce opportunities for independent thinking.

The survey measures students' reported experiences and opinions. It does not directly measure their actual cognitive ability or academic performance. Therefore, the results should be understood as students' perceptions rather than proof that Generative AI has increased or decreased their problem-solving ability.

6.1 Additional descriptive analysis of the survey responses

The survey responses provide additional information about students' familiarity with Generative AI, the academic activities in which they use it, and their opinions about guided use.

Education profile: Most respondents were postgraduate students (70.3%), followed by undergraduate students (23.8%) and diploma students (5.9%). This describes the educational composition of the survey respondents.

Familiarity: A combined 83.1% of respondents reported being very familiar or somewhat familiar with Generative AI tools. The remaining respondents were slightly familiar (14.9%) or not familiar at all (2.0%). This suggests that most participants had some level of familiarity with these tools.

Academic activities: This was a multiple-response question with 101 respondents. Understanding difficult concepts was selected by 59 respondents (58.4%). Generating ideas was selected by 46 (45.5%), coding and programming by 44 (43.6%), solving problems and assignments by 42 (41.6%), and writing essays or reports by 40 (39.6%). Exam preparation was selected by 34 respondents (33.7%), while 16 (15.8%) selected other activities. Understanding difficult concepts was the most frequently selected academic activity.

Generative AI tools used: This multiple-response question received 98 responses. ChatGPT was selected by 63 respondents (64.3%), Claude by 48 (49.0%), Google Gemini by 47 (48.0%), Microsoft Copilot by 44 (44.9%), and other tools by 27 (27.6%). ChatGPT was the most frequently selected tool among the respondents.

Guided use: This question received 99 valid responses. A total of 82 respondents (82.8%) believed that students should be encouraged to use Generative AI with proper guidance. Fifteen respondents (15.2%) selected no, while 2 (2.0%) were not sure. This indicates strong support for guided use among the respondents.

6.2 Consolidated numerical interpretation

The overall-impact responses show that 69% of respondents viewed the impact of Generative AI on learning and problem-solving positively. This includes 50% who selected very positive and 19% who selected somewhat positive. Another 17% reported neither a positive nor negative impact, while 13% reported a negative impact. The remaining 1% were not sure.

The two most frequently reported concerns were overdependence on AI (38.6%) and reduced independent thinking (21.8%). Together, these accounted for 60.4% of the responses to the concern question. Incorrect or misleading information was another important concern, selected by 16.8% of respondents.

The academic activity responses show that students use Generative AI for different purposes, especially understanding difficult concepts, generating ideas, coding, and solving assignments. The results also show that 82.8% of respondents support the use of Generative AI with proper guidance.

Overall, the findings suggest that students recognise the academic usefulness of Generative AI but also have concerns about depending too much on it. These results support the importance of using AI as a learning support tool rather than relying on it as a complete replacement for personal effort and independent thinking.

6.3 Hypothesis testing procedure and decision rule

Hypothesis testing requires respondent-level data in which each participant's answers to different survey questions can be compared. The Google Forms summary provides

overall counts and percentages for individual questions, but it does not show how the same respondent answered two different questions.

Therefore, the available summary is not sufficient to perform chi-square tests or establish relationships between variables. The respondent-level spreadsheet must be obtained before carrying out these tests.

For any chi-square test, the significance level should be fixed in advance, commonly at $\alpha = 0.05$. The analysis should report the chi-square statistic, degrees of freedom, p-value, sample size, and an appropriate effect size such as Cramér's V. Expected cell counts should also be checked before interpreting the result. If the assumptions are not met, Fisher's exact test may be considered where appropriate.

A p-value below 0.05 indicates a statistically significant association under the selected test assumptions. A p-value above 0.05 means that the study fails to reject the null hypothesis; it does not prove that the null hypothesis is true.

The proposed hypothesis comparisons require the following information:

- **H1:** Use frequency and self-reported reliance. The current survey summary does not provide a direct respondent-level comparison for reliance.
- **H2:** Attempt-first behaviour and perceived learning support. A direct question measuring whether students attempt tasks before using AI would be needed.
- **H3:** Familiarity with Generative AI and perceived impact. This comparison requires respondent-level answers to both questions.
- **H4:** Frequency of Generative AI use and perceived impact. This comparison also requires respondent-level answers to both questions.

Thus, no hypothesis can be accepted or rejected using only the available summary totals. Hypothesis testing should be completed only after obtaining and analysing the respondent-level dataset.

6. FINDINGS

The data collected from the 101 responses were analysed to get the following findings:

1. Most of the students were post graduate students. (70.3%) 23.8% were undergraduate and 5.9% were Diploma students.

2. Majority of students were very and somewhat familiar with the use of Generative AI Tools. (83.1%)

3. 44.6% of students used Generative AI several times per day, 18.8% used it everyday and 19.8% used it several times per week. This reflects Generative AI is regularly used by many students.

4. Students reported that they used Generative AI frequently (57%) and occasionally (26%). Generative AI tools were mainly used to understand complex concepts, come up with ideas, complete assignments and help with coding and programming.

5. Overall 69% of students said Generative AI had a positive impact on their learning and problem solving. 13% said it had a negative impact and 17% said it wasn't either.

6. The main issue students had with Generative AI was becoming too dependent (38.6%) followed by decreasing independent thinking (21.8%) and providing incorrect or misleading information (16.8%). This shows students are aware of the negative impacts of overusing AI.

7. The majority of students agreed Generative AI should be used with correct guidance within education (82.8%). This suggests students realise Generative AI should be used responsibly.

8. The most popular tool used was ChatGPT (64.3%). Other tools commonly used were Claude (49.0%), Google Gemini (48.0%) and Microsoft Copilot (44.9%). This shows students use various Generative AI tools within their studies.

Overall, Generative AI has become a useful tool for many students. It has provided positive impacts for the majority of students, especially when trying to understand concepts and complete academic tasks. However, there was some issues with students becoming too dependent and decreased independent thinking.

This is just what students have reported and does not show independently that Generative AI has improved or decreased students' learning ability.

7. CONCLUSION

Generative AI is changing the way students understand concepts, come up with ideas and solve academic problems. The findings from this study have shown that Generative AI is regularly used by many students within their studies. Majority of students said Generative AI had a positive impact on their learning and problem solving. 69% of students had a positive view on Generative AI.

However the findings did show there were some key concerns. The most common of these were students becoming too dependent on AI and decreased independent thinking. Whilst Generative AI can help within education, it can cause students to become too reliant on it.

The findings also showed that 82.8% of students agreed Generative AI should be used with correct guidance. This means students should use Generative AI to gain explanations, ideas and feedback but should still try to improve their own understanding and problem solving.

Overall Generative AI should be seen as a learning aid. If used with correct guidance, verifying information provided, being transparent within academic tasks and practising independent problem solving regularly students can use Generative AI responsibly. Finding a balance between using Generative AI and independent learning will help make it beneficial within education.

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