

# Helpful or Harmful? – High School Students’ Generative AI Use for Learning

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## Introduction

### Background

- High school students’ GenAI use for schoolwork increased from 79% to 84% (Jan–May 2025) [1].
- Students remain divided on whether GenAI helps or harms learning [2].
- GenAI may negatively impact learning through plagiarism, misinformation, reduced creativity, and diminished critical thinking.
- Most high schools lack clear GenAI policies, and educators are still determining how to regulate its use [3].

### Current Literature

- Over-reliance occurs when students accept AI-generated content without critical evaluation and default to GenAI for academic tasks [4,5].
- Goal orientation explains why students engage in learning and respond differently to achievement situations [6,7].
- GenAI shows a moderate positive impact on learning performance across K–12 and undergraduate levels [8].
- Heavy reliance on GenAI solutions may reduce deep learning, problem-solving engagement, and independent learning autonomy [9].
- Though there are prevalent studies on university students’ influencing factors and usage of GenAI, surveys on high school students are not prevalent.

## Research Questions

- GenAI Use** - How do high school students use GenAI?
- GenAI Use and Goal Orientation** - How is their GenAI use associated with their goal orientation?
- GenAI Use and Learning Impact** - How is their GenAI use associated with their learning behavior and outcome?



## Hypotheses

### GenAI Use

- Students use GenAI tools to engage in various activities.
- Students use GenAI tools for school work in both productive and counterproductive ways.

### GenAI Use and Goal Orientation

- Students who are learning-goal oriented are more likely to use GenAI in productive ways and are less likely to over-rely on GenAI.
- Students who are performance approach or performance avoidance goal oriented are more likely to use GenAI in counterproductive ways and over-rely on GenAI.

### GenAI Use and Learning Impact

- Students who use GenAI productively are more likely to report positive impact on their learning.
- Students who use GenAI counterproductively are more likely to report negative GenAI impact on their learning.



## Hypothesized Relationship

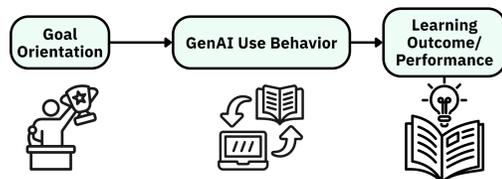


Figure 1. Hypothesized Relationship

## Procedures & Methodology

### Procedure

- Ask high school students if they are willing to participate in the study.
- If yes, give the student the parental and student consent form.
- If students turn in both consent forms, give them the survey link.
- After they complete the survey, each participant receives a \$5 compensation for their time. Responses are anonymous.

### Instruments

- Demographic Information
- Goal Orientation (Table 1)
- GenAI Use
  - Productive Use (Table 2)
  - Counterproductive Use (Table 2)
  - Purpose of Use (Table 3)
  - Over-reliance (Table 5)
- GenAI Impact on Learning (Tables 2&4)

### Participants

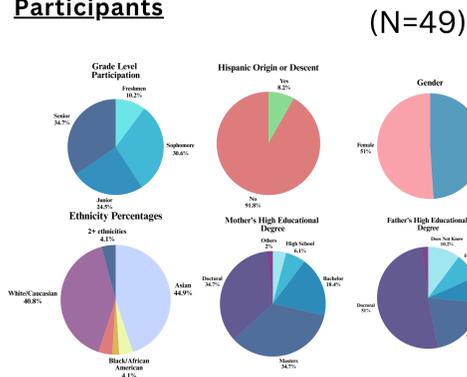


Figure 2. Demographic Information

Table 1. Goal Orientation

Statement	Alpha	M (SD)
<b>Learning Goal Orientation</b>	.77	3.54 (0.63)
I like schoolwork the most when I learn from it.		
I do my schoolwork because I like to learn new things.		
An important reason I do my school work is that I enjoy learning.		
My goal in school is to learn as much as possible.		
<b>Performance Approach Goal Orientation</b>	.86	3.30 (0.96)
Doing better than other students in school is important to me.		
I would feel successful in school if I did better than most of the other students.		
I enjoy schoolwork the most when I do better than my classmates.		
My goal in school is to perform better than other students.		
<b>Performance Avoidance Goal Orientation</b>	.83	2.90 (0.98)
It's very important to me that I don't look less knowledgeable than my peers in my classes.		
I do my schoolwork to avoid doing worse than other students.		
The reason I do my work is so others won't think I lack ability.		
One of my main goals is to avoid looking like I can't do my work.		

Table 2. GenAI Use

Construct	Example	N	Alpha Coefficient	Mean (SD)
Productive Use Frequency	I critically revised AI output before I use it.	4	.75	3.47 (0.83)
	I verified AI output from other sources to ensure accuracy.			
Counterproductive Use Frequency	I compared AI correction with my original work to learn from AI.	5	.80	1.95 (0.68)
	I interacted with AI to gain a deeper understanding of topics.			
Perceived Positive Impact	I used AI to solve problems before trying them myself.	5	.85	3.95 (0.66)
	I pasted AI outputs directly into my homework assignment.			
Perceived Negative Impact	I used AI outputs directly without understanding it.	4	.67	2.36 (0.69)
	I used AI to complete my schoolwork for me.			

## Results & Analysis

Table 3. Purpose Of GenAI Use

Statement	Mean	SD
Completing my homework problems	2.69	1.45
Helping me with challenging homework problems	3.31	0.96
Checking the correctness of the homework assignments I have completed	3.00	1.26
Providing detailed feedback for improving the work I have completed	2.84	1.40
Explaining the contents that I need help with	3.43	1.17
Learning more and in greater depth	2.90	1.39
Writing practice test problems for me	2.53	1.17
Writing computer code for me.	1.63	1.24
Debugging my programming	1.65	1.30
Making a study plan	1.57	0.76
Helping me find information sources	2.04	1.26
Summarizing reading	1.92	1.11
Brainstorming ideas for writing or projects	2.04	1.08
Drafting writing	1.51	0.96
Editing/Proofreading/Improving my writing	2.33	1.14
Translating languages.	1.51	0.89

Table 4. GenAI Impact Scale

Statement	n	Percentage
<b>Positive Impact on Learning (M = 3.95, SD = 0.66)</b>		
AI helps me understand difficult contents.	44	90%
AI helps me learn more.	36	73%
AI helps me learn efficiently.	34	69%
AI helps me teach myself.	39	80%
Overall, using AI helps my learning.	33	67%
<b>Negative Impact on Learning (M = 2.36, SD = 0.69)</b>		
AI makes me less motivated to learn.	6	12%
AI hinders my creativity.	10	20%
AI hurt my independence in learning.	9	18%
Overall, using AI hurts my learning.	2	4%

Figure 3. GenAI usage on Subjects

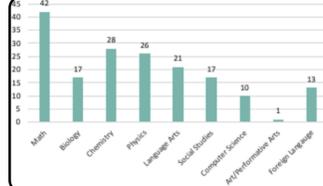


Figure 4. GenAI Influencers on Students

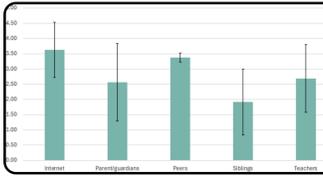


Figure 5. GenAI Tools Usage

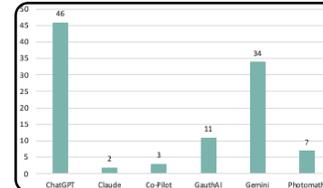


Table 5. GenAI Over-reliance Scale

Statement	n	Percentage
I rely on AI to do my homework assignments.	5	10%
Without AI, I struggle to generate ideas.	2	4%
When I use AI, I often stop trying to solve the problem on my own.	12	25%
I feel less confident completing schoolwork without AI.	14	29%
I use AI even when I could figure things out myself.	9	18%
I try less hard on assignments because I know AI can help.	10	20%
I turn to AI quickly when schoolwork feels difficult.	16	33%
I give up on a problem if AI can do it faster.	7	14%
I use AI to complete tasks instead of learning how to do them.	9	18%
Using AI for schoolwork has become a habit for me.	16	33%

Table 6. GenAI Over-reliance compared to other factors

	1	2	3	4	5	6	7
1 GenAI Over-reliance							
2 GPA	-.291*						
3 Total GenAI Usage	.521**	-.053					
4 Learning Goal Orientation	-.305*	0.215	0.038				
5 Performance Approach Orientation	-0.095	0.177	-0.039	-0.233			
6 Performance Avoidance Orientation	0.047	-0.053	0.022	-0.104	.546**		
7 Positive Impact on Learning	-0.094	-0.049	0.007	0.172	0.175	0.088	
8 Negative Impact on Learning	.372**	-0.13	0.266	-0.266	-0.034	0.045	-.302*

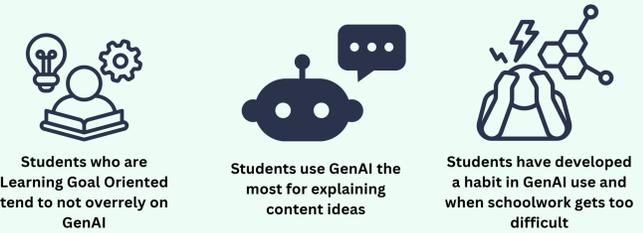
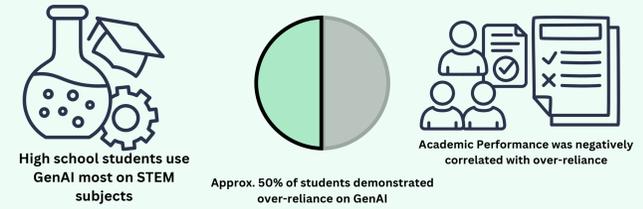
\*. Correlation is significant at the 0.05 level (2-tailed).  
\*\*. Correlation is significant at the 0.01 level (2-tailed).

### Results

- GenAI Use**
  - Students mainly use GenAI to help with challenging learning problems, checking the correctness of the homework assignments, and content explanation. In contrast, GenAI is used less frequently for independent and organizational tasks, such as making a study plan, drafting writing, and translating languages
  - Students used GenAI tools to support learning across all different subjects (see Fig. 3a). However, they tend to use GenAI predominantly for STEM-related subjects.
  - The paired samples t-test revealed that students reported significantly higher levels of productive GenAI use than counterproductive GenAI use,  $t(48) = 9.27, p < .001$ , with a mean difference of 1.52 (SD = 1.15, 95% CI = [1.19, 1.85]).
  - GPA was significantly and negatively associated with counterproductive GenAI use ( $r = -.30, p = .036, 95\% \text{ CI} = [-.54, .02]$ ), indicating that students with higher GPA reported lower levels of counterproductive GenAI use.
  - Students learned how to use GenAI more from internet and peers than teachers and parents.
- GenAI Use and Goal Orientation**
  - Students with learning goal orientations were less likely to over-rely on AI or have a negative impact on learning. Sequential regression with GenAI over-reliance as the dependent variable, GPA as the first predictor, and learning goal orientation as the second predictor. We found that learning goal orientation increased R-squared from .085 to .146,  $F(1, 46) = 3.32, p = .075$ .
  - Neither performance approaching nor performance avoidant orientation was statistically correlated with GenAI over-reliance.
- GenAI Use and Learning Impact**
  - The total GenAI usage is not significantly associated with GPA. That is, GPA is linked to how students use GenAI (i.e., over-reliance) rather than how much they use it.
  - GenAI over-reliance is significantly correlated with students' GPA in a negative way. That is, the higher the academic performance, the less likely students are to have GenAI over-reliance.
  - Negative learning impact was strongly correlated with GenAI over-reliance. Those who over-rely on GenAI are more likely to perceive a negative impact on learning, e.g., less motivation to learn, reduced creativity, and reduced independence

## Discussion & Limitations

### Discussion



### Limitations and Future Direction



Future research should include:

- Multiple school settings and socioeconomic backgrounds
- More diverse student populations
- Larger sample sizes

## Conclusions

- GenAI Use**
  - Students use GenAI for STEM subjects more than non-STEM ones.
  - Students reported to use GenAI in productive way more than counterproductive ways.
  - Lower performing students are more likely to use GenAI in counterproductive way and over-rely on GenAI.
- GenAI Use and Goal Orientation**
  - Students with learning/mastery goal orientations were less likely to over-rely on AI or have a negative impact on learning.
  - It is important to promote mastery-focused learning goals in school environment to reduce GenAI over-reliance.
- GenAI Use and Learning Impact**
  - Negative learning impact was strongly correlated with GenAI over-reliance.
  - How students use GenAI rather than how much students use GenAI impact their learning.
  - It is important to guide students, especially the students who need academic help, to use GenAI as a tool to support learning while maintaining independent, creativity, critical thinking, and cognitive development.

## References

[1] College Board: New research: Majority of high school students use generative AI for schoolwork. College Board Research Brief (2025). [2] Hu, D. X., Pang, D. D., & Xing, Z.: Evaluating the effects of Generative AI on student learning outcomes. Educational Technology & Society, 28(3), 226-240 (2025). [3] Detello, J. A., Sung, W., Mokhtari, K., Hebert, J., Bronson, A., & Giuseppe, T. D.: AI in the Classroom: Insights from Educators on Usage, Challenges, and Mental Health. Education Sciences, 15(2) (2025). [4] Zhai, C., Wibowo, S., & Li, L.D. The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. Smart Learn. Environ. 11, 28 (2024). [5] Abubakar, S., Jeitani, A., & Yusuf, M.: The role of over-reliance on AI in the negative consequences of student learning: The moderating effects of ethical concerns and institutional policies. Cogent Education, 12(1) (2025). [6] Ames, C., & Archer, J.: Achievement goals in the classroom: Students' learning strategies and motivation processes. Journal of Educational Psychology, 80(3), 260-267. (1988). [7] Meece, J. L., Anderman, E. M., & Anderman, L. H.: Classroom goal structure, student motivation, and academic achievement. Annual Review of Psychology, 57, 487-503 (2006). [8] Gököglü, Seyfullah, & Erdoğan, Fatih: The effects of GenAI on learning performance: A meta-analysis study. Educational Technology & Society, 28(3), 263-280. Springer, (2025). [9] Chiu, T.K.F.: The impact of Generative AI (GenAI) on practices, policies and research direction in education: a case of ChatGPT and Midjourney. Interactive Learning Environments 32(10), 6187-6203 (2024)