

# Breaking Barrier of Perplexity: How AI Tackles Brainstorming in Academic Writing

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## ABSTRACT

*The potential of AI as a writing help has garnered attention in recent years. Students have trouble brainstorming in writing articles. Artificial Intelligence, such as Perplexity as a writing assistance, can expand brainstorming ideas with appropriate sources and make article writing more productive. This study examines students' views on Perplexity as AI for academic writing brainstorming. This study uses descriptive qualitative with interviews as the instrument. The sample is from the English Department Study Program at one of the Universities in Central Java, Indonesia. To gather the data for this research, a close-ended interview combined with and semi-structured interview to gain more information. The results found that the most common problem encountered during pre-writing is brainstorming. Furthermore, it was found that Perplexity AI can help in brainstorming. However, there are some challenges found when using Perplexity for brainstorming, such as unexpected answers, lack of accuracy and consistency, use of unfamiliar words or language, and a tendency to exaggerate ideas. Moreover, this study implies that Perplexity AI can help students brainstorm academic writing, but educators should be aware of its limits. The use of AI for brainstorming ideas may boost creativity and productivity in the pre-writing stages.*

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## 1. INTRODUCTION

Writing plays a crucial role in English especially in this 21st century because technological advancements in the 5.0 society strengthen the need to communicate effectively through writing, especially in the context of education and professions. According to a study by Sutisna et al. (2022), writing is a complicated process that may be enhanced through dynamic thinking skills, analytical abilities, and the capacity to differentiate things effectively and validly. Writing is an essential component of the comprehensive learning process of the students. Academic Writing refers to the act of writing to meet academic requirements or to accomplish assignments for publishing or conference purposes attended by academics (Bailey, 2003; Paquot, 2010; Taylor, 2009; Thais & Zawachi, 2006). Proficiency in writing necessitates ongoing practice due to the complexity of the task. Some students are still struggling with the same issues that they always had, regarding producing texts, grammar, spelling, and identifying an idea in a piece of writing, especially in academic writing. Pratiwi (2016) stated that one issue with academic writing is that, because one has not used brainstorming approaches before, it might be challenging to arrange the ideas that have been developed into a comprehensible and logical structure. This is supported by Henry (2023) that one of the problems in academic writing is collecting the ideas into systematic structure. This proves that some academic writing problems that arise during the writing process are due to a lack of brainstorming ideas.

As explained previously, brainstorming is one of the problems in the writing process. Pratiwi et al. (2022) claimed that brainstorming is a technique for writing confidently. In brainstorming, several problems occur, including difficulty in elaborating the idea, limited sources and references, and difficulty organising the ideas found. Based on Al-Samarraie and Hurmuzan (2018), these challenges arise from the complexity of the topic and the difficulty of linking the ideas together. It can impact the challenge of obtaining reliable information and varied viewpoints to enrich the writing. As Patel (2014) pointed out, the growing significance of technology indicates its ever-expanding function as a pedagogical instrument. Technology has become more accessible, and some language skills, such as speaking and writing, are easier to do with technological implementation (Shadiev & Yang, 2020).

Artificial Intelligence (AI) has emerged as a potential tool for facilitating the brainstorming and identification of relevant reference materials in the research process. According to Muhie and Woldie (2020), AI refers to the potential for developing computer systems that simulate human-like cognitive processes for pedagogical purposes. It is supported by Memmert and Tavanapour (2023) that the use of AI has the potential in supporting individuals during brainstorming sessions. This is also in line with the result of the study conducted by Kuleto et al. (2021) that technology, especially AI can enhance student's skill, learning process, and also benefit for research purposes. In consideration of the challenges and advantages mentioned above, it is evident that AI can assist with specific aspects of the writing process, particularly in facilitating brainstorming and identifying credible sources. In this study, the researchers use Perplexity. Perplexity (<https://www.perplexity.ai/>) is an Artificial Intelligence tool that developed with the intention of assisting in the process of writing and coming up with new ideas. Perplexity works by delivering pertinent information, suggestions, or inspiration based on the input provided by the user. With the help of Perplexity AI, users can receive reliable references and be directed to sources that are pertinent to their writing, which speeds up and improves the efficiency of the writing process. A new concept can be generated with the assistance of Perplexity AI, which offers suggestions or themes that are connected. Through the provision of pertinent information or references in a timely manner, Perplexity AI helps users reduce the amount of time required to search for ideas from a variety of sources, enabling them to concentrate on producing additional ideas.

Several studies are related to the current topic, such as the study by Mariana (2016) showed that three brainstorming strategies, freewriting, listing, and clustering are equally beneficial in assisting English IKIP Mataram third semester students in the academic year 2015–2016 in generating ideas and improving their academic writing abilities. Statistical analysis using the ANOVA test supports this, as the P value ( $0.747 > 0.05$ ) is greater than alpha 0.05. It means that brainstorming to generate ideas for a pre-writing assignment greatly impacts how the students develop their ideas for academic writing. However, in the previous study, the writer did not use specific AI. Hence, in this research, the researchers use Perplexity as a tool for brainstorming ideas.

Phan (2023) in his study found that the students had positive opinions about AI writing tools because of their ease of use, flexibility, and accessibility. However, using these tools inevitably leads to some difficulties due to factors like learners' anxiety about technology and a lack of variety in the tools given. It shows that students' attitudes on the use of AI-based tools in their writing education were generally positive, especially for brainstorming ideas. Moreover, in this previous study, the writer explains the kinds of AI too broader. Hence, in this research, the researchers focus on Perplexity as AI in pre-writing stages especially brainstorm ideas.

Zhao (2022) discovered in his study on utilising Artificial Intelligence in writing that it can serve ideas when brainstorming as a source of motivation for users during the writing process and help them avoid being stuck on complex English ideas. From the previous study, it can be concluded that the study only explains the benefits and use of AI for brainstorming in general, so there are no relevant aspects. However, this study reports a student's perspective towards Perplexity as Artificial Intelligence to brainstorm ideas and to explore the challenges of it in teaching and learning in the 21st century.

This study aims to explore the benefits and challenges of using Perplexity as AI to brainstorm ideas. Furthermore this study also answer the research questions: *“What are the benefits and challenges of using Perplexity as AI to brainstorm ideas in academic writing?”*

## 2. METHOD

This research uses descriptive qualitative research to report student's perspective towards Perplexity as Artificial Intelligence to brainstorm ideas and explore its challenges in teaching and learning in the 21st century. This is supported by Cresswell and Cresswell (2018) which argued that qualitative research design aims to understand and describe things in detail.

In gathering the data, the research used close-ended interviews for combine structured inquiry data collection and semi-structured interview to gain more information. The questions were made in Google Form which that adapted from Aldabbus and Almansouri (2022); Ismail (2024); Phan (2023). The close ended interviews were designed to provide accurate data and to be specific to the goals of the study. The questions were divided into two sections. First, students were asked three questions about problems in pre-writing, especially brainstorming ideas. Second, students were asked eight questions about the use and kinds of AI that can help them to brainstorm ideas in pre-writing. In addition, after the researchers got the data from close ended interview, the researchers use semi-structured interviews that adapted from Aisy (2023); Zulfa et al. (2023). Eight questions are presented in this session to gain more information about AI which is called Perplexity and supporting the close ended interview.

The research involved 35 fifth-semester students from the English Department of Academic Writing course at one of universities in Central Java, Indonesia. Random sampling technique was used by using questionnaires. This kind of sampling was used because the population is in the same category (Sinaga, 2014). For analysis of the data, the researchers use descriptive qualitative. Agustinova (2015) cites Miles and Huberman (1984) state that the data analysis includes reduction of data, the display of data, and the drawing of conclusions

or verification. After collecting the data, the data were changed into percentages using Microsoft Excel to show the proportion of the sample. Then, after getting the data from the questionnaires, purposive sampling technique was used by using semi-structured interview for getting the sample which have the same categories that had been determined. The last step of the procedure is analysis using descriptive qualitative to ensure and detail the information.

### 3. RESULTS AND DISCUSSION

#### 3.1. Results

##### 3.1.1. Problems in Pre-Writing of Academic Writing

Prewriting is an essential step in academic writing because it lays the groundwork for creating essays or papers that are cohesive and well-structured. However, a number of obstacles that students frequently encounter during this stage may impede their writing process as a whole. A survey was administered to 35 students in order to gather information about these challenges. The results point to crucial prewriting tasks including topic selection, outline, and brainstorming as the issues of difficulty. The following Table 1 displays the data:

**Table 1.**

*The Difficulties during Prewriting Stage of Academic Writing*

Difficulties	Number of students (N=35)	Percentage
Brainstorming	29	82.8 %
Outlining	4	11.4 %
Choosing The topic	2	5.7 %

Based on the data from table 1, students were given 3 choices of difficulties in pre-writing and must choose one. The table showed that 29 students chose brainstorming, 4 students chose outlining, and 2 students chose the topic. It can be concluded that brainstorming is the most difficult thing experienced by students, it is shown by the percentage that is 82.8 % out of 100%.

**Table 2.**

*The Reason of Difficulties during Pre-Writing Stage*

The Factors	Number of students (N=35)	Percentage
Difficulty to elaborate the idea	27	77.14%
Limited sources and references	8	22.86%

Based on the results of table 2 it can be concluded that most students face the main challenge of outlining ideas during the prewriting stage, with around 77.14% of the total respondents experiencing this problem. However, limited sources and references are also a concern, albeit to a lesser extent, with only about 22.86% of students experiencing this. This shows that although there are constraints in accessing adequate sources and references, the biggest challenge remains related to the ability to elaborate ideas.

##### 3.1.2. Artificial Intelligence in Pre-Writing

The potential of AI tools to facilitate brainstorming, organize ideas, and increase overall writing efficiency has led to their growing popularity among students. Through idea generation, vocabulary suggestion, and structure coaching, these tools give invaluable support, ultimately assisting students in overcoming common writing obstacles. Students' preferences and usage frequency of the various AI tools during the pre-writing phase are highlighted in the accompanying graphic.

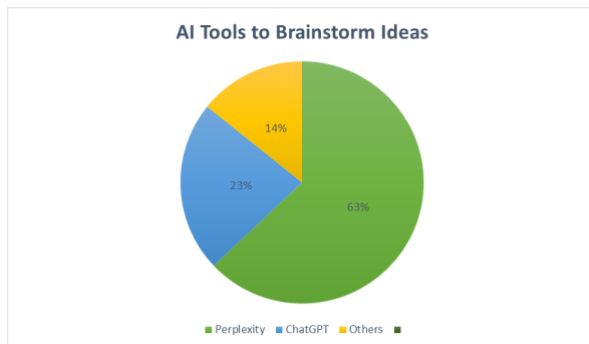
**Chart 1.***AI Tools Used by the Students*

Chart 1 shows the distribution of students who used AI to brainstorm ideas using different websites. It is shown that 63% which is represented by 22 students who are using Perplexity to brainstorm the ideas. This is followed by 23% which is 8 students who are using ChatGPT, and 14% students which is only 5 students who are using other AI tools in brainstorming ideas. It can be seen that Perplexity is the most used and is effective to be used among the other AI tools in the prewriting stage.

**Table 3.***The Use of AI in Pre-Writing Stage*

The use of AI	Number of students (N=35)	Percentage
Helps come up with ideas by making it easier to understand and find articles or references related to the study.	5	14.29%
Assists brainstorming and rough drafting ideas.	11	31.43%
Help to choose the most suitable idea to write about.	9	25.71%
Aids in developing creative ideas	2	5.71%
Provides examples and helps create overviews for writing.	3	8.57%
Helps for gather supporting information to develop further ideas	5	14.29%

Based on the table 3, the results showed that the use of Artificial Intelligence (AI) made a significant contribution to the writing process. AI helps students in the writing process by facilitating brainstorming, finding references, choosing topics, developing creative ideas, providing examples, and collecting supporting information. Thus, AI plays an important role in accelerating and enriching the writing process.

### 3.1.3. Students' Voices about Challenges of Perplexity as Artificial Intelligence for Brainstorming Ideas

**Table 4.**

*Students' Voice towards Perplexity in Brainstorming*

Students' voice	Time depth	Indicators
<b>Student 2:</b> <i>"From my opinion, I am really satisfied with Perplexity. It really helps me to brainstorm ideas."</i>	0.05-0.13	Feelings
<b>Student 7:</b> <i>"Yes, I feel happy while using Perplexity because it provides some sources related our research"</i>	0.04-0.10	
<b>Student 17:</b> <i>"My personal opinion, I feel enthusiastic of using Perplexity because it helps me for find idea in writing"</i>	0.21-0.30	
<b>Student 18:</b> <i>"I'm happy because it is easy to use for explore topics"</i>	0.13-0.19	
<b>Student 4:</b> <i>"Yes it does, the reason is Perplexity helps me to brainstorm the ideas and motivate me to seek verification, and engage in critical thinking"</i>	0.18- 0.34	Benefits
<b>Student 5:</b> <i>"Yes, I think perplexity helps me to brainstorm ideas because when I try to find a new topic for research or my paper I usually get problems to propose to my paper. I think using perplexity, it can narrow down what I want to write."</i>	0.06- 0.37	
<b>Student 12:</b> <i>"I think perplexity can help in brainstorming ideas by generating a range of suggestions or content strategies, saving time, and improving efficiency in the brainstorming process"</i>	0.05- 0.16	
<b>Student 15:</b> <i>"Absolutely yes, because perplexity helps me by offering different suggestions and references, also prompts based on the topic and provides inspiration that makes me easier to come up with the idea"</i>	0.07-0.23	
<b>Student 20:</b> <i>"Yes, I think perplexity helps me to brainstorm ideas because it suggests and give ideas to trigger my creative ideas"</i>	0.04-0.10	
<b>Student 21:</b> <i>"Yes, it really helps because perplexity can help me in providing new insights, generating drivers point of view, and inspiring me to gain new and innovative ideas, and perplexity can be a valuable tool for brainstorming."</i>	0.06-0.24	

The results of interviews with students regarding the use of Perplexity for brainstorming ideas which stated in table 4 showed positive findings. The majority of students expressed their satisfaction with its use, recognizing that it helped them develop ideas more effectively. Some students also revealed that Perplexity accelerated their idea selection process and made it easier for them to access examples and create overviews. The students saw many positive benefits from using Perplexity in brainstorming, including its ability to generate new ideas and support the development of those ideas with relevant examples. Overall, the interviews showed that the use of

artificial Intelligence such as Perplexity has great potential to increase creativity and effectiveness in the writing process.

**Table 6.**  
*Challenges and Suggestions in Using Perplexity to Brainstorm Ideas*

Challenges in Using Perplexity	Time depth	Issues
<b>Student 1:</b> <i>“Sometimes I got little bit of problem like the answer is different from what I want”</i>	0.03-0.19	Unexpected answer
<b>Student 12:</b> <i>“Yes I have encounter some challenges, particularly with its understanding of content, accuracy of its generated text, inappropriate and bias content, because lacks of human judgement can lead into lack of consistency”</i>	0.02-0.16	Lacks of accuracy and consistency
<b>Student 21:</b> <i>“The challenge I may experience sometimes is the difficulty in interpreting and implementing the result of the information provided by Perplexity due to the unfamiliar words and language”</i>	0.05-0.20	Unfamiliar words/ language
<b>Student 16:</b> <i>“I do have some problems such as, I think it's more technical problems like I don't know the keyword or instructions that I must write to give the best result ”</i>	0.01-0.25	Prompting

Suggestion	Time depth
<b>Student 1:</b> <i>“It could be customised models for specific task”</i>	0.11-0.18
<b>Student 7:</b> <i>“I think Perplexity should add some references from research gate”</i>	0.08-0.15
<b>Student 17:</b> <i>“In my opinion, Perplexity offer more user friendly language such as the use of familiar words”</i>	0.02-0.11
<b>Student 20:</b> <i>“Maybe the suggestion is Perplexity can develop the ability to understand the context without write instruction completely”</i>	0.03-0.12

Table 6 which contains about research into the challenges and suggestions of using Perplexity for brainstorming highlighted some of the issues that users face. Challenges included unexpected answers, lack of accuracy and consistency, use of unfamiliar words or language, and a tendency to exaggerate ideas. Users also provided suggestions to improve the user experience, such as more brainstorming exercises to enhance creativity, providing more reference sources, expanding the examples provided by the AI, updating the AI algorithm to generate more innovative ideas, and adding collaboration features with friends.

### 3.2. Discussion

In the writing process, students in English majors face difficulties at the prewriting stage, especially in the process of brainstorming ideas. However, they have become familiar with the use of artificial Intelligence (AI) as an aid in solving this problem. AI technology has provided significant help in stimulating students' creativity by providing diverse and inspiring sources of ideas (Burkhard, 2022). Supported by Tülübaş et al. (2023), AI has revolutionised the academic prewriting process by presenting easy-to-read results for brainstorming. This proves that AI allows students to more easily find ideas that are relevant and interesting to the topic they are researching, thus facilitating their pre-writing process effectively.

In this study, the finding in Chart 1 showed that Perplexity became the most frequent tool of AI for brainstorming ideas. Perplexity is not only the most frequently used tool for brainstorming, but also shows excellence in presenting a wide range of relevant ideas in the pre-writing process. Prasad and Jaheer (2023) stated that with its ability to analyse and generate cohesive texts, AI provides English majors with greater access to various sources of inspiration and ideas, helping them transcend any creative blocks they may face. In line with Elkhatat et al. (2023) which states that the integration of AI in the pre-writing process also allows students to develop a sensitivity to different concepts and viewpoints that they may not have thought of before, enriching their thinking in exploring their research topics. Thus, this study implies that Perplexity as an AI tool in pre-writing enhances the writing skills and enriches the ideas of English students with greater access to inspiration and diverse viewpoints.

The other interesting findings, particularly in the survey, show that there were students who have actively used Perplexity before we introduced the website so this shows a tendency to utilise the tool consciously. Furthermore, there are students who use Perplexity because they are influenced by the snowball effect, which is the influence of their peers or environment. On the other hand, the survey also showed that there are also students who tend to use Perplexity without paying attention to its purpose or benefits in depth. Finally, it was found that there was a group of students who showed a tendency to be lazy in filling out Perplexity, it could be due to a lack of motivation or understanding of the value of the activity. A detailed analysis of these patterns of behaviour provides valuable insights for pedagogical approaches in introducing and integrating tools (Meng-yue et al., 2020) such as Perplexity in the learning environment. With a better understanding of the factors that influence the use of such tools, educators can develop more effective strategies to increase participation and quality of Perplexity use in the learning process.

Based on the result of the interview, students who are using Perplexity have different experiences. Some students find it tricky because Perplexity can sometimes misunderstand what they are asking, give wrong or unfair answers, or use confusing words. This shows that Perplexity might have trouble understanding complicated topics and could benefit from clearer instructions or guides to help users get the most out of it. Therefore, there are some big themes of challenges in using Perplexity, such as how to prompt effectively to get the expected answer, credibility issues regarding the answer, and also comprehension ability of the student itself. This suggests Perplexity might work better for certain tasks or some students might be better at using it. Some students may have not encountered these challenges yet, or maybe their use cases align well with Perplexity's strengths.

By knowing the benefits and challenges of Perplexity, students have several innovative suggestions for increasing Perplexity. One notion from students was to develop customized versions for certain jobs, such as scientific research or creative writing. Student 7 proposed that Perplexity incorporate references to research databases to improve credibility and allow readers to go further into the sources. Ease of use was also an issue, with one student suggesting that Perplexity explain hard topics in simpler terms. Another student, who are student 20 proposed the ultimate aim for Perplexity which is to understand context without the need for particular instructions. These recommendations produced some interesting innovations, such as the customization of Perplexity, make the user easier to get references, also simplify explanation while maintaining accuracy. By addressing these recommendations and implementing the student suggestions, Perplexity has the potential to become a far more powerful and user-friendly learning tool.

## 4. CONCLUSION AND SUGGESTION

This research has revealed the challenges faced in using artificial Intelligence (AI) to generate ideas in academic writing. The results show that while AI can be a useful tool in facilitating the brainstorming process, there are still some barriers that need to be overcome. First, the complexity of the language and concepts involved in academic writing means that AI sometimes struggles to generate relevant and creative ideas. Limited understanding of the context and nuances of language is a major challenge in this regard. Second, although AI can provide a variety of sources and references for inspiration, its ability to generate original and innovative ideas is still limited. As a learning tool, Perplexity can be considered as an effective way to brainstorm idea learning processes. However, this study cannot be widely generalised because it only used students' perspective towards a website which is Perplexity in brainstorming. Furthermore, for future research, it is recommended to conduct a more in-depth study on the use of AI in the process of brainstorming ideas in academic writing.

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