

Impact of Artificial Intelligence Tools on Technical Communication Skills of Engineering Students

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Abstract: *Artificial Intelligence (AI) is becoming very common among engineering students. It helps them in many tasks, such as writing technical reports and improving professional emails. This study looks at how AI tools like ChatGPT, Grammarly, and QuillBot affect the way students communicate technical ideas.*

To understand this, a survey was conducted among engineering students using structured questionnaires. The aim was to find out whether these tools are actually helpful or if students are becoming too dependent on them.

The results show both positive and negative effects. On the positive side, students are improving their writing skills. Their grammar has become better, their vocabulary is more technical, and their reports are more organized. AI tools act like a writing assistant that is available anytime, helping students present their ideas more clearly and professionally.

However, there is also a concern. Many students are starting to rely too much on AI. Because of this, they may not develop strong critical thinking skills, may struggle to create original ideas, and their ability to write on their own may decrease over time.

In conclusion, the study suggests that balance is important. AI is a powerful tool that can improve technical communication and prepare students for future careers, but it should not replace human effort. Students should use AI as a helper to improve their work, while they themselves remain responsible for thinking and creating ideas. When used properly, AI can help students become more skilled and confident communicators.

Keywords: Artificial Intelligence (AI), Technical Communication, Engineering Students, AI Tools in Education, Academic Performance, Communication Skills, Machine Learning in Education, Digital Learning, Writing Enhancement, Educational Technology

I. INTRODUCTION

In recent years, the way engineering students study and work has changed a lot because of artificial intelligence (AI). AI tools are now a regular part of their daily activities. Students use these tools for many purposes, such as writing code, improving technical documents, and managing heavy writing tasks.

For example, students use AI to write lab reports, prepare project proposals, and send formal emails to teachers or industry mentors. These tools help save time and reduce mistakes, especially in complex technical writing. Since engineers often need to explain difficult concepts to different types of people, being able to write clearly and professionally is very important. For many students, especially those who are not very comfortable with English, AI is very helpful. It improves their confidence and helps them express their technical knowledge

without worrying too much about language mistakes. However, there are also some concerns. Teachers and experts worry that students may become too dependent on AI tools. If students rely too much on these tools, they may not develop important skills like critical thinking and problem-solving. Writing and thinking independently is very



important for engineers, and overuse of AI might reduce these abilities. When students depend heavily on AI to create content, they may stop thinking deeply about the topic. Instead of developing their own ideas, they might just edit what AI generates. This can reduce creativity and make it harder for them to communicate clearly without using AI tools. Because of this, it is important to understand both the benefits and risks of AI in education. The goal should be to use AI as a helpful learning tool that improves writing and efficiency, but not as a complete replacement for human thinking and effort. A balanced use of AI can help students become more skilled and confident engineers.

II. OBJECTIVES

- To examine how often engineering students use artificial intelligence tools while preparing technical reports, presentations and emails
- To understand the positive impact of AI tools on students' technical communication skills, such as clarity, grammar, structure and confidence in writing
- To identify the negative effects, for example over-dependence on AI, loss of individual writing style and possible reduction in critical thinking while preparing technical documents
- To understand how aware students are about ethical issues like plagiarism and the misuse of AI-generated content in their academic work.
- To provide simple and practical guidelines for using AI tools in a way that helps students improve their skills, without replacing their own learning and ability to communicate technical ideas.

III. LITERATURE REVIEW

Many researchers have studied how AI tools affect students' communication and writing skills, especially in engineering education. Studies show that AI tools help improve writing quality by making grammar, vocabulary, and sentence structure better. AI has greatly impacted the writing process for engineering students. For instance, it assists them in transforming intricate concepts into easy-to-understand reports. While grammar checkers were previously used only to improve punctuation, current tools enable students to comprehend the material and convey it to their audience efficiently.

Furthermore, many advanced AI writing tools have speech correction capabilities, thus helping learners enhance their presentation skills and speak confidently. These tools also offer great flexibility in formatting, editing, and citation management, thereby freeing up engineers' time. Consequently, they can concentrate on comprehending the material rather than engaging in tedious editing.

However, several problems arise with the excessive reliance on AI writing assistants. First, using these programs may lead to a lack of independent thinking and creativity because students are unlikely to make efforts to develop their ideas when they receive ready answers to any questions. Moreover, there is a high likelihood of misuse related to plagiarism and copyright. It may be challenging to identify whether the document was written by an engineer or by AI technology. Therefore, in the field of engineering education, where oral communication is not always prioritized, AI can be particularly beneficial; nevertheless, it must be used responsibly. In summary, AI is generally considered a powerful resource that promotes clarity and efficiency. Nonetheless, engineers should use these resources as support systems without relying on them exclusively

IV. METHODOLOGY

In this segment, an outline of the methodology used for determining the impact of artificial intelligence on the mode of communication by engineering students will be provided. The procedure adopted will be described in clear and concise steps to show the methodology adopted for the research.

1. Research Type

For our research, we decided to adopt a mixed method to explore the theme from various angles. Rather than using only quantitative data for our study, we also paid much attention to the actual experience of the students.



Through our analysis of both quantitative data and students' perspectives, we went further to understand how the students make use of AI tools in their daily academic activities.

2. Data Collection

We collected data in two ways:

a) Primary Data In this section, our main emphasis will be on the information gathered directly from the students themselves. This was achieved by creating an online survey with the help of Google Forms, making the process easy for all the students involved.

As a result of obtaining various students' answers, we were able to have a much more complete picture of the technology use among their academic work. It was vital to learn about the types of AI tools the majority of the students use in order to conduct the analysis. In particular, it was important to examine what tools are more popular among the students, as well as how often they are used.

In other words, with the help of this tool, we were able to determine the pattern of AI tools use among students when conducting different tasks, especially connected with writing. How often they use them Whether AI improves their writing, presentation, etc. We may also take small interviews or feedback from some students.

b) Secondary Data

We also collected information from: Research papers Journals Online articles related to AI in education

3. Sample Selection

We selected around 50–100 engineering students Students from different years (1st year to final year) This gives a better understanding of different experiences

4. Tools Used

Google Forms → for survey AI tools (ChatGPT, Grammarly) → to understand their usage Basic tools like Excel → for data analysis

5. Data Analysis

After collecting the data: We converted responses into percentages and charts Compared: Students who use AI tools Students who don't use AI tools We analyzed whether AI improved: Writing skills Clarity Grammar Presentation skills

6. Variables in Study

Independent Variable: Use of AI tools Dependent Variable: Technical communication skills

7. Ethical Considerations

Students' data was kept confidential Participation was voluntary No personal information was misused

V. AI TOOLS USED BY ENGINEERING STUDENTS

Ai tools used by engineering students

1. ChatGPT is an AI tool that helps students in: Writing technical reports Writing emails Making assignments Generating project ideas Explaining technical topics in simple language Creating presentations Writing code and code documentation It improves sentence formation and technical explanation, but over-dependence may reduce students' own thinking and writing skills.

2. Grammarly is used for: Grammar correction Spelling correction Sentence improvement Formal writing Email writing Report writing It helps engineering students write professional and error-free technical documents.

3. QuillBot QuillBot is used for: Paraphrasing (rewriting sentences) Summarizing long text Improving vocabulary Making sentences more formal Students use it while writing project reports and research papers.



4. Google Translate Google Translate is used by students who are not comfortable in English. It helps in: Translating Marathi/Hindi to English Understanding technical content Writing reports in English But sometimes translation is not technically correct.

5. Canva (AI Presentation Tool) Canva AI helps in: Making technical presentations Slide design Presentation content writing Visual communication This improves presentation and visual communication skills.

VI. IMPACT OF AI ON TECHNICAL COMMUNICATION

Impact of AI on Technical Communication Skills Artificial Intelligence (AI) tools like ChatGPT, Grammarly, QuillBot, and others are changing how engineering students write reports, create presentations, and communicate technical ideas. These tools have both positive and negative effects.

A. Positive Impact

- Improves Writing Quality AI tools help correct grammar, spelling, and sentence structure, making technical writing more clear and professional.
- AI helps make complex technical terms easier to understand by converting them into simple language, which allows students to explain concepts more clearly and effectively.
- Saves Time Students can quickly generate ideas, summaries, and drafts, which reduces the time required for writing reports and assignments.
- Enhances Vocabulary and Style AI suggests better words and phrases, improving overall communication style.
- Helps in Learning Students can learn how to structure reports, emails, and presentations by observing AI-generated content.
- AI tools help students improve their presentation skills by creating well-structured content for PowerPoint presentations and speeches, making their communication more clear and organized.

B. Negative Impact

- Over-dependence on AI: Students may rely too much on AI tools instead of improving their own writing and thinking skills.
- Reduced critical thinking: When AI provides answers, students may not analyze or understand the topic deeply.
- Loss of originality: AI-generated content may lack personal ideas, creativity, and uniqueness.
- Moreover, there is a problem of developing one's competencies, because if the person uses an AI software tool constantly while writing, he or she will not learn how to do it independently. It may result in the inability to formulate thoughts and convey one's ideas properly, without any additional assistance.
- Accuracy is one more question. AI does not comprehend information provided to it. Therefore, it provides answers based on certain patterns and not facts. Consequently, there may be some mistakes. They are especially dangerous in the field of engineering, where one should pay great attention to details and accuracy.

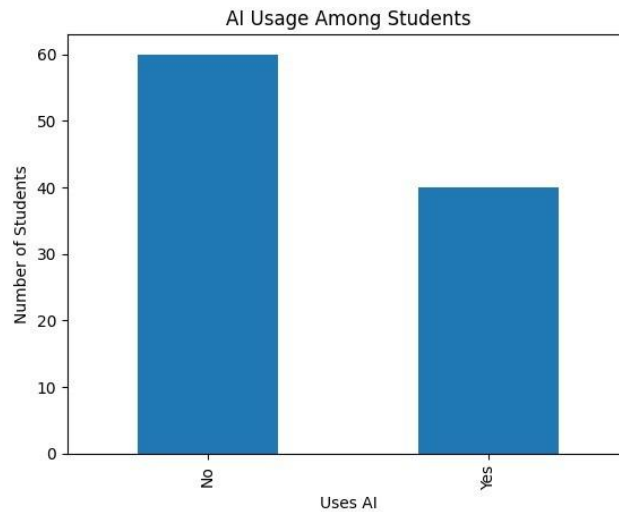
VII. RESULTS AND DISCUSSION

A. AI Usage Among Students

It is clear from the analysis of data that AI technology is no longer rare or novel. It is increasingly being used in students' daily academic routine. School students and college students are equally using AI technologies such as writing essays, completing homework, and working on complex assignments. Not only is the AI used to complete writing assignments, but many students are employing AI to help them resolve coding issues and comprehend complicated technical courses that may require too much time otherwise. This proves that AI technology is gaining importance in the field of academia with each passing day.

It can be concluded that AI technology continues to gain popularity due to its usefulness and convenience. AI technology makes it easier to learn difficult concepts in less time.

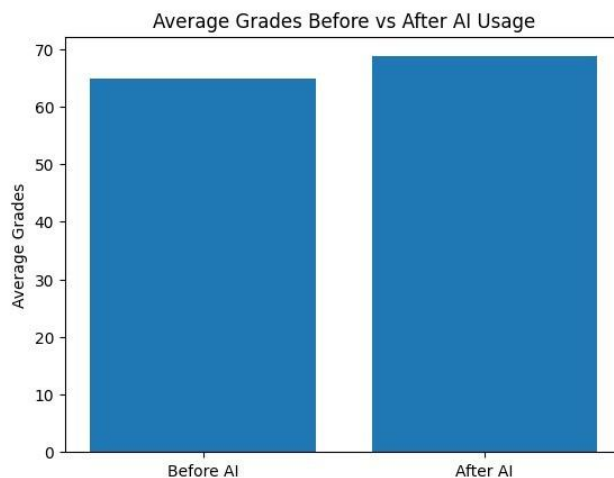




Discussion: According to the results obtained, it becomes clear that many students employ AI technologies, which now represent an integral part of their study routine. Such technologies make it easier for students to complete their tasks faster and provide an additional ease of studying. However, the main drawback of such approach is the risk of becoming too dependent on AI. Therefore, when employing AI, it is necessary to ensure that it complements, rather than replaces human thinking.

B. Academic Performance (Before vs After AI Usage)

The findings show that there has been a positive effect of AI applications on the performance of students. The mean score before the use of AI was 64.77, but after utilizing these tools, it rose to 68.70. It implies that AI does not only check grammar; it also enhances the students’ comprehension of the topic. There is an improvement in the clarity, coherence, and accuracy of the students’ submissions. This applies across various subjects and types of assessments. The other benefit is that the use of AI cuts the submission time because it formats the text.



Discussion: From the findings, it can be seen that artificial intelligence is no longer an unfamiliar tool for students but rather a commonplace aspect of their day-to-day assignments. However, this brings up an issue whereby if used excessively, the reliance on AI can hinder students' cognitive development since they will be dependent on it rather than using their brains to solve problems.

The major problem that students have to overcome is learning how to use artificial intelligence effectively. This entails being able to balance between using the technology to assist themselves and relying on their minds to function.

C. Purpose of AI Usage

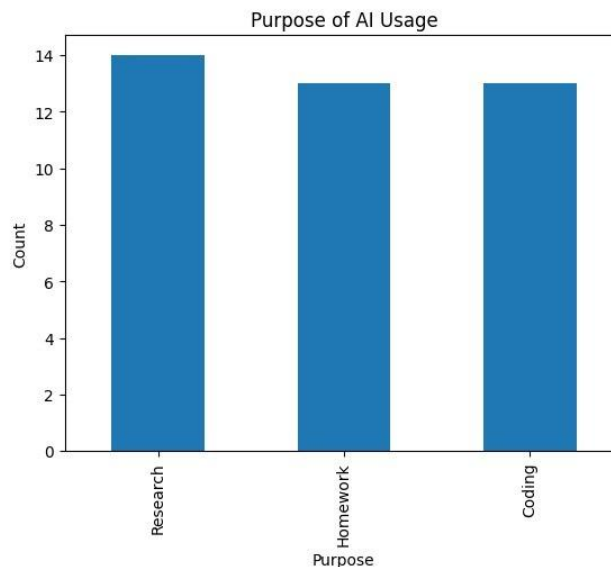
The findings indicate that the primary role of AI in the activities of students is related to learning and conducting research for homework or coursework assignments. Through this, students develop an understanding of the concepts taught in class and acquire the necessary communication skills that will enable them to explain technical concepts.

Through AI, students have access to resources that will guide them when undertaking their activities. This also simplifies processes for the students, saving their time and helping them learn effectively.

In conclusion, the findings point out that AI has become very useful in the learning process. Not only does it help students perform better in class, but it also ensures that they can easily articulate technical knowledge.

Discussion: In our study, we concluded that students use artificial intelligence mostly for researching and writing assignments, as well as for solving programming problems. In this case, one can see the role that artificial intelligence plays in studying and communicating complicated notions.

AI has been shown to have a beneficial effect on students' work. It helps students structure their thoughts, make clear explanations, and be more productive.



Nevertheless, there should be a reasonable approach toward using artificial intelligence. It must be used to enhance learning process rather than substitute personal thinking. In other words, despite helping to complete some challenging tasks, students need to stay engaged in the activity.

D. Result

Having analyzed the results, it becomes evident that AI technology is having a positive impact on the students' academic achievements and communication skills. Something that seemed novel before has become an essential part of the routine of engineering students. Using AI tools in their research, assignments and solving complex coding issues is a common practice among today's learners.



Not only do such technologies help in completing tasks faster, but also they contribute to students' better comprehension of complex information and ability to articulate thoughts clearly. These benefits are confirmed by the data provided. As the analysis shows, on average the marks increased by nearly four points after the introduction of AI – from 64.77 to 68.70. It means that AI technologies enable learners to produce more coherent papers.

However, there might be another negative aspect of relying on AI tools, i.e. potential impact on students' creativity and ability to think critically.

Summarizing all above mentioned facts, it could be stated that AI is a very useful instrument of modern times. Nevertheless, its proper usage is crucial. Learners have to use AI just as some guide in their academic progress.

E. Decision

From the analysis above, it is evident that artificial intelligence is significantly influencing engineering students positively. The use of these tools by engineering students helps them enhance management and technical communication skills.

Apart from saving time, AI facilitates easy organization, clear writing, and understanding of concepts that may be challenging. It can be used by students during research, homework assignments, and even in solving coding issues in a particular programming language.

However, caution is required since using AI to a high degree affects the thinking process of an individual. The lesson learned in this experience is that balance is critical in using these tools.

Engineering students need to learn and use AI while still exercising independent thought to avoid dependence on artificial intelligence.

VIII. RECOMMENDATIONS

Therefore, in the coming years, the best strategy will be to view AI technology not as a tool that will do the job, but as an advisor or intelligent assistant who will help complete assignments. In addition, it is necessary for engineering students to employ AI to improve the skills required to produce professional emails and reports. The best practice in this regard will be to initially prepare the report and then apply AI tools to refine the text and improve its quality by eliminating inaccuracies.

It is necessary for colleges and universities to also make their contribution. First, they need to arrange seminars where students are trained in responsible and ethical application of AI technology. In addition, teachers can suggest applying AI technology to generate ideas and check the grammar of sentences but cannot rely entirely on AI. They can only copy the text from this program if it has been written for some other purpose.

Moreover, AI technology will be very helpful in making high-quality presentations. It can provide suggestions for organizing slides and delivering technical information to the audience. Nevertheless, students will still need to cross-check any information provided by AI because, in some cases, it might give a confident yet wrong answer.

In conclusion, AI technology can be considered an extremely helpful instrument under certain circumstances.

IX. CONCLUSION

The purpose of this research is to analyze how modern technological advancements in artificial intelligence (AI) transform communication between engineering students.

Today, technologies like ChatGPT, Grammarly, and Google Translate are no longer optional; they are a standard part of the students' studying experience. Students utilize these tools when writing reports, revising email messages, and preparing technical presentations. By using them, they manage to enhance their grammar skills, employ proper technical vocabulary, and deliver their thoughts in an organized manner. The mentioned technologies prove to be particularly efficient for those students who struggle with English language skills or technical writing in general. AI provides quick assistance and ensures the creation of high-quality materials, reducing errors and saving time. That



explains why today, many students feel more confident in their presentation skills, whether they present in written or oral forms.

Nevertheless, the study reveals a potential issue that needs addressing. In case students become over-reliant on artificial intelligence, it can adversely affect their creative thinking abilities. For example, copying an answer provided by the AI without comprehending it deprives them of valuable learning and reduces their capacity to solve problems.

Summing up, the role played by AI in modern life proves to be both positive and negative. On the one hand, it assists a lot with supporting and developing thoughts. However, on the other hand, it cannot replace individual thinking in any case. Therefore, it is recommended that AI should be used responsibly.

X. FUTURE SCOPE

In future, artificial intelligence will continue to become even more prevalent in higher education, including the field of engineering. In addition to basic functions such as proofreading, it will become more of an assistance in developing specific skills in engineering students. These include developing the ability to write lengthy technical reports, prepare for presenting material, as well as composing more professional emails. With more accuracy and user-friendliness, it is expected that artificial intelligence will soon become commonplace for engineering education, assisting in understanding the technical terms and developing good communication skills.

Another positive trend in the application of AI technology is the introduction of real-time assistance, which enables the student to receive feedback immediately after completing a task. Such technology allows to continuously improve one's skills and become better at what they do. Online learning tools are increasingly incorporating this approach into their practice in order to offer students more customized help.

Of course, the increase in usage of artificial intelligence brings certain drawbacks. The excessive use of technology can potentially hinder students' creativity and independent thinking. This issue requires further investigation, therefore, future studies should focus on comparing frequent users of AI technology with infrequent users.

One of the ways to counter this problem could be to implement AI-related training programs at universities, where future engineers would learn how to use artificial intelligence responsibly. Moreover, instead of viewing it as a substitute, they should learn to see it merely as an auxiliary tool. It could have a positive effect on the development of teamwork and communication skills of engineers.

All in all, the prospects for further development and integration of artificial intelligence in education look very bright. Used wisely, this technology has the potential of producing highly skilled, well-prepared engineering professionals.

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