

## Imparting Academic Writing Skills to the Engineering Students: A Case Study

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### **Introduction**

Academic writing is a specific, subject-oriented and a formal way of presenting information in educational and research settings. It is used to express ideas, share findings, or build arguments in a clear, structured, and logical manner. This style emphasizes accuracy, brevity, objectivity, and reliability on evidence to support the said claims. Typically, it is written for a particular group of students, researchers, and professionals. It follows specific conventions, including proper references, using of formal language, and a logical flow of ideas, to ensure effective communication in a research-discipline or in a specialized-topic. It is written specifically for a learned audience and is easily available in the public domain. It is the higher order productive skill which demands sub-skills of language and mechanics of writing- discourse markers, spelling, punctuation, capitalization, vocabulary and grammar. All these mechanics of writing make the piece of writing (content) readable and comprehensive. It is about dissemination of information and ideas after a thorough analysis, interpretation and arguments leading to a proper assessment and evaluation. At every step of academic writing accuracy, brevity, clarity and objectivity are maintained through. Further, in content, form, style and language it is different from other sorts of writing such as technical writing, creative writing, business writing and various other forms of writing.

The purpose of Academic Writing is to demonstrate a theory and a point of view as against of Technical Writing which provides the technical information on how to use a particular finding by an industry, a sort of consumers and voracious readers as well. Both of the writings supply

accurate information; but, an Academic Writing is only for the highly learned audience whereas; Technical writing, is for the broader audience.

If we compare academic writing to creative writing, creative writings are to entertain and educate the audience in ample time. Whereas, creative writing plays the role of being didactic and instructive in societal arena with the help of imaginative characters in different genres like mythological, folklore and so on. In the case of business writing, we can find the business-related communications such as reports of business proposals, business strategies, business meetings, some sort of investments, profits and losses etc.

Many researchers think that Technical Writing and the Academic Writing are similar. In fact, it is not true. Presentation of information in both the cases is similar as it deals with specific domain, target audience, and using specific language (jargon). However, Academic Writing is intended to present someone's knowledge in a specific domain. It helps the researcher to find out the result of the existing research. In a nutshell, we can say that academic writing is based on research, while technical writing is to provide factual information. Academic writing presents a certain point of view of the researcher in a particular research arena; while technical writing helps to provide particular information in a particular industry or services. Commonly, Technical Writing is used in technical institutions or in engineering colleges as engineers use it in their project work and course assignments, while Academic Writing is used in universities or in Research arenas.

## **Literature Review**

In their pursuit for excellence, engineering students should and must develop their academic writing skills effectively. It is essential for them as it plays a pivotal role in the communication of ideas in the scientific and technical domains. For engineering students, the ability to write clearly and persuasively is essential for producing research papers, technical reports, project reports and contributing to academic discourse throughout their final years. However, research indicates that engineering curricula often focus primarily on technical content, with minimal attention to writing instruction (Beaufort, 2007). They only focus

on other part of the content and form rather than the style, pattern, point of view etc. This lack of focus on writing can leave students ill-prepared for the demands of academic and professional communication (Carter, 2007). It is challenging to write from requirement-based knowledge to research-based knowledge. However, it is eccentric for students to make the shift from **consumers** of research-based knowledge to **creators** of research-based knowledge (e.g., Coffin, 2006, Hood, 2004).

Numerous interventions have been conducted such as writing workshops and peer review observation etc, and it has been shown that there must be improving writing skills, but the effectiveness of these strategies in engineering contexts remains underexplored (Hounsell, 2007). Moreover, engineering students may struggle with aspects of academic writing such as organization, presentation and argumentation and the use of proper citation and referencing. However, they are unable to use technical linkers and cohesive devices in proper manner. Regarding this concern earlier studies have highlighted the value of integrating writing instruction into existing courses and providing continuous feedback to reinforce writing proficiency (Jones & Lunsford, 2014).

Engineering students need to be proficient in academic writing not only for educational success but also for professional overall development. The skill of writing is essential for documenting experiments in the college laboratory, preparing technical papers, applying for research grants and communicating within multidisciplinary tasks.

## **Aim and Research Question**

Commonly, students in engineering colleges typically excel in technical subjects such as artificial intelligence, coding, logical reasoning etc., but they often struggle to communicate complex ideas in written form effectively. The ability to write clearly and coherently is an essential part for their project work, research papers, and drafting reports etc. Despite of being well-versed in their technical areas; many engineering students still face difficulties in mastering academic writing, that often leads to challenges in publishing research, collaborating on technical projects, and fulfilling course requirements. This difficulty of writing for engineering students in technical institutions/engineering colleges is often

attributed to the fact that they need to focus on several components of writing such as accuracy, brevity and clarity (ABC). We will try to describe all the components as follows.

**Accuracy, Brevity and Clarity (ABC):** Academic Writing must convey the complex ideas briefly and concisely and whatever the subject matter is presented, accuracy should be maintained. Students are encouraged to avoid wordiness, repetitions, ambiguity, redundancies and over use of technical jargon that may lead to confusion and complexities among readers. Clarity of the content must be achieved by using appropriate cohesive devices.

**Organized Structure:** Effective Academic Writing follows a clear and compact structure—usually an **introduction** to the topic, a **body** that includes a review of existing work, methodology, results, analysis and finally **conclusion**. This structure ensures that readers can follow the systematic presentation of the research and achieve cohesion which facilitates the readers to comprehend the importance of the findings in written piece of content writing.

**Use of Evidence and Citations:** Proper citation of sources is critical in academic writing. This not only gives credit to original researchers but also strengthens the credibility of the arguments presented. Further, academic writing generally avoids personal opinions or emotional language. Instead, it focuses on factual, objective information conveyed in a concise and formal style.

The purpose of this case study is to examine effective strategies for teaching academic writing to engineering students and to evaluate the impact of specific interventions aimed at improving their writing skills. This study investigates and examines the challenges and strategies associated with enhancing academic writing skills among engineering students in an engineering college in Hyderabad, India. Further, this case study implemented a series of interventions, including writing workshops, peer reviews, and discipline-specific assignments, aimed at improving the academic writing skills of students in an engineering program. Results showed significant improvements in the clarity, structure, and academic rigor of students' written work, but also revealed

challenges such as resistance to non-technical writing and limited time for writing development. The findings highlight the necessity of integrating academic writing training into engineering.

In the contemporary engineering education, technical proficiency is highly valued, yet writing skills often remain unappreciated. While engineering students are trained to solve problems and create innovative solutions, they frequently encounter challenges in articulating their ideas clearly and coherently in academic writings such as Report, Project and other writings. This case study addresses these challenges by investigating the effectiveness of a structured intervention designed to enhance academic writing skills in engineering students. The intervention included writing workshops, peer review activities, and specialized writing assignments to address the gap between technical expertises and writing proficiency. By documenting the process and evaluating the outcomes, this study contributes to the growing body of literature on the integration and imparting of writing skills into engineering and technical education.

In Academic Writing, knowledge of discourse markers (linkers), cohesion and cohesive devices is essential. When cohesive devices are used to link between words, sentences and paragraphs logically then coherence is achieved in writing. Cohesive devices, also called linkers, connectors, discourse markers, or transitional words, are words or phrases used to connect ideas within a text, showing relationships between sentences and paragraphs, such as “however,” “for example,” “in addition,” “therefore,” and “in conclusion”. Further, the following are the examples of use of signal words while talking about facts in academic writing.

- The research confirms...
- The investigation demonstrates...
- Scientists discover....
- The survey proves...
- Darwin’s theory states...
- The result verifies...
- Common phrases

Apart from the cohesion and cohesive devices lexical forms are also quite essential in academic writing. These lexical forms like *although*, *and*, *but* help us in composing a good paragraph and express our ideas clearly. Since they scaffold ideas they are called linkers. The linking of ideas with the help of these discourse markers if done logically, then it brings coherence to the paragraph and when all paragraphs built up with appropriate linkers then there will be cohesion to that paragraph and in turn to the entire piece of writing. Consequently, there is a greater role to play by linkers which play an important role in building a paragraph in fact giving direction to the writer and guide the reader throughout. They can be classified as follows depending on the kind of role they play. A linking word is selected based on its meaning and logical sequence the writer selects to express the character of person, place and thing.

Currently in engineering colleges many engineering students are trained to focus on problem-solving and technical precision. Nonetheless, they are still lack of exposure to the conventions of academic writing, such as structure, clarity, argumentation, and citation practices. Review of existing research on methods used to improve academic writing in engineering education, such as writing workshops, peer review, and discipline-specific writing courses suggest the lacunae and deficiency in imparting such skills. To get the intervention successful I took several students as an active participant.

## **Participants**

Geethanjali College of Engineering and Technology (GCET), Hyderabad in India, is an institution with a strong engineering program, observed that many of its engineering graduates struggled with academic writing such as Project Report, Leave Application, Application for scholarships, Statement of Purposes (SOP) while they apply for Master of Science (MS) to pursue in a university abroad, and many more technical writings.

After the assessment of many students in writing given by the teaching staff members they (faculty) reported issues such as poor organization, lack of clarity, and insufficient referencing skills in students' project reports and their research papers. Recognizing the importance of these skills for academic success and career readiness, the college implemented

so many courses in English Language from first year to third year. This case study mainly focused on Third Year B.Tech students in GCET as they opted a new course *English for Professional Success* for the readiness of all the basic skills and proficiency in the professional world. The primary objective of EPS is to improve the academic and technical writing abilities of engineering students. Specifically, the program aimed to:

1. Recognize and understand the meanings of Phrases, Phrasal verbs, and other uses of Figures of Speech.
2. Read critically to comprehend the given text.
3. Understand the nature and importance of presentation skills.
4. Know the importance of organizational communication in writing formal documentations; Notice, Circular, Agenda, MoM, and SOP etc.

### **Why Academic Writing is important in Technical Institution?**

Academic Writing is a critical skill for engineers, who must be able to communicate their work not only to their peers but also to stakeholders, clients, and the public. Engineering writing includes documentation for research papers, technical reports, project proposals, and even patent applications. A good writing skill is essential for engineers to clearly articulate technical concepts and findings. It helps to document methodologies and experimental results accurately. It also helps in demonstrating credibility and professionalism. With smooth writing skill one can publish research, which can lead to professional recognition and career advancement.

Since engineering is a field that relies heavily on data-driven insights and precise methodologies, clarity in writing ensures that findings are communicated effectively and misunderstandings and ambiguities are minimized.

## Research Methodology

This case study was conducted in the classroom situation of the Computer Science and Engineering (Artificial Intelligence and Machine Learning) and the Civil Engineering departments at Geethanjali College of Engineering and Technology, Cheeryal, Hyderabad. The participants were 101 students enrolled in the course of *English for Professional Success*, designed to improve academic Reading and Writing skills. The student cohort was composed of undergraduates in their B.Tech third year first semester of their study, primarily from the Artificial Intelligence and Machine Learning (AIML) and the Civil Engineering branches. The intervention was administered over one and half months' time frame and involved in a combination of writing activities, workshops, assignments, and peer reviews.

## Intervention Design

The intervention focused on improving key aspects of academic writing, including genre, style, structure, clarity, and cohesive devices and cohesion practices. The intervention was structured by involving the students actively in the following areas of writing such as workshops, collaborative reviews, writing assignments.

- a) **Workshops:** Weekly workshops addressed various writing skills, including writing abstracts, finding genres, and formulating research questions, and structuring arguments within the specific piece of contents. These sessions also emphasized the importance of academic structure, language, point of view, tone and style.
- b) **Collaborative Review:** Students participated in structured peer review activities, providing feedback on each other's writing. This encouraged critical reading and self-reflection on their work.
- c) **Writing Assignments:** Assignments included writing lab reports, literature reviews of given novels, articles in the newspapers and summaries of academic journal articles related to engineering topics. These assignments were designed to mirror the types of academic writing students would encounter in their study and in future careers.

Thus, the researchers used several methods to extract the writing skills of a particular group of participants in the classroom situation with proper settings.

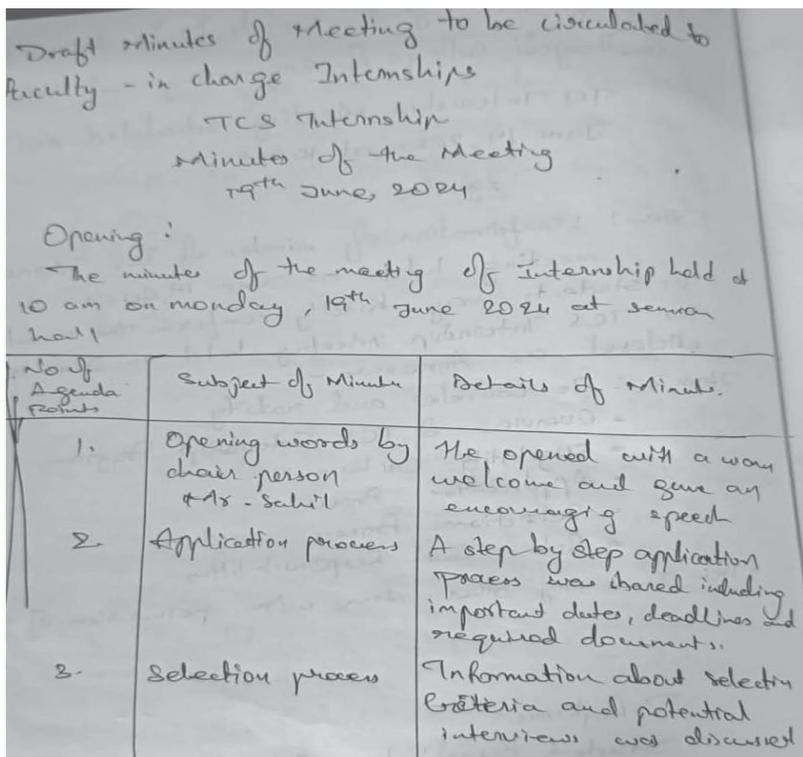
### Data Collection

Data collection involved both qualitative and quantitative methods: At the outset of the program, students demonstrated a lack of clarity in presenting ideas, difficulty organizing content logically and challenges in adhering to academic citation styles. The writing was often heavily technical with minimal attention to the structure or flow of the argument.

#### Activity: Picture 1

Draft a Minutes of Meeting (MoM) to be conducted in the department for the agenda of Internship.

#### Student's copy



5	Internship Details	• TCS representatives outlined the duration, location, roles, responsibilities & any stipend or benefit associated with the internship
6	Expectations from Interns	• Expectation regarding to conduct, work culture & performance evaluation were communicated
7	Closing Remarks	The meeting concluded with a motivational message

After the exposure to the technicalities of Academic Writing

Geeethanjali College of Engineering  
and Technology  
Minutes of Meeting  
20th June, 2024

• Informative meeting on TCS Internships held at 10:00 AM, on Monday, 20th June, 2024, Seminar Hall Block U.

Sub of Minutes	Details of Minutes
Welcome & Introduction	• The meeting commenced at 10:00 AM with a welcome note from the Student Coordinator • Introduction of the speaker & TCS representative
Overview of TCS Internship	• Representative from TCS provided an overview of the internship program, highlighting its objectives
Eligibility Criteria	• Detailed explanation of eligibility requirements for 1 <sup>st</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> year students
Application Process	• Step-by-step guide on the application process was shared including important dates, deadlines & required documents

- **Pre- and Post-Assessments:** Writing samples were collected from students before and after the intervention. These were assessed for clarity, structure, coherence, and adherence to academic conventions.
- **Surveys:** Students completed surveys to evaluate their perceptions of the effectiveness of the workshops and peer review activities.
- **Instructor Feedback:** Instructors provided feedback on the overall improvement in students' writing, specifically focusing on content organization, technical accuracy, grammar and adherence to academic conventions.

## **Results**

The case study highlights the importance of incorporating academic writing instruction into the engineering curriculum. While students improved their writing skills through structured workshops and assignments, challenges remain in helping students transition from technical to academic writing.

### **Improvement in Writing**

Analysis of the pre- and post-assessments showed significant improvement in several key areas like clarity and organization, style of writing. In this regard, students demonstrated improved clarity in presenting ideas, with fewer instances of convoluted or unclear arguments. Many students also showed enhanced ability to structure their papers logically, adhering to common academic formats (e.g., introduction, methods, body, results, discussion and conclusion). Students demonstrated greater proficiency in writing in an academic style, tone, avoiding overly technical or colloquial language, and focusing on clear and concise communication.

### **Student Feedback**

Survey results revealed that students found the peer review process particularly helpful in identifying areas for improvement in their own writing. While some students initially resisted the shift from technical to

academic writing, many reported feeling more confident in their writing abilities by the end of the course. Students noted that the workshops were most useful when they directly related to the types of writing they encountered in their coursework and future careers.

Students appreciated the hands-on approach of the workshops, especially peer review exercises, as they felt they received practical, constructive feedback. However, some students expressed difficulty in shifting from a purely technical mind-set to focusing on broader academic writing skills.

## **Faculty Feedback**

Instructors reported noticeable improvements in students' ability to organize their writing and follow academic conventions. However, faculty also noted that while students improved in technical accuracy and structure, many still struggled with critical analysis and synthesizing academic literature. This indicates the need for further focus on critical thinking and argumentative writing in future writing instruction.

Instructors reported an improvement in the quality of student submissions, particularly in terms of structure and organization. However, they noted that there was still room for improvement in terms of critical analysis and synthesis of literature.

## **Discussion**

### **Challenges in Teaching Writing to Engineering Students**

Despite the improvements in the level of academic writing, several challenges persist. Engineering students often face difficulty in shifting from purely technical writing, which emphasizes clarity and precision, to academic writing, which requires a more argumentative and critical approach. Resistance to writing that is not directly tied to technical content remains a barrier to the success of writing instruction. Additionally, time constraints imposed by the rigorous demands of the engineering curriculum made it difficult for students to dedicate adequate time to improving their writing skills.

Many engineering students are used to writing only technical reports or solving mathematical problems in written form. The transition to more descriptive, analytical, and argumentative writing was met with resistance, especially in courses where technical writing is not traditionally emphasized.

### **Suggestions for Teaching Strategies**

The findings from this study suggest several recommendations for future academic writing instruction for engineering students. They are as follows:

- **Integrate Writing into Technical Courses:** Writing assignments should be integrated into core engineering courses to ensure students practice writing in context, rather than isolating it in standalone workshops.
- **Provide Continuous Writing Support:** Writing support should be available throughout the duration of the engineering program until final year of the course with on-going workshops, writing assignments, continuous effort in fiction and few technical writing as well as individualized feedback.
- **Emphasize Critical Thinking and Argumentation:** Writing instruction should go beyond basic writing skills and encourage students to engage in critical analysis, synthesize academic literature, visualize the content and present well-supported arguments and of course provide a thoughtful judgment or form an appropriate opinion.
- **Discipline Domain Instruction:** It can include more discipline-specific writing instructions within the engineering curriculum to bridge the gap between technical knowledge and writing proficiency.
- **Feedback:** Implement more opportunities for peer review and collaborative writing to foster critical thinking and feedback.
- **Integrating in Academics:** Integrate academic writing into existing courses (e.g., research-based projects, lab reports) rather than isolating it in standalone workshops.

- Provide continuous support and resources to engineering students, especially in upper years, where research papers and professional communication become more critical.

## Conclusion

This case study highlights the importance of academic writing in engineering education and the effectiveness of structured interventions aimed at improving students' technical writing skills. While significant improvements were observed in clarity of thought in writing, organization of material, use of cohesive devices leading to cohesion of the piece of writing and they were made to understand the importance of referencing, challenges remain in addressing students' resistance to non-technical writing and time constraints. The integration of academic writing instruction into the engineering curriculum, along with continuous support and feedback is essential for developing well-rounded engineers capable of communicating their ideas effectively in both technical and academic contexts.

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