

Academic vs. Technical Writing- Strategies for Engineering Students

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Abstract

In the technologised world of today, with the advent of Artificial Intelligence in every aspect of education, ESP students are struggling to find inspiration for academic writing without plagiarising websites or without using AI to do their work for them. Ideally, students who develop their academic writing skills will display enough confidence to tackle the endeavour of writing without resorting to technology to do it for them, or at least will use technology as a tool rather than make a master of it. Academic writing tasks prepare students for the profession of technical writers, among others. The current paper seeks to investigate how the skill of writing can be improved during engineering English classes so that it plays an active role in the process of developing knowledge, critical thinking and problem solving while making good use of the technical and general vocabulary, grammar and syntax taught during ESP classes. Additionally, the paper tries to identify how technical writing differs from academic writing, thus helping future engineers transition to technical writing as a profession.

Keywords: academic writing, skill development, technical writing, writing autonomy, writing stages.

Rezumat

În lumea hipertehnologizată de azi, marcată de prezența inteligenței artificiale în fiecare aspect al educației, studenții de la facultățile tehnice se confruntă cu reale probleme în a găsi inspirație pentru sarcinile de scriere academică fără a comite plagiat sau fără a utiliza inteligența artificială pentru a le face treaba. În mod ideal, studenții care își dezvoltă aptitudinile de scriere academică vor deține suficientă încredere pentru a aborda sarcinile de scriere fără să apeleze la tehnologie sau, cel puțin vor folosi tehnologia ca pe o unealtă, nu ca pe un stăpân. Scrierea academică va pregăti studenții facultăților tehnice și pentru profesia de scriitor tehnic, între altele. Lucrarea de față încearcă să analizeze cum meșteșugul scrisului poate fi perfecționat pe parcursul cursurilor de limba engleză pentru ingineri astfel încât să joace un rol activ în dezvoltarea cunoașterii, gândirii critice și rezolvării de probleme în paralel cu utilizarea optimă a conceptelor de vocabular tehnic și general, gramaticii și sintaxei predate la cursurile de limba engleză. De asemenea, lucrarea încearcă să identifice principiile care diferențiază scrierea academică de scrierea tehnică, ajutând viitori ingineri să devină scriitori tehnici profesioniști.

Cuvinte cheie: scriere academică, dezvoltarea aptitudinilor, scriere tehnică, autonomie de scriere, etapele redactării.

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Introduction

As technology is becoming pervasive into every aspect of personal and professional lives, technical students are faced with the dire necessity of becoming comfortable to writing in English in the context of in-company communicational exchanges after graduation. It is often the case that engineering students resort to technology for a good turn of phrase, such as translation apps and AI can often compensate for what the human user lacks in terms of ability to write. Nonetheless, even the output that technology gives must be supervised and corrected if one is to make sure that the message matches the intention. Hence the need for educators to help students develop their professional writing skills so that they can generate and/or supervise effective and accurate output in the foreign language. Ideally, after completing a technical English course, students should possess sufficient writing autonomy that they do not resort to technology to write for them. A hybrid scenario might entail that students will generate technical writing with technology but are capable of proofreading and adapting output in a personal manner that reflects their intended purpose. In the worst case scenario, students will rely entirely on technology to produce their technical writing and lack the skill to overwrite it, based on the assumption that they could not have done it better anyway.

In order to help students avoid the latter scenario, technical writing skills need to be trained, adapted and internalised to ensure that students possess the confidence that they can write better and more genuinely than authors on the internet or than AI. In other words, they should gain the confidence they can become excellent content creators in writing. Moreover, educators have a responsibility to encourage students to produce genuine expressions of their knowledge, thought and view on a technical matter rather than recycle the compiled views and knowledge of internet flocks of experts. As humans are the sum of their individual and collective experiences, so should their writing be.

The specificity of academic technical writing poses the great advantage that it does not require frills and sophisticated metaphor, which most students are often intimidated by. In return, both academic and technical writing must be clear and straightforward, *process and results* oriented, easily manageable with the tools of logic and attention to detail. Last & Neveu (2019: 6) argue that technical writing, as a form of non-fictional writing, communicates information for practical and clear purposes, takes document design into account, and is usually intended for particular readers. Hence the need to familiarise students with academic writing formats, socio-cultural conventions of appropriate professional communication depending on the target reader



and the totality of strategies and techniques of practicality and directness in the coding of the written message.

The main challenge remains that students possess a deep understanding of concepts, rules and phenomena that govern the technical field in which they are preparing together with the ability to synthesize and render appropriate messages in writing. They also need to be skilled in the use of vocabulary, morphology and syntax of the English language. Additionally, they might be required to apply strategies of analysis, induction and deduction, critical thinking methodologies and problem solving abilities when they write for academic purposes. According to Bereiter and Scardamalia (1987:24), what differentiates between novice and expert writers is the use of critical thinking skills while writing. Hayes (2014) dwells on Socrates' understanding of the role of critical thinking in the educational process as *"the awakening of the mind to the need for criticism, and then to the uncertainty of the principles by which it supposed itself to be guided."* In other words, exceptional minds possess knowledge and challenge it constantly; they acquire information and question its core principles constantly, thus releasing more understanding of it. Similarly, good technical writers possess information about technical systems, principles that govern them and usage data and in their writing they analyse, compare and contrast, infer and deduce what the data may signify in relation to the purpose of the writing, anticipate potential problems and adapt the content according to its relevance to the target reader.

Paired with the aforementioned capabilities, students must be in possession of the needed technical vocabulary plus the ability to form the necessary parts of speech through derivation, conversion, composition etc. Additionally, during technical writing tasks, students get to practice the grammatical structures that enable them to accurately describe, make inference and deduction, emphasise and conclude, therefore it is essential to possess the ability to use modals, passive voice, reported speech, non-predicative moods and an entire range of other complex syntactic architectures they have learned during English classes. Additionally, academic writing will raise students' awareness of in-company communicative, social and cultural conventions they will need to abide by.

Academic vs. technical writing

A large proportion of graduate students discover technical writing as a profession, i.e. they are assigned to write product manuals for users in which they describe product functionality, anticipate usage errors, create troubleshooting guides etc. Technical communication differs



slightly from the academic forms of writing that are often taught during university education. Nonetheless, most of the content and skill developed in academic writing can be put to good use in professional technical writing under certain conditions. The academic writer's purpose may be to write an email, report, proposal, research paper, presentations etc. Such assignments are often designed so that students get a chance to practice the vocabulary and grammar they have learned and develop their mastery at putting the knowledge acquired in class to good use in their written assignments. In other words, the aim of academic writing is not necessarily to improve writing skills and customize them to target readers' needs, but rather to practice learned content in a written form.

Technical writing, by comparison, will be produced with more specific purposes in mind, such as to provide or ask for information, record details, or convince readers of something (Last & Neveu, 2019, p. 18). It is an **audience-centered** form of communication providing a target reader with concise and unhindered access to technical information. The readers may range from peer specialists, non-specialists to company executives. In the industrial world, time is money, and so arises the need to save time and increase communicational efficiency through technical writing. The technical writer acknowledges, respects, and addresses the importance of time in effective and efficient communication by producing written documents in a range of specific formats while using unambiguous language to deliver clearly accessible information. The reader, in turn, must comprehend the information in order to provide a thoughtful response or simply to be able to make optimal use of the information provided.

Technical writing is aimed at professional or non-professional users operating in technical fields such as engineering, computer information software and systems, medical professions, aeronautics, robotics, automotive, etc. Technical writing should be designed to inform either professionals or laypersons or, sometimes, both, by anticipating and answering audience questions before they are asked; instruct the audience to perform a task or follow a procedure, and persuade the audience through relevantly detailed explanations, analyses and solutions. When writing product manuals, troubleshooting guides or product specifications, the technical writer will employ self-explanatory visual aids, clearly stated information in uncomplicated syntax, format and terminology. The writing output targets its specific audience by being precise and moderating jargon and obscure phrases in a way that does not hinder the reader's understanding of the content.



Academic Technical Writing vs. Professional Technical Writing

Academic writing occurring both in academia as well as in company and **professional technical writing** designed to serve informational purposes are required in a wide range of situations some of which include but are not restricted to the following:

Academic Writing	Technical Writing
Essays (argumentative, opinion, pros/cons etc) Reports on fictional situations Proposals for fictional events Letters (of complaint, of information request etc) Emails to peers, superiors, business contacts Memos Reports of data: Departmental monthly reports, progress and recommendations reports Reports on real events Memos Proposals (budget, real event planning etc.) Newspaper article MSc/PhD final projects or theses Journal (research) articles Emails to business contacts Letters (of rejection, complaint, inquiry, claims etc.)	Descriptions of products Technical manuals Product/ services brochures Requests for /reports about detailed figures of faulty end products Evaluations of a machines/systems breakdown Laboratory reports Operating and/or Troubleshooting guides

While academic writing tasks are orchestrated to fulfill social, cultural and institutional expectations and conventions apart from being informative, technical texts serve a definitely informative purpose and are intended for people the writer will never meet in real life or establish rapport with but who have a need to know how a technical system works, is operated etc. While academic writing is often elaborate and communicatively complex, technical writing aims at brevity and straightforwardness. Additionally, while academic writing needs to abide by social conventions and employs metaphor and euphemism for communication achievement, technical texts need not. Additionally, technical writing is factual and unhindered by personal opinion, whereas in academic writing the writer's perspective is carefully devised with hedges such as modality, opinion markers and carefully crafted expressions of subjective interpretation.



In the following section, we shall try to illustrate some contrasted examples that outline the differences in approach between the two types of writing.

Academic writing	Technical writing
Sentence and paragraph length	
Elaborate, multiple subordinates, use of metaphor E.g. By weight, aluminum has higher conductivity than copper, but it has properties that cause problems when used for building wiring. It, Aluminum can " creep ", slowly deforming under load, eventually causing terminals of device connections to loosen, and also has a different coefficient of thermal expansion compared to the materials used for connections.	A sentence should contain a single unit of information, sentences are grouped into paragraphs based on common ideas. Arguments are bulleted lists (easy to follow). E.g. <i>Advantage:</i> Aluminum has higher conductivity than copper by weight. <i>Disadvantages:</i> It is not optimal for building wiring: • slowly deforms under load, causing terminals of device connections to loosen; • has a different coefficient of thermal expansion compared to the materials used for connections.
Bullet points and enumerated lists, ellipsis	
Undesirable, full sentences are preferred E.g. Conduction materials include metals, electrolytes, superconductors, semiconductors, plasmas and some non-metallic conductors such as graphite and conductive polymers. Most familiar conductors are metallic. Copper is the most common material used for electrical wiring. Silver is the best conductor, but it is expensive. Because gold does not corrode, it is used for high-quality surface-to-surface contacts. However, there are also many non-metallic conductors, including graphite, solutions of salts,	Numbered lists, subheadings and elliptic sentences as they are easy to read, understand, memorise E.g. Conduction materials: • metals, • electrolytes, • superconductors, • semiconductors, • plasmas • non-metallic conductors (graphite and conductive polymers) Most familiar conductors are metallic. • Copper - most common material for electrical wiring. • Silver - best conductor, but



and all plasmas. There are even conductive polymers.	expensive. • Gold does not corrode, used for high-quality surface-to-surface contacts. Non-metallic conductors: • graphite, • solutions of salts, • all plasmas • conductive polymers.
Formulation	
Complex, intricate, metaphoric, often idiomatic, play-upon-words E.g. Future tech trends may be thought of as either leading edge or " bleeding edge " technology in that this cutting edge is not without its trials and tribulations because for investors pouring money into predictions that futuristic technology will pay off may not produce results for decades if ever. Money on future tech may be wasted in the eyes of some who decide that caution is the better part of valor . But, for some investors, the payoff is in the project itself, and not necessarily in the economic payoff .	Using plain English, proper meaning of words E.g. Investments into future technologies may cost investors a lot of money. The profit is not immediate. Some investors invest in the idea without expectations of profit.
Choice of words	
Multiple descriptive words to elicit imagery	one word verbs are preferred
reattach loose components	reconnect
change an old or damaged component	replace
make a close inspection	examine
remove connection between parts so as to interrupt flow	disconnect
find the correct position or configuration	adjust
break bond between components	detach
break a system into pieces	dismantle
remove liquid from a system	drain
do periodic maintenance	service



increase grip pressure	tighten
Stock phrases and formal references	
Are preferred in academic writing for the rapport they establish with the reader	Are avoided in technical writing for being unnecessary and prolix
E.g. There is a reasonable expectation that ...	Probably ...
Owing to the situation that ...	Because, since ...
Should a situation arise where .../ in case there is	If ...
Taking into consideration such factors as ...	Considering ...
Prior to the occasion when ...	Before ...
At the precise moment in time ...	Then/when
Use of visuals	
Not recommended in academic writing E.g. Fiberglass is a silicate fiber made from very fine strands of glass. Today, it is primarily used for insulation in homes and buildings to replace asbestos. Unlike asbestos, fiberglass is a man-made material. Fiberglass has three main uses: electrical insulation, thermal and acoustic insulation and heat resistance or lightweight materials. Industrial fiberglass offers excellent thermal and electrical insulation, flame, corrosion and pest resistance, lightweight strength and dimensional stability, compatibility and for safer, more efficient operations across the industries.	Highly informative and often used E.g. 

General Principles for Academic and Technical Writing

According to Rahmat (2020), good writing should be coupled with critical reading skills. Perhaps one reason why writing is not a favourite

among students is that in order to write on academic topics writers must master the topic they are writing about, therefore they need to read beforehand. It is not only the content, but the form as well that require mastery when writing. Academic writing will entail reading about and gaining grasp of the:

- Language structures that are to be used in the writing: syntax, phraseology and vocabulary that are to be applied in the writing. For technical writing, making the most of a limited word count is also important, for instance using gerunds to replace entire sentences, mastering ellipsis etc.;
- Specific and desirable layouts and conventions for letters, reports, proposals, research papers as well as for user manuals, brochures, user guides etc.;
- Social, institutional and cultural conventions of the target reader's;
- Persuasion techniques that trigger the desired effect in the reader and best capture the intention of the writer.

The strategy described below by Bombardó Solés et al. (2007:35) is what most writing activities rely on and is intended to offer guidance in the writing process. Writers can customise these suggestions to their personal aim, preferences and style. The process of technical writing (be it academic or professional) can be described as non-linear and recursive, i.e. writers will often revisit some of the steps for further refinement and it is highly recommended that they do so. The writing process roughly revolves around three main stages, as described below.

Stage 1: Pre-writing preparation

Before the actual writing stage, writers ought to invest some time planning what to write and how to convey the information. Skipping this stage can result in the so-called *writer's block* or can simply impact the outcome of the writing negatively, i.e. communicational inadequacy and lack of relevance. The pre-writing stage can prove to be a smart investment of time in the long-run, especially if students are trained to use it from the very beginning of their writing skills development. With this in mind, before embarking on the initial draft, one should consider:

(a) the audience and purpose (who they are writing to/for and why). In academic writing, for instance, writing a report to a manager will differ dramatically from writing a report for company peers. Similarly, a troubleshooting guide for inexperienced users or laypersons will differ from a troubleshooting guide designed to be used by experienced professionals in terms of jargon, formulations and layout. It is also at this point that the writer must decide whether they will opt for a



hyperspecialised, abstract and impressive formulation or, instead write plainly.

(b) **the tone and style**- how the writer formulates the information and the nonverbal underlying tonality. The choice of neutral tone and style are often preferred and students need to gain understanding of how they can be achieved (marks of informality and excessive formality, politeness startegiist etc.)

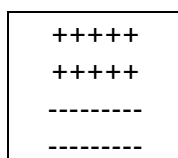
(c) **information gathering**- in-depth reading, brainstorming (spidergrams, ideas lists, diagrams), analysing and referncng sources of information, summarising, data selection and exclusion etc.

(d) **outlining**- organization of data based on criteria of similarity or dissimilarity, pendulation etc.

Stage 2: Writing. Once the information has been gathered and organised, writers can embark on writing an initial draft. At this stage, it is essential to consider the main parts of the text, paragraph development and coherence as well as conventions that pertain to genre. As one revises and considers all these aspects, it may be helpful to use representative models as a reference.

One particular challenge for academic writing at this stage is to correctly sequence the ideas in a paragraph and sequence the paragraphs themselves and carry the argument through. For instance, students are often tempted to pendulate from a positive to a negative outlook and return on a positive note within the same paragraph. Instead, organising ideas into paragraphs should be made based on criteria of communality:

a) Either all ideas focus on advantages, then move on to disadvantage in a second paragraph and tackle only drawbacks:



b) The **topical idea** changes from one paragraph to another and within one paragraph they should explore both the plusses and minuses of the topical idea:

Paragraph 1= Topical idea 1	+++++	-----	-----+++++
Paragraph 2= Topical idea 2	+++++	-----	-----+++++

For professional technical writing, another important aspect is the creation and use of visuals such as pictures, diagrams and graphs illustrate content optimally and increase efficiency of communication.

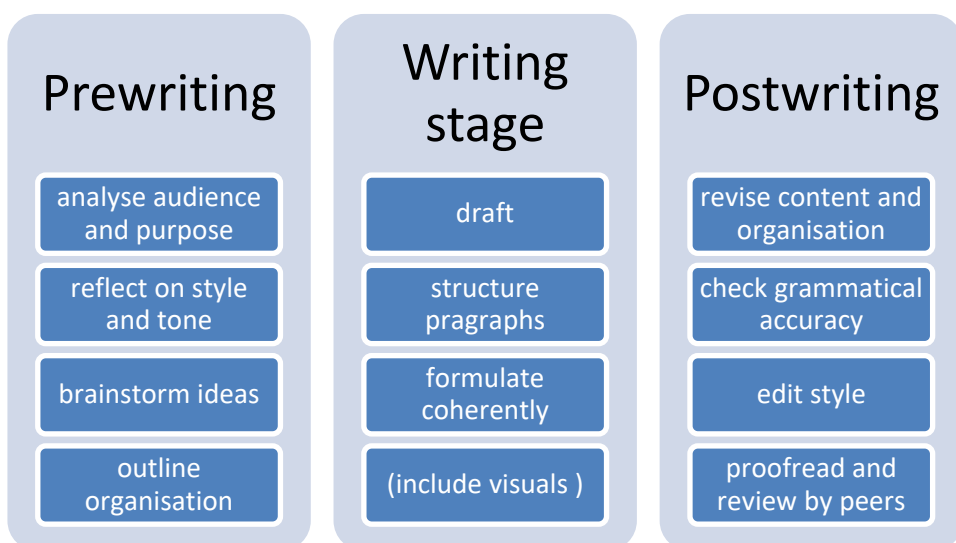
Stage 3 Post-writing. The last stage of the writing process should be centered around

(a) revising content and organization with an objective eye, as if reading it for the first time

(b) checking for grammatical mistakes;

(c) editing style and forms of address to ensure objectivity and avoid misinterpretations;

(d) proofreading and peer review, aimed at crossreferencing and verifying accuracy of content against peers' view.



The more students practice with writing tasks, the easier the endeavour of writing becomes. According to Richards (2020) the development of writing as a skill should focus on the students' need to increase their understanding of and appreciation for the purpose of writing and on the development of writing efficiency. Also, this development occurs in stages which, in time, lend themselves to becoming more complex and abstract. When students display a combination of awareness and possess the skill, they become better writers and start applying techniques and abilities to a wider range of situations as well as import abilities from other areas into their writing, thus gaining autonomy and self-confidence. This increase in writing awareness will soon be paired with an increase of memory, critical thinking and motor skills as listed below:



The mechanical skills involve the physical components of writing and the speed of motor performance. - Lower level tasks such as the choice of typefaces, use of space, basic spelling, capitalization, and punctuation. - Advanced mechanics represented by speed, clarity of expression, and the use of appropriate grammar and syntax.	The content skills - the way in which writers organise and express ideas relying on active working memory, critical thinking, formulation and abstractisation. The upper level skills include: - Writing using a variety of writing styles depending on the target audience; - Displaying flexibility in the writing process; - Understanding the perspective of the reader and adapting the writing to match it; - Writing with power, i.e. enthusiasm and passion for the domain in which the writer is operating.
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Conclusions

The development of skill in any profession derives primarily from experience coupled with an interest in self-development. Though engineers are not famous for their writing capabilities, if trained during academic years to express engineering concepts in writing with a clear aim and make the most of the knowledge they possess they will find writing to be a powerful tool of expression and communication later on in their in-company interactions with peers, executives, clients (products and services users). Particularly since writing entails in-advance preparation and time awarded for research, aiding tools and rewriting, it creates a safe environment for expression and reduces the risk of contradiction, falsification and blunders. For all these reasons, technical students should be encouraged and trained to develop their proficiency at writing during academic years with a view to developing autonomy and efficiency in the workplaces they will occupy post-graduation.



References

- Bereiter, C., & Scardamalia, M. (1987). *The Psychology of Written Composition*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Bombardó Solés, C, Aguilar Pérez, M, Barahona Fuentes, C, (2007) *Technical Writing- A Guide for Effective Communication*, Edicions UPC, available at www.e-buc.com
- Last, S. and Neveu, C. (2019). *Understanding the Rhetorical Situation*. *Technical Writing Essentials*. Retrieved from <https://pressbooks.bccampus.ca/technicalwriting/chapter/understandingrhetoricalsituation/>
- Hayes, D. (2014). *Let's Stop Trying to Teach Students Critical thinking*. *The Conversation*. Available at <http://theconversation.com/lets-stop-trying-to-teach-students-critical-thinking-30321>
- Hamlin, A., Rubio, C., & DeSilva, M. (2017). *Ethics in technical writing*. In A. Gross, A. Hamlin, B. Merck, C. Rubio, J. Naas, M. Savage, & M. Desilva, *Technical writing* (pp. 91-104). Open Oregon Educational Resources. License: CC-BY-NC-SA 4.0. <https://openoregon.pressbooks.pub/technicalwriting/>
- Rahmat, N. H. (2011). *Approaches in the Teaching of ESL Writing*. Selangor, Malaysia: UiTM Press.
- Rahmat, N. H. (2020). *Thinking about Thinking in Writing*. *European Journal of Literature, Language and Linguistics Studies*, Vol 3(4). Available at <https://oapub.org/lit/index.php/EJLLL/article/view/153>
- Richards, R. C. (2020). *Understanding Why Students Avoid Writing*. LD Online. Retrieved from <http://www.ldonline.org/article/5892/>