

# Exploring Bangladeshi STEM Students' Academic Writing Challenges

By

Luthfunnaher  
22103050

A thesis submitted to the Department of English and humanities in partial fulfillment of  
the requirements for the degree of  
B.A. in English

Department of English and Humanities  
Brac University  
January 2026

© 2026. Brac University  
All rights reserved.

## **Declaration**

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

---

Luthfunnaher

22103050

## Approval

The thesis titled “Exploring Bangladeshi STEM students’ academic writing challenges” submitted by

1. Luthfunnaher
2. 22103050

of Fall, 2025 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of B. A. in English on January 19, 2026.

## Examining Committee:

Supervisor:  
(Member)

---

Dr. Sabreena Ahmed  
Associate Professor  
Department of English and Humanities  
BRAC University

Thesis Examiner:  
(Member)

---

Mizanur Rahman Khan  
Assistant Professor  
Institution of Modern Language  
University of Dhaka

Departmental Head:  
(Chair)

---

Dr. Firdous Azim  
Professor and Chairperson  
Department of English and Humanities  
BRAC University

## **Abstract**

While academic writing is an integral part of students' lives; it is frequently observed that students find academic writing challenging to learn due to its complex and multifaceted nature. Yet, very little attention has been given to Bangladeshi STEM students' academic writing experience. Therefore, this study aims to explore Bangladeshi STEM students' academic writing challenges and present feasible measures to reduce these challenges. It adopts a qualitative phenomenological research approach and collect data through semi-structured interviews. 10 STEM participants from two Dhaka based private institutions join and share their academic writing experiences. The findings reveal, Bangladeshi STEM students face several challenges in academic writing which include; lack of vocabulary, organisation challenges, redundancy, formatting, insufficient feedback and writing support, limited facility and academic resources, poor conceptual understanding and psychological challenges. This study found lack of writing practice in STEM discipline and indifferent writing attitude are resulting students' poor academic writing performance. However, STEM students try to counter these challenges by using digital tools, peer support and engaging in extramural English language activities. Insights from this study can be used by the STEM educators and curriculum developers to increase writing support and opportunities for STEM students and reform the STEM education practice.

**Keywords:** [ Academic writing; academic writing challenges; STEM; Bangladeshi STEM students; STEM students' academic writing challenges overcoming strategies]

## **Dedication**

I dedicated this work to my parents, who make immense sacrifice and try to provide me best of everything.

Secondly, I would like to remember one of my primary school teacher who first make me realized how impactful encouragement and simple ‘I know you can do it’ can be for someone.

## **Acknowledgement**

I hereby acknowledge that this research paper entitled “Exploring Bangladeshi STEM students’ academic writing challenges” has been prepared by me at BRAC University, Dhaka, under the guidance of Dr. Sabreena Ahmed, Associate Professor of English and Humanities department. This research paper has not been submitted in other universities or towards any other degree before this below-mentioned date.

Student’s Full name & Signature:

Luthfunnaher

22103050

## Table of Contents

|                                                                  |            |
|------------------------------------------------------------------|------------|
| <b>Declaration.....</b>                                          | <b>ii</b>  |
| <b>Approval .....</b>                                            | <b>iii</b> |
| <b>Abstract/ Executive Summary .....</b>                         | <b>iv</b>  |
| <b>Dedication .....</b>                                          | <b>v</b>   |
| <b>Acknowledgement .....</b>                                     | <b>vi</b>  |
| <b>Table of Contents .....</b>                                   | <b>vii</b> |
| <b>List of Tables .....</b>                                      | <b>xi</b>  |
| <b>List of Figures.....</b>                                      | <b>xii</b> |
| <b>Chapter Introduction.....</b>                                 | <b>1</b>   |
| 1.1English language and its global significance.....             | 1          |
| 1.2 The use of English language in STEM discipline .....         | 1          |
| 1.3 English language challenges in STEM discipline.....          | 2          |
| 1.4 Statement of the Problem.....                                | 3          |
| 1.5 Central Research Objective.....                              | 5          |
| 1.6 Research questions .....                                     | 6          |
| 1.7 Conceptual framework of the Study .....                      | 6          |
| 1.8 Scope of the Study.....                                      | 8          |
| 1.9 Significance of the Study.....                               | 8          |
| 1.10 Definition of the Key terms.....                            | 9          |
| <b>Chapter 2 Literature review.....</b>                          | <b>11</b>  |
| 2.1 Part One: Challenges of Academic writing among students..... | 11         |

|                                                                               |           |
|-------------------------------------------------------------------------------|-----------|
| 2.1.1: Academic writing and Its features.....                                 | 11        |
| 2.1.1.1: Types of academic writing: .....                                     | 12        |
| 2.1.2: Challenges of academic writing.....                                    | 13        |
| 2.1.2.1: Grammar and Vocabulary.....                                          | 13        |
| 2.1.2.2: Organisation and style.....                                          | 13        |
| 2.1.2.3: Writing research paper.....                                          | 14        |
| 2.1.2.4: Psychological obstacles.....                                         | 15        |
| 2.2 Part 2: Language skills and academic performance among STEM students..... | 15        |
| 2.2.1: Receptive skills among STEM students.....                              | 16        |
| 2.2.2: Productive skills among STEM students.....                             | 16        |
| 2.3 Part three: Bangladeshi Education system .....                            | 18        |
| 2.3.1: Education system of Bangladesh.....                                    | 18        |
| 2.3.2: Academic writing challenges of Bangladeshi students.....               | 19        |
| 2.3.3: Bangladeshi STEM students and language challenges.....                 | 20        |
| 2.3.4: Research gap.....                                                      | 21        |
| 2.4 Chapter summary.....                                                      | 22        |
| <b>Chapter 3 Methodology.....</b>                                             | <b>23</b> |
| 3.1 Introduction.....                                                         | 23        |
| 3.2 The qualitative paradigm and its philosophical assumption.....            | 23        |
| 3.3 Research design.....                                                      | 25        |
| 3.4 The researcher's role .....                                               | 26        |
| 3.5 Setting.....                                                              | 26        |
| 3.6 Selecting the participants .....                                          | 26        |
| 3.7 Participants profile.....                                                 | 27        |

|                                                                                             |           |
|---------------------------------------------------------------------------------------------|-----------|
| 3.8 Data collection procedure .....                                                         | 28        |
| 3.8.1: Semi-structured interview.....                                                       | 28        |
| 3.8.1.1: Interview protocol .....                                                           | 29        |
| 3.8.1.2: Piloting the interviews .....                                                      | 30        |
| 3.8.1.3: Conducting the final interview.....                                                | 30        |
| 3.9: Data analysis framework .....                                                          | 31        |
| 3.9.1: Mindful data collection.....                                                         | 31        |
| 3.9.2: Familiarisation with data.....                                                       | 31        |
| 3.9.3: Coding & Theme generation.....                                                       | 31        |
| 3.9.3.4: Reviewing and Data presentation.....                                               | 32        |
| 3.10 Ethical considerations.....                                                            | 32        |
| 3.11 Trustworthiness of this Study.....                                                     | 32        |
| 3.12 Chapter Summary.....                                                                   | 33        |
| <b>Chapter 4 Results and Discussion .....</b>                                               | <b>34</b> |
| 4.1 Introduction .....                                                                      | 34        |
| 4.2 Academic writing challenges of Bangladeshi STEM students.....                           | 34        |
| 4.2.1: Lack of vocabulary.....                                                              | 34        |
| 4.2.2: Over dependency on AI.....                                                           | 35        |
| 4.2.3: Difficulties in organisation, maintaining logical flow<br>redundancy in writing..... | 37        |
| 4.2.4: Difficulty in writing different sections of academic paper.....                      | 38        |
| 4.2.5: Psychological challenges .....                                                       | 39        |
| 4.2.6: Insufficient feedback, writing support and academic resources.....                   | 40        |
| 4.2.7: Poor conceptual understanding, limited facility and                                  |           |

|                                                                                   |            |
|-----------------------------------------------------------------------------------|------------|
| formatting challenges.....                                                        | 41         |
| 4.2.8: Lack of writing practice in STEM discipline .....                          | 43         |
| 4.3 Overcoming the challenges of Academic writing.....                            | 46         |
| 4.3.1: Extramural English activities.....                                         | 46         |
| 4.3.2: Use of Digital technology .....                                            | 47         |
| 4.3.3: Peer support.....                                                          | 44         |
| 4.4 Chapter summary.....                                                          | 49         |
| <b>Chapter 5 Conclusion and Implications.....</b>                                 | <b>50</b>  |
| 5.1 Introduction.....                                                             | 50         |
| 5.2 Contributions of the Study.....                                               | 50         |
| 5.2.1: Implications for the Knowledge.....                                        | 50         |
| 5.2.2: Implications for Theory.....                                               | 51         |
| 5.2.3: Implications for Pedagogy.....                                             | 52         |
| 5.3 Recommendations.....                                                          | 52         |
| <b>References.....</b>                                                            | <b>54</b>  |
| <b>Appendix A Letter of concent for participants.....</b>                         | <b>75</b>  |
| <b>Appendix B Interview questions for participants .....</b>                      | <b>77</b>  |
| <b>Appendix C Sample interview of participant .....</b>                           | <b>83</b>  |
| <b>Appendix D Sample of coding template by the researcher.....</b>                | <b>90</b>  |
| <b>Appendix E Theme Generation Template.....</b>                                  | <b>101</b> |
| <b>Appendix F rating for students' interview by Rater.....</b>                    | <b>102</b> |
| <b>Appendix G Inter-rater reliability calculator for students' interview.....</b> | <b>107</b> |

|                                                            |            |
|------------------------------------------------------------|------------|
| <b>Appendix H Sample of email for member checking.....</b> | <b>108</b> |
| <b>Appendix I Audit Trail of the study.....</b>            | <b>109</b> |

## List of Tables

|                                                       |    |
|-------------------------------------------------------|----|
| Table 1: Philosophical assumptions of the study ..... | 25 |
| Table 2: Participants profile .....                   | 27 |

## List of Figures

|                                                  |    |
|--------------------------------------------------|----|
| Figure 1: Conceptual framework of the study..... | 7  |
| Figure 2: Emergent themes of the study.....      | 45 |

# **Chapter 1**

## **Introduction**

### **1.1 English language and its global significance**

In today's globalised world, English language has become the connecting bridge between all nations. English is now used as a worldwide medium of communication. It also continues to solidify its global status because of its dominance in world business, politics, media, science and academic sectors (Shaxrizoda, 2024). Due to the growing influence of English language, now most non-English speaking countries give great emphasis on learning English. In fact, right now non-native English speakers outnumber the native speakers of this language. Countries from Europe, Asia, and Africa now adopted English language in their national policies (Kimsesiz, 2024).

Currently, proficiency in English is the gateway of opportunities in the international field. From the world of academia to the global job market, the demand for English language is non-negotiable. By using English, people from different backgrounds and cultures can attain the knowledge and resources which are preserved and disseminated through English. It opens the global workplace to everyone and ensures upward mobility. In this way, English language became a true global medium, shaping communication, education and the professional landscape across the borders (Fareen, 2025; Sulashvili et al., 2025).

### **1.2 The use of English language in STEM discipline**

Amid the growing prominence of English in academia and higher education, it became the most used language in the field of STEM. English is considered as the language of science and technology. The majority of scientific journals are published in English which ensures easy access to these resources for people from different backgrounds (Márquez & Porras, 2020). English is also used as the common medium of communication in scientific conferences and

workshops. It ensures communication, the exchange of scientific findings and promotes collaboration within the STEM community. The English language is needed to write research proposals and funding applications in STEM at the international level. English is also used as the language of coding and programming and it is essential in the area of technology and engineering (Rejepova, 2025). Further, English is the dominant language in the medical field to access and share latest medical knowledge (Díaz-Rodríguez et al., 2022).

As a result, mastery in the English language is now crucial for the STEM graduates' and researchers' academic advancement. Research and collaboration opportunities, funding, publications opportunities greatly depend on one's English language proficiency. Beside this, career mobility heavily relies on English skill, as it is often placed as a primary requirement in the global market (Turba et al., 2015). To meet this expectation, STEM graduates now need equal competency in all four English language skills which include reading, writing, listening and speaking. Now industries want to employ STEM graduates who are both experts in their fields and possess excellent communication skills (Hiew et al., 2021). Good reading skill and reading comprehension also hold great significance as most STEM resources and materials are in English. Further, most countries now use English as a medium of instruction in STEM where academic contents and lectures are provided in English language. In this practice, English listening and comprehension skills work as primary tools for students for keeping pace with learning. Overall, English language skill is mandatory for excellence in STEM education.

### **1.3 English language challenges in STEM discipline**

At present, the centrality of English competency is well-established within the STEM discipline and global workplace. However, many STEM graduates, specifically the non-native speakers, face disadvantage only because of their limited English proficiency and many of them face

multiple challenges to master different language skills as well. In Canada, a study conducted among International students who used English as an additional language shared that international STEM students faced challenges performing critical reading and writing tasks. Students' unfamiliarity with discipline specific terms and cultural barriers are major reasons behind these issues (Russell et al., 2022). Chandran et al.'s 2022 study in Malaysia also revealed Malaysian STEM students struggle with STEM vocabulary and their lack of reading proficiency resulted in poor conceptual understanding. Moreover, Indian STEM students also shared similar opinions regarding their vocabulary and comprehension challenges in English (Kakepoto et al., 2022). In addition to these challenges, STEM students often encounter major difficulties in English communication skills. Rothinam & Maniam's (2025) research shared that Malaysian medical students' fluency and clarity in English communication hindered due to insufficient training, limited exposure and lack of real-life practice opportunities. Meanwhile, Thai engineering students reported limited interaction and collaboration as crucial barriers in developing their competence in English communication (Charoenpornsook & ThumvichitMiga, 2025). Migallos & Parina's (2023) research in the Philippines also documented a clear gap between language expectation and actual language skill among Filipino engineering students and expressed an urgent need for pedagogical changes for overcoming language challenges. Hence, despite the crucial role of English language skill for STEM graduates, considerable challenges continue to be observed globally.

#### **1.4 Statement of the problem**

Of all four English language skills, writing is a highly significant skill for students in higher education including STEM. From writing undergraduate assignments, lab reports to publishing journal articles or writing proposals for funding, academic writing is irreplaceable in the life of STEM students and researchers. Despite this, sometimes academic writing is not effectively taught and practiced in STEM disciplines which leads to poor academic performance and loss

of international opportunities. This further created many difficulties for students while writing academic papers (Thompson et al., 2021; Moon et al., 2018).

Several researches have been conducted in many countries to find out the major challenges STEM students face in academic writing and how these challenges can be overcome. A study conducted in the United States among lower division STEM students found that students often find difficulty in initiating writing, generating ideas, creating structures and navigating resources. They also believed proper teachers' guidance, writing courses and different modes of resources can assist students to overcome their academic writing weakness (Dunn et al., 2023). Similarly, learning background, lack of balanced syllabus and teaching technology are also found as significant barriers for Russian engineering students (Bolsunovskaya & Rymanova, 2020). Moreover, further research confirmed students from non-English speaking countries faced more challenges in multiple domains of academic writing compared to the native speakers. Zhang's (2025) study in China reported linguistic and cultural barriers as a primary obstacle in English language learning. On the other hand, language comprehension and core linguistic challenges are some major setbacks for Malaysian and Thai engineering students in writing (Othman et al., 2022; Prapobratanakul, 2024). Meanwhile, Pakistani medical and nursing students find academic writing challenging due to lack of confidence and language proficiency, low self-efficiency and time management (Jamil et al., 2024).

In Bangladeshi context, STEM and English language are closely related. Bangladesh gives great importance in STEM discipline and offers several STEM related courses and degrees with the worldwide rise of STEM education. To meet the global demand and competitiveness, Bangladesh also integrated English language in STEM disciplines because of the dominant use of English language in the STEM curriculum. Currently, most STEM related courses are taught in English. Further, many Bangladeshi public and all reputed private universities also use

English as a medium of instruction in STEM disciplines (Hamid & Amin, 2022). Taken together, it can be stated Bangladesh started to incorporate English language in STEM.

Nonetheless, these initiatives and practices are subject to several limitations. Bangladeshi STEM students often faced difficulties comprehending STEM contents through English medium instructions in university settings due to low English language proficiency and lack of experience (Islam et al.,2025). Beside The EMI challenge in Bangladeshi STEM education, Rafa's (2024) and Sharmin's (2022) studies revealed weak communication skills of Bangladeshi STEM graduates. These studies documented several speaking-related challenges and causes behind these difficulties. At large, the overall competence of English reading, writing, listening and speaking of Bangladeshi STEM students is not up to the mark.

While few studies have been conducted on the challenges Bangladeshi STEM students face in English communication, the area of Bangladeshi STEM students' academic writing and the challenges they faced is not addressed yet. If STEM students' perception regarding challenges of academic writing is not explored, then the teachers will not be able to support the students in writing classes. Moreover, overcoming these challenges will make our STEM graduates qualified and prepared for the future. Thus, it is essential to examine the challenges Bangladeshi STEM students face in academic writing and how they overcome these problems. The findings of this research will provide critical insights of STEM students' academic writing need and condition to STEM educators and curriculum designers.

## **1.5 Central Research Objective**

To explore academic writing challenges faced by Bangladeshi STEM students and how they overcome those challenges.

## **1.6 Research questions**

1. What challenges do Bangladeshi STEM students face in academic writing?
2. How do they overcome those challenges?

## **1.7 Conceptual framework of the Study**

The conceptual framework for this study has two main stages. The researcher of this study will hold a one-in-one interview session with each participant to complete these two stages. In the first stage, the researcher will find out the Bangladeshi STEM students' perception and challenges in academic writing. To ensure this outcome, this study will focus on four main aspects such as linguistic & cognitive barriers (Prapobratanakul, 2024), interdisciplinary barriers (Dyussebekova & Ti Wu, 2022), psychological factors (Ferolino et al., 2022) and instructional factors (Prapobratanakul,2024). Following these aspects, the researcher will construct a few questions for the semi-structured interview beforehand and the participants will be encouraged to share their position without any interference.

In the second stage of this study, the researcher explores the ways STEM students overcome various challenges they face in academic writing. Typically, each student has their own strategies to overcome various barriers. In this study, few strategies are followed which include Interdisciplinary literacy (Shanahan, C. & Shanahan, T., 2012) learners' attribute (Prapobratanakul,2024), pedagogical practice and environmental support (Hamad & Haji, 2025).

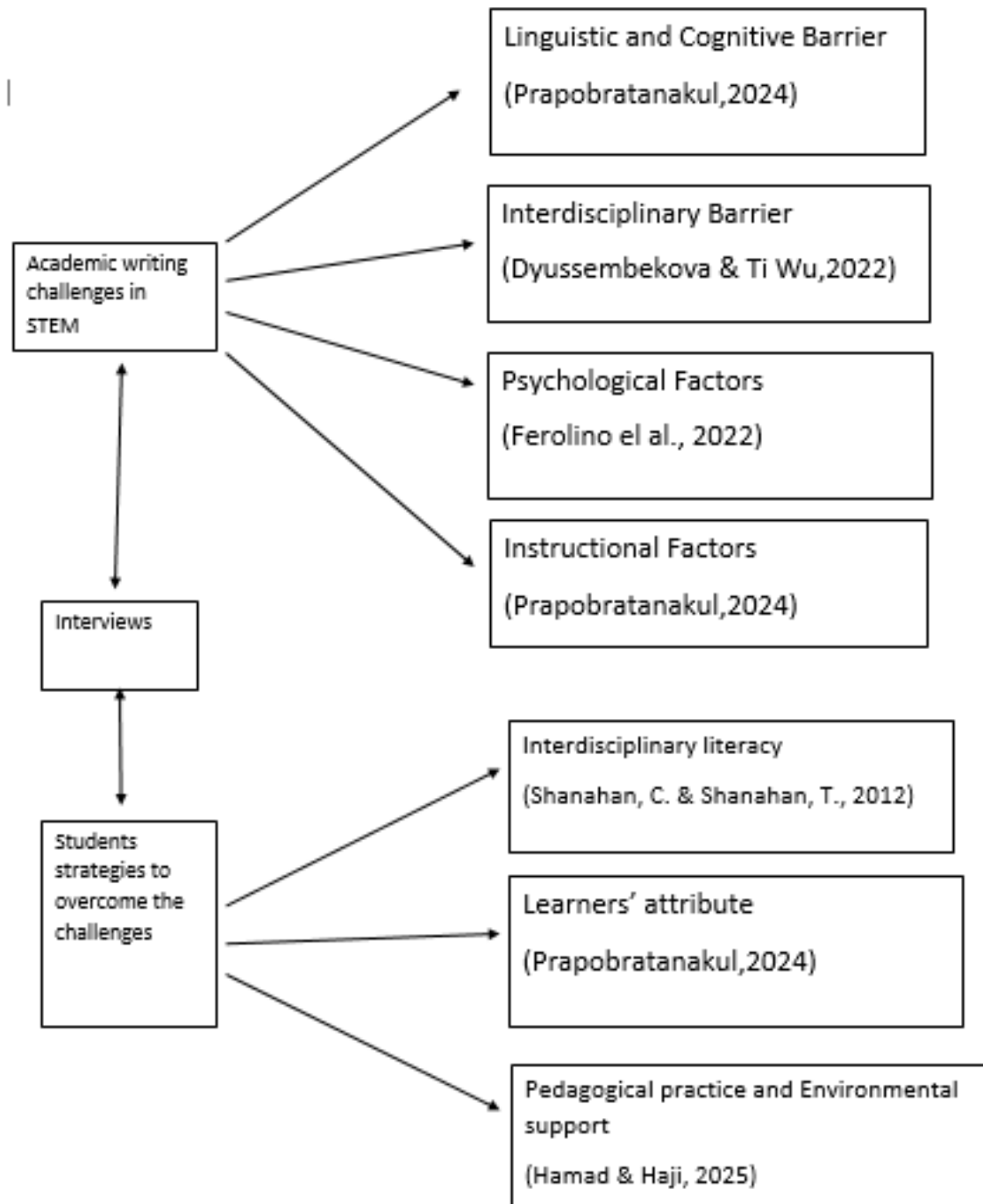


Figure1: Conceptual framework of the study

## **1.8 Scope of the Study**

Academic writing is a crucial skill to attain academic success and future opportunities for students across disciplines. However, the situation of Bangladeshi STEM students in this area is under-emphasised and alarming. In this scenario, this study investigates STEM undergraduate students' perceptions and challenges in academic writing. It further explores the ways STEM students counter these challenges and improve their writing skills. It is a small scale study comprising 10 3rd year and 4th year STEM undergraduate students. All the participants are from two private institutions of Dhaka city considering the limited time, accessibility and feasibility of the research. Private higher education institutions in Dhaka tend to offer diverse STEM courses and associated infrastructure for STEM learning. In the semi-structured interviews with the researcher, participants share their perceptions and challenges in academic writing. This study uses a qualitative research approach to present each participant's individual accounts and in-depth insight based on the collected data and does not evaluate their writing skills or demonstrate any generalised conclusion. Therefore, the scope of the study is limited due to STEM participants' lack of diverse institutional and geographical background and only offered lived experiences of participants in the urban private educational context.

## **1.9 Significance of the Study**

As of now, no study has been conducted to examine Bangladeshi STEM students' academic writing challenges and how they overcome these challenges. This study fills this gap by exploring Bangladeshi STEM undergraduate students' perception of academic writing and its associated difficulties.

This study's finding is valuable in the field of Bangladeshi STEM teaching-learning practice of academic writing which is essential for STEM students' academic achievement. This study explored STEM undergraduate students' writing challenges and experience through individual

interviews. The insights from the study will benefit STEM practitioners and curriculum designers to deliver effective academic writing support and a supportive learning environment. This will further benefit STEM policy maker and STEM institution authorities to take necessary measures. This study's central focus on STEM discipline will further extend the current literature on academic writing challenges in Bangladeshi context.

### **1.10 Definition of key terms**

**STEM:** STEM is an acronym which refers to the field of Science, technology, engineering and mathematics. STEM subjects are included in the academic curriculum from preschool to post graduate level across the world, where this term is used to refer to the education and careers in these respective fields. The importance of STEM education has now reached its highest point in the 21st century. As we are living in today's modernized world, our tiny to bigger everyday functions are related to STEM. From lifesaving medicines to advanced infrastructures, technologies are now tied with the advancement and research of STEM disciplines. Moreover, apart from the complex STEM innovation, STEM learning fosters critical reasoning and logical thinking among learners. It assists young individuals to start questioning the world around them and make the best decisions for themselves. Thus, STEM education is needed to be accessible for everyone throughout the world.

To prepare students for the STEM advanced world, Bangladesh also gives great importance to STEM education in the Bangladeshi educational curriculum. Students started to learn science and mathematics from primary school. In secondary level, CT is included alongside science and mathematics. In general education, three distinguished streams called science, commerce and arts are operated from the ninth grade and onward. In this system, science stream is considered under education as STEM related subjects like physics, chemistry, higher mathematics, biology is taught here. This is basically work as the preparation phase for students for the future STEM learning in higher education. After the completion of higher secondary

education, students can avail different STEM related degrees in Public and private universities. In addition, there are also several designated public engineering and medical institutions for STEM students. Except for these higher education institutions, there are several technical and vocational institutions where STEM related diploma courses are taught in the aim of creating a skilled workforce (Hoque & Alam, 2020). In this study, STEM students from two Dhaka based private educational institutions, one is a private university and another is a private medical college joined as participants and describes their perceptions from their academic lives.

**Extramural English activities:** The term Extramural English (EE) first coined by P. Sundqvist in 2009 refers to the idea of learning English outside the classroom. In extramural English activities, learners engage in various activities which help them to learn and enhance their English skills. Watching English movies and videos, listening to English music, reading English books or blogs, playing games in English or browsing the internet that is filled with English language contents are common popular extramural English activities among learners. Learners can engage in any or all activities based on their interests. As usually engaging extramural English activities occur by learners' free will and do not have any strict control over the process of learning, it reduces anxiety and enhances motivation (Snoder,2018).

## **Chapter 2**

### **Literature review**

#### **2.1 Part One: Challenges of academic writing among Students**

##### **2.1.1: Academic writing and its features**

Academic writing is a crucial skill for students and scholars to achieve success in academia. It is evidence based, where writers consider a topic from an impersonal and research driven angle (Bolsunovskaya & Rymanova, 2020). According to Nunn et al. (2018), objectivity is a key characteristic of academic writing. Writers critically assess the writing task and avoid individual biases. Formal style is another requirement in academic writing. Slang, colloquial languages and shorthand are discouraged to maintain the formal tone in writing. In addition, academic writing is structured. It typically includes introduction, main body and conclusion; more segments get added depending on the type. Moreover, clarity, cohesion, depth and breadth are some other core features of academic writing. A writing which consists of clear meaning, easily understandable language, varied range of evidence and logical flow is preferred in the academic world (Gabi, 2022).

Academic writing requires advance planning and time management. According to Bailey (2015), academic writing involves several stages like planning, note-taking, outlining, drafting, revising, editing and proofreading. He emphasised the importance of note-taking and carefully outlining as the author believed good notes can help to save a lot of time and avoid plagiarism. Moreover, drafting is considered the most challenging phase for most of the writers as in this part writers need to fill the pages with early generated ideas which later become refined through multiple revisions (Chauhan, 2022). For further improvement in clarity and logical development of the first draft, final editing/rewrite and proofreading is very crucial for

academic writing. According to Ochieng (2019), by proofreading writers can avoid small errors and ensure accuracy and comprehension.

Furthermore, maintaining originality is another essential in academic writing. Additionally, academic writing includes various academic evidence; in which writers must acknowledge all sources through referencing to avoid plagiarism. Proper citation and referencing is strictly necessary in all types of academic writing (Gabi,2022). Overall, above these are some key characteristics of academic writing.

### ***2.1.1.1: Types of academic writing:***

Academic writing is broadly divided into four categories; Descriptive writing, analytical writing, persuasive writing and critical writing. Descriptive writing provides facts or information such as summary or report. Descriptive writing presents a clear picture of the outcomes through meticulous outlining, clarity and depth. Descriptive writing is often used in history and humanities disciplines (Melody et al., 2025). Analytical writing needs reorganisation of the facts and information. Compare, contrast, relate, examine are common characteristics of analytical writing in higher education. Analytical writing emphasis on logic and reasoning to interpret. Additionally, use of empirical evidence, data and statistics are the key features of analytical writing (Kelly, 2008). Persuasive writing style requires further depth; in addition to all the features of analytical writing, persuasive writing includes the author's point of view. According to Jonson (2016), persuasive writing takes a stand on a topic; either in favor or against of it by using sound reasoning, objectivity and conciseness (as cited in Chauhan, 2022). Persuasive writing needs academic evidence for all the arguments, recommendations, interpretations or evaluation of the work in the writing. In persuasive writing, writers require clear ideas of the target audience and skill to refute counterargument by facts and reasoning. In addition to facts and logic, persuasive writing sometimes uses

rhetorical strategies to pursue the audience (Aziz & Ahmad, 2017). Finally, critical writing requires two points of view, writers must include both his/her own and author's point of view in critical writing. Writers share their opinion in favor or against of the author's views in critical writing (University of Sydney, 2025). The above types of academic writing can be seen in practice.

### **2.1.2: Challenges of academic writing**

The complex and multifaceted nature of academic writing often presents multiple challenges for students. Several previous studies revealed various difficulties that students faced while academic writing.

#### ***2.1.2.1: Grammar and Vocabulary***

Mastery of grammar and vocabulary is very crucial for academic writing (Sreejak, 2024). Mustafa and Shahab's (2024) research reported that many Kurdish EFL undergraduate students faced writing difficulties due to lack of linguistics components including common writing errors such as grammar, spelling and capitalization. Another study by Nawangsih et al. (2024) revealed, Indonesian students struggle with maintaining grammatical accuracy while writing. According to Akhter et al. (2020) and Suleiman et al. (2023), lack of mastery in grammar is also common among Malaysian students. Suleiman et al. 's (2023) study further found, Malaysian students struggle with word choices in academic writing. Similarly, Libyan tertiary level students could not choose appropriate academic words in their writing (Aldabbus & Bhengazi, 2022). Further, Mahjabeen et al. (2025) also revealed a similar finding which states Arab students' limited vocabulary knowledge affects their academic writing performance. Thus, lack of mastery in grammar and vocabulary are significant setbacks in academic writing.

### ***2.1.2.2: Organisation and style***

Organisation and style are key elements of academic writing where several previous studies confirmed that the majority of student's encounter difficulties in academic writing style and organisation. Arihasta's (2023) study found that many Thai students cannot produce well-structured writing, often struggling with introductory and concluding paragraphs. Another study conducted by Wati (2024) et al reported that Indonesian university students' major challenges in academic writing include structuring, use of academic language and styles. In addition, Prasadini's (2025) and Nenotek's (2022) research also confirms these findings about Indonesian students. Another report by Songjin (2023) in Malaysia showed that coherence and cohesion are two major challenges among Malaysian undergraduate students. Meanwhile, Wen et al. (2025) study revealed Chinese students struggle with integrating multiple sources in a cohesive manner. Ultimately, maintaining proper academic writing style and organisation are major challenges among students.

### ***2.1.2.3: Writing research paper***

The majority of students face challenges in research and research related issues in academic writing. Finding academic resources is one of the very common challenges faced by students (Bakhou, 2021; Hardianti & Sabata, 2025; Gerovav & Ivanova, 2023). According to Bakhou (2021), Algerian students get overwhelmed when they have to decide on a research topic. They also reported that they went through difficulties while reviewing literature and synthesizing the findings. Similarly, Averina & Kanasya's (2025) study revealed that Indonesian students find synthesizing and paraphrasing challenging while writing academic papers. Beside these issues, Fu & Mok's (2025), Gerova & Ivanova's, (2023) and Alostath's (2021) research shared referencing and citation as two major challenges among Chinese and Bulgarian students. Alostath (2021) further stated, Turkish undergraduate students believed the lack of emphasis on reference and citation in the early academic years made this practice difficult in academic

writing. The following research confirmed students across the world face difficulties while doing research and other research related aspects.

#### ***2.1.2.4: Psychological obstacles***

Psychological factors like writing anxiety, stress, behavioral issues are major obstacles in academic writing performance. A study conducted by Akhter et al. (2020) documented a high level of writing anxiety among undergraduate Malaysian students. Similarly, Izwandi (2025) reported that writing anxiety causes avoidance behaviors, physical and cognitive anxiety which hinders Taiwanese students' academic writing ability and overall academic performance. Further, language barriers, cultural differences and stress are some major challenges in academic writing among Chinese postgraduate students (Wen et al.,2025). Another report by Chen (2023) pointed out that writing anxiety resulted in lack of confidence, fear of poor grades and negative feedback. All these factors have negative correlation with writing performance. Meanwhile, Gao's (2022) research on Chinese college students also confirmed similar findings. Overall, all these findings suggested students' psychological state plays a significant role in their academic performance.

## **2.2 Part 2: Language skills and academic performance among STEM students**

In today's globalised world, English language proficiency is very crucial for STEM students to achieve academic and professional success (Pazillah et al.,2023). Most non-English speaking countries now give great emphasis to utilize the English language in STEM disciplines (Sultana et al.,2021). Several previous studies confirmed the growing importance of the English language in STEM and how lack of English language proficiency causes numerous challenges in STEM students' academic and professional life.

### **2.2.1: Receptive skills among STEM students**

STEM students require excellent reading and listening skills for their education and job purposes. Engineering students in Oman faced discipline-specific barriers. They encountered obstacles in grasping complex terminology and discipline specific terms in English. Different accents, fast delivery and poor conceptual understanding also impose further challenges on their comprehension of the lecture (Ali,2020). Saudi Arabian medical students also shared similar concerns, highlighting their difficulty in understanding new reading material, technical terms and concepts (Alanazi & Curle,2024). Separate studies by Hamad et al. (2025) and Alrashed & Latif (2025) reported a significant relation between English language proficiency and Saudi Arabian medical students' academic performance. These studies revealed the majority of medical students faced difficulties comprehending English text. Further, Kalola's (2022) research results are also aligned with the previous findings. Both these research confirmed Namibian medical students faced significant challenges in reading materials for medicine. Similarly, Buriro et al.'s (2025) study revealed that Pakistani medical students' language needs, where students expressed reading skills as the most important for medical students in their academic setting. It revealed that students' inadequate knowledge of scientific vocabulary is a significant barrier in their academic performance. Thus, these challenges in receptive skills among STEM students limit students' academic success and further opportunities.

### **2.2.2: Productive skills among STEM students**

English productive skills are very crucial for STEM students' academic and professional success. Eren et al. (2024), documented Turkish health science students' needs and attitudes towards English language. The majority of students believed English proficiency is essential for their field, and further stated their challenges in speaking related-problems and

insufficient vocabulary. Similarly, the majority of Saudi Arabian medical students struggle with communication in English resulting in challenges in conveying empathy, understanding patients' concern and conducting thorough medical histories (Hamad et al.,2025). Two other studies conducted by Alrashed & Latif (2025) and Alanazi & curle (2024) also pointed out speaking as a major challenge among Saudi medical students. These studies stated difficulty pronouncing medical terms, insufficient vocabulary, lack of fluency and confidence as some common challenges in speaking. Similarly, Alrashed & Latif (2025) research in Indonesia revealed Indonesian nursing students' challenges in speaking; which include limited English vocabulary, accent barriers and difficulties in pronunciation. Meanwhile, Pakistani medical students stated speaking as a crucial skill for their profession where they believed the education system solely focuses on grammar and translation based study offers little help to improve their speaking (Buriro et al.,2025).

Berdanier & Zerbe (2018) quantitative investigation in American engineering students revealed students' perception and challenges in academic writing. It reported low self-efficiency, procrastination and writer blocks in academic writing. Meanwhile many students also believed writing as an innate ability which cannot be taught. On the other hand, Hamad & Haji's (2025) research reported linguistic barriers as the major challenges in academic writing among bachelor of science students in Iraq, which include vocabulary, grammar and development of coherent texts. Egyptian bachelor in science students also faced similar concerns, including grammar, paragraph assembling including paraphrase and quoting, right voice of academic word and inadequate teachers role (Sajjad et al.,2021). Grammar and organisation of ideas are also common challenges among Saudi Arabian medical students (Alanazi & curle,2024).

According to Bolsunovskaya & Rymanova (2020), Russian engineering students lacked lexical resources, both technical and general vocabulary. Organisation is another factor that many

students show weakness, struggle to maintain logical coherence and cohesion. Further, Ead et al.'s (2023) study in Egypt revealed that Chemistry doctoral students reported struggle with organising writing coherently and clearly and achieving objectivity. Other factors like limitation in word counts, lack of foreign language proficiency and motivation also hinders their performance in academic writing. Overall, these are some factors that affect students' academic writing across the

## **2.3 Part three: Bangladeshi Education system**

### **2.3.1: Education system of Bangladesh**

The Bangladeshi education system is governed and administered by the ministry of Education Bangladesh. It is divided into three categories; primary education, secondary education and higher education. General education and Madrasah education are two streams under primary education. General primary education offers Bangla medium and English version education meanwhile Madrasah has its own distinct curriculum with emphasis on religious education. Secondary education has three streams which include general education, madrasah and technical education. Again, Bangla and English versions are available in secondary general education. Under NCTB curriculum, Bangladeshi students attend two major examinations, Secunder school certificate(SSC) after tenth grade and higher secondary school certificate (HSC) after twelfth. It typically takes twelve years to complete schooling. After HSC, students can pursue higher studies in different streams offered by public and private universities. Higher education in Bangladesh also has similar divisions like secondary education which include general, and madrasah education (Bangladesh ministry of education, n.d.).

Alongside general and madrasah education, Bangladeshi education system also offers technical and vocational education, which is primarily governed by Bangladesh technical education Board (BTEB). In this system, students can enroll in vocational education after completing

grade eight and sit for secondary school certificate (vocational) and higher secondary school certificate (vocational) examination. Students can further pursue various short and long term diploma courses in engineering/technical courses at polytechnic institutions. The overall vision of technical and vocational education is to provide career-oriented and skill-based learning and prepare students for the job-market (Bangladesh Board of Technical education, n.d.; Newaz, 2013).

Furthermore, the English medium is another established education system in Bangladesh. In this system, English is the primary mode of communication and teaching-learning. The English medium system mainly offers education from kindergarten through A level. English medium institutions typically follow international curriculum like Cambridge international examination, Edexcel or IB in Bangladesh. English medium students usually attend O level/IGCSE and A level examination, locally conducted by the British council. Typically, students from affluent backgrounds attend English medium school where these institutions assert to maintain international standards (British council Bangladesh, n.d.; Kader & Salam, 2018).

### **2.3.2: Academic writing challenges of Bangladeshi students:**

Bangladeshi students encounter numerous challenges in academic writing which include linguistic, psychological and external factors. According to Rahman et al. (2024), Younus (2025) & Chowdhury et al. (2025), limited vocabulary and poor grammar are two biggest weaknesses of Bangladeshi undergraduates. Due to vocabulary gaps and confusion about word meanings, students are unable to express detailed ideas and show redundancy. Meanwhile, students' lack of grammar mastery produces grammatical errors in their writing.

In addition to these challenges, Rahman et al. (2024), Rahman & Hasan (2019) and Ahmed (2024) shared maintaining logical flow and academic structure is difficult for Bangladeshi students. These studies also stated that Bangladeshi students often lacked critical thinking skills

and struggled to use their own voice and find topics in writing. According to Roy (2024), students' superficial understanding of the notion of voice, cultural factors and lack of linguistic proficiency limit their voice projection in written expression. Ahmed (2024) further stated that Bangladeshi students who are studying in Malaysia are unaware of the norms of academic writing. Students believed rote learning and their past learning was not adequate enough to foster their academic writing skill. Another study by Milton (2025) also suggested rote-learning practices are major underlying factors for Bangladeshi students' inadequate academic writing skill. Furthermore, Rahman et al. (2024) shared that many Bangladeshi students faced difficulty in forming argument, analysis, synthesis and interpreting. Further, students faced challenges finding academic references and including proper citation in writing. organisation, reference and citation as other major problems in academic writing among Bangladeshi students.

Moreover, Younus (2025) and Chowdhury et al. (2025), research listed students' lack of motivation, procrastination, unfamiliarity with writing process and limited learning support such as inadequate feedback as the barriers of academic writing. Chowdhury et al. (2025) further emphasized on students' fear of making mistakes, reluctance to engage in writing and habit of no revision hinder students' academic writing progress. Collectively, the above research presents Bangladeshi students' several key challenges in academic writing.

### **2.3.3: Bangladeshi STEM students and language challenges**

The integration of the English language in Bangladeshi higher education established English proficiency as an essential skill for Bangladeshi STEM students (Rahman & Singh, 2021). However, the reality in Bangladesh is quite different, where many students lack English competence and face multiple challenges regarding their language proficiency. Due to inadequate linguistic knowledge, Bangladeshi engineering students face difficulties in comprehending lectures, delivering presentations and writing assignments. In many cases,

students experience a sudden shift from Bangla medium instruction to English medium instruction in STEM higher education, which causes students to suffer from these challenges even more (Islam et al., 2025). According to Rafa (2024), Bangladeshi STEM graduates face many obstacles in speaking English that include anxiety, lack of fluency and vocabulary, and grammatical challenges. She further stated that lack of a favorable environment, using Bangla as the teaching medium and negative feedback as the reason behind STEM students' incompetence in speaking. Another study by Sharmin (2022) also confirms these observations regarding STEM students' English speaking challenges. In addition, she added, little to no use of supportive materials and student's unwillingness to practice English speaking hinders their speaking ability.

#### **2.3.4: Research gap**

The existing scholarly literature establishes that English language proficiency and mastery in all four language skills is very important for STEM students' educational and professional journey (Pazillah et al., 2023; Sultana et al., 2021). STEM students face several challenges in learning these skills. Regarding receptive skills, complex terminology, inadequate vocabulary, poor conceptual knowledge, different accent, and weak comprehension are some major concerns among Saudi, Oman and Pakistani STEM students (Ali, 2020; Alanazi & Curle, 2024; Buriro et al., 2025). On the other hand, a huge number of STEM students across the world have major issues in productive skill. Studies from Turkey, Saudi Arabia, Indonesia, Pakistan all reported lack of fluency, confidence and vocabulary are major setbacks in speaking English (Eren et al., 2024; Alrashed & Latif, 2025; Alrashed & Latif, 2025; Buriro et al., 2025).

Further, among STEM graduates, academic writing is one of the major parts in which they often struggle. Several previous studies across the world revealed that STEM students faced difficulties in academic style, organisation, grammar & vocabulary and referencing (Hamad & Haji's, 2025; Sajjad et al., 2021; Alanazi & curle, 2024). A few other researchers discovered

psychological issues like lack of motivation, preparedness, and procrastination affect quality of academic writing (Berdanier & Zerbe, 2018; Bolsunovskaya & Rymanova, 2020). Bangladeshi scholars also conducted multiple research on challenges in academic writing. Prior studies by Rahman et al. (2024); Younus (2025); Chowdhury et al. (2025); Ahmed (2024); Milton (2025) highlighted many linguistic, psychological and environmental challenges that Bangladeshi students faced in academic writing.

Although few previous studies have explored the academic writing challenges among Bangladeshi students, no attention has been given to STEM students like other countries. To this date, no studies have been conducted specifically on Bangladeshi STEM students' academic writing challenges. This is why this current study attempts to investigate the challenges Bangladeshi STEM students face in academic writing and the factors behind it.

## **2.4 Chapter summary**

In the first part, this chapter presented definitions and the various features of academic writing. The second part documented the existing literature about academic writing challenges among students across the world. It further elaborated on STEM students the English language difficulties. In the third part, it discussed the Bangladeshi educational contexts and English language challenges among Bangladeshi students. Gradually, it presents the existing research on Bangladeshi STEM students' difficulties in learning English. At the end of the chapter, it presented the gap of the knowledge that has been found in light of current research in this field.

## **Chapter 3**

### **Methodology**

#### **3.1 Introduction**

This study aims to explore Bangladeshi STEM students' academic writing challenges and how they counter these issues at tertiary level. This chapter presents the adopted research methodology for conducting this study. The two main research questions guided the design of the methodology. This chapter further discusses the justification behind choosing a phenomenological research approach, the process of participant selection and data collection, the data analysis procedures and the steps taken to ensure the credibility of the study.

#### **3.2 The qualitative paradigm and its philosophical assumptions**

Philosophical assumptions and specific research paradigms are major aspects of qualitative research. This study is guided by the interpretive paradigm, where understanding the STEM students' perception and challenges in academic writing is the primary focus. In this regard, interpretive approach is well suited as it believes that reality is shaped and interpreted by human experience, socio-cultural influences and circumstances. Interpretive paradigms prioritise participant's viewpoint, individual's way of constructing meaning and decision making as well as guarantee in-depth insights of a specific context. This further aligns with this study's aim to explore how STEM students overcome challenges in academic writing (Pervin & Mokhtar, 2022). According to Scotland (2012) & Raddon (n.d.) any paradigm consists of four philosophical assumptions which include ontology, epistemology, axiology and methodology. Under interpretivism, reality is subjective and multiple realities exist. Hence, this study's ontological assumptions are that each participant has their own subjective views on academic writing challenges and individual strategies to overcome these challenges. For this reason, the researcher of this study held individual interviews with each participant to understand their

positions regarding (R1) what challenges Bangladeshi STEM students face in academic writing? and (R2) how do they overcome these challenges? Next, this study followed the epistemological assumptions to create knowledge where findings come from participants' perspective and interpretation of the researchers (Alharahsheh & Pius, 2020). Therefore, the researcher analyzed and interpreted each participant's interview.

The third assumption is an axiological assumption where participants' and researchers' values are acknowledged in the research process. In this study, the researcher believed exploring STEM students' academic writing challenges is an urgent need due to the researcher's own educational background (current background is in the English and humanities department while having past experience of studying in the STEM stream). However, the researcher's personal interest supported deeper understanding of the topic rather than creating biases during the research and data analysis process. Moreover, all the data are collected in an impartial manner to discover genuine findings about STEM students' academic writing challenges.

Finally, methodological assumptions of this study are grounded on the phenomenological research approach. In this study, the researcher used semi-structured interviews to encourage participants to share their lived experiences and an inductive way to collect and analyze the data within a phenomenological framework (Alharahsheh & Pius, 2020).

The philosophical assumptions used in this paper are adapted from Creswell's (2007) table of "Qualitative inquiry and research design: choosing among five traditions" (p. 17).

**Table 1***Philosophical assumption of the study*

| Paradigm       | Ontology                                   | Epistemology                                                                            | Axiology                                                                                                                                                               | Methodology                            |
|----------------|--------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Interpretivism | Multiple subjective views of participants. | Knowledge is created through participant's perspective and researcher's interpretation. | Researcher's values and biases are acknowledged, where the researcher's primary focus is to uncover STEM students' academic writing challenges in an impartial manner. | Qualitative Phenomenological approach. |

### 3.3 Research Design

This research was guided by the following research questions and numerous previous literature. In addition, this study followed an interpretive research paradigm as it allowed in-depth exploration of an issue by prioritising individual perspective and lived experience. Here, in-person semi-structured interviews were conducted by the researcher to give the participant space to share their perception and experience. The central objective of this research is to explore the Bangladeshi STEM students' academic writing challenges and the strategies used to overcome these issues, so the researcher decided to choose a qualitative phenomenological research approach.

Qualitative research focuses on understanding human behavior and a qualitative researcher delves into the depth of an issue to share the insights of a phenomenon (Oranga & Matere, 2023). So, why Bangladeshi STEM students struggle in academic writing and what are the challenges they face can only be understood through qualitative research approaches which

allow students to share their stories through in-depth interviews. The detailed design of this study is presented in the following sections of the chapters.

### **3.4 The researcher's role**

The researcher of this study was inspired to work in this research field due to her own academic experience. The researcher is currently a student of Applied Linguistics and ELT in Brac University. Before joining the university, the researcher completed her higher secondary education from the science discipline. In her past academic life, she observed many times academic writing is overlooked and how students from STEM backgrounds often face challenges in writing tasks. The researcher later had accounts where her friends and peers from STEM disciplines shared their struggle in academic writing in university life. These experiences encouraged the researcher to look further into this subject and explore the challenges Bangladeshi STEM students face in academic writing. However, throughout the research process, researcher's interest assisted her to explore the topic more thoroughly instead of incorporating any personal biases into the research.

### **3.5 Setting**

This study was set in two private higher educational institutions in Dhaka city. The first institution was a private university that offered undergraduate program in various STEM disciplines and the second institution was a private medical college that offered the MBBS degree. The primary objective of this study was to discover academic writing challenges of Bangladeshi STEM students, hence, both university and medical college were selected to include Bangladeshi science, engineering and medical students who all shared the STEM background.

### **3.6 Selecting the participants**

The appropriate sampling technique is very important for the successful completion of any qualitative research. The researcher of this study chose undergraduate STEM students from different department. All the participants were Bangladeshi and in between the age range of 20 to 23 years old; coming from different private institutions of Dhaka city. The researcher informed all the participants about the research objectives and nature of the study before proceeding with the data collection. Later, 10 participants were selected for this study for the purpose of exploring academic writing challenges of Bangladeshi STEM students.

In order to do this research, the researcher used snowballing sampling technique. The researcher gets connected with more candidate through her initial participants and all the participants in this study are undergraduate students in their 3rd year or above. This selection allowed the researcher to quickly reach more suitable participants and gain context-specific insights from the participants who encountered various academic writing tasks and challenges.

The criteria for selecting the participants for this study were:

The participants must have a STEM background and be enrolled in an undergraduate degree in STEM discipline.

The participants must be in their 3rd year or above.

The participants must be willing to participate in this research and face academic writing challenges.

### **3.7 Participants profile**

Information about the participants are shown in the table below.

**Table 2***Participants profile*

| Name    | Age | Gender | Medium of education | Department    | Academic level | Institution        |
|---------|-----|--------|---------------------|---------------|----------------|--------------------|
| Afia    | 23  | Female | Bangla              | Microbiology  | 4rt year       | Private University |
| Pushpa  | 22  | Female | Bangla              | Microbiology  | 3rd year       | Private University |
| Afrin   | 23  | Female | Bangla              | Microbiology  | 4th year       | Private University |
| Suma    | 21  | Female | English             | Biotechnology | 3rd year       | Private University |
| Zaima   | 23  | Female | English (Version)   | CSE           | 4th year       | Private University |
| Rabeya  | 22  | Female | Bangla              | CSE           | 4th year       | Private University |
| Neha    | 21  | Female | Bangla              | CSE           | 3rd year       | Private University |
| Sanzida | 23  | Female | Bangla              | CSE           | 4th year       | Private University |
| Meem    | 23  | Female | Bangla              | Medical       | 4th year       | Private Medical    |
| Tonni   | 23  | Female | Bangla              | Medical       | 4th year       | Private Medical    |

### 3.8 Data collection procedure

In this study, the researcher used semi-structured interviews to collect data for successfully conducting the research.

#### 3.8.1: Semi-structured interview

In qualitative research, interviews are a very common and feasible method of data collection. Interviews allow the researcher to collect data from the participant through conversation. Howard & Bruce (2018), refers to interviews as a “conversation with purpose” which give the participant an opportunity to share their thoughts and experiences.

Meanwhile, semi-structured interviews are a type of interview in which the researcher can gather detailed information on a particular topic. Semi structured interviews are often a combination of predetermined close and open ended questions. However, it also gives researchers the flexibility to ask prompt questions during the interview (DiCicco-Bloom & Crabtree, 2006). Therefore, the researcher of this study chose semi-structured interviews to collect data from the participants to conduct this research.

#### ***3.8.1.1: Interview protocol***

The interview protocol framework (IPR) offers a systematic way to develop interview protocols for qualitative research. The IPR framework ensures the reliability of the qualitative data. In addition, the IPR framework is more suitable for structured and semi-structured interviews. Hence, the semi-structured interview questions of this study were designed following the four phases of the IPR framework (Shoozan & Mohamad, 2024).

Phase 1: Ensuring interview questions are aligned with research questions.

In the first phase, the researcher confirmed each interview question is based on one or more central research questions. To keep the alignment, a matrix is used to map the interview questions under research questions (Please see Appendix B). It assisted the researcher to avoid unnecessary questions and keep the gathered information central to the research topic.

Phase 2: Constructing an inquiry based conversation

In the second phase, the researcher made clear distinctions between the research questions and interview questions for creating an easy and natural setup with the participants. The interview questions were formulated using everyday language and avoid jargon or technical terms to keep

the usual flow of a conversation. In addition, the researcher prepared extra questions for follow up during the interviews.

#### Phase 3: Receiving feedback on the interview protocol

The third phase of the IPR framework suggests receiving feedback from an expert to enhance the reliability of the study and its instruments. Regarding this, the researcher of this study contacted an expert with 16 years' experience of working on numerous research projects within applied linguistics and language learning. The researcher moved to the last phase of the IPR framework after receiving the feedback and guideline from her.

#### Phase 4: Piloting the interview protocol

The last phase of the IPR framework is piloting the interview with participants after receiving the feedback from the expert. Piloting the interview gave the researcher further clarity to improve the interview questions.

##### ***3.8.1.2: Piloting the interviews***

After receiving the supervisor suggestion on the interview questions, the researcher piloted the interview question with two of her initial participants. After piloting with the first participant Afrin the researcher made some changes in her interview questions, such as replacing words with easier alternatives that participants found difficult to understand. Some follow-up questions were added and the researcher discarded and readjusted the questions which elicited similar answers from the candidates. She further made the decision to keep the option of using Bangla or English language in order to make the interview session convenient for the participants. In addition, after piloting the interview with the second participant, the researcher made a choice of eliminating her as a participant. The choice was made due to the particular participant being only a 1st semester student who did not possess substantial experience on the research subject to share with the researcher.

##### ***3.8.1.3: Conducting the final interviews***

After completing the piloting and necessary adjustment to the interview questions, the researcher conducted the final interviews with the participants. The interviews were individually held with each participant through zoom meetings considering the convenience of the participants. All the sessions were recorded with the permission of the participants for further analysis. The researcher started the session by asking the participants background questions and later gradually moved to the research topic. Furthermore, the researcher maintained a friendly interaction with all participants and made sure participants were given time to freely share their experience without any interruptions.

### **3.9 Data analysis framework**

In qualitative research, data analysis refers to the systematic way of finding patterns and meaning from vast non-numerical data. This study followed a four steps data analysis process inspired by Patton's (2015) qualitative research and evaluation methods.

#### **3.9.1: Mindful data collection**

According to Patton, data analysis starts from the field, which demands snowballing participant selection and ongoing critical analysis and adjustment during the time of data collection. Snowballing sampling was used in order to receive rich insights and the researcher continuously took note of the important points and emerging ideas, cleared meaning, adjusted interview questions and reflected on the researcher's role.

#### **3.9.2: Familiarization with data**

Familiarity with the data is crucial for understanding the intended message of the participants in qualitative research. In this study, participants' recorded in-depth interviews were transcribed and translated by the researcher. The researcher further read the data transcription multiple times and cross-check with the recorded interview to eliminate any transcription and translation errors.

#### **3.9.3: Coding & Theme generation**

After the completion of data transcription, coding was done for organisation and recognition of prominent patterns from the data (Please see Appendix D). The researcher used the seven column coding template (Ahmed, 2017) for coding (Tabassum, 2025). The researcher further highlighted participants' own words through in-vivo coding to highlight participants' voices and ensure authenticity. Later, categories emerge from repeated codes and recurring patterns from categories generate broader themes (Please see Appendix E).

#### **3.9.4: Reviewing and Data presentation**

In the final step, the researcher re-checked the themes with the original data. To strengthen the credibility of the analysis, further adjustments were made after the theme was rated by an expert of the field who contains 16 years of experience in teaching and ELT research. Thus, the researcher presented the final findings of Bangladeshi STEM students' academic writing challenges and how they overcame these challenges.

#### **3.10 Ethical considerations**

This study carefully considered all the ethical issues while conducting the research. All the participants were well-informed about the study before the interview session and given a consent form. The consent form stated the aim of the study and the expected contribution from the participants. It also informed the participants that their interview sessions would be recorded (Please see Appendix A). Further, the researcher ensured the confidentiality of their personal information. Hence, pseudonyms were used for each participant in this study.

#### **3.11 Trustworthiness of this Study**

Qualitative studies require the researcher to create the credibility of the study (Kocaman,2024). As a step towards establishing the credibility of this study, the researcher used member checking, inter-rater reliability and audit trail. Member checking is a strategy that gives participants the opportunity to observe the interpretation of the data and ensure the alignment

of the data with the real life situation of the participants (Russell & Gregory, 2003). In order to maintain the confirmability, the researcher sent the transcript interviews to the participants for their responses (Please see Appendix H).

The researcher also applied inter-rater reliability. The researcher developed code from the vast interview information to improve the reliability of the research result (Please see Appendix G). Afterwards, an expert of this field reviewed it and rated the generated theme by the researcher. The researcher further used an audit trail which documents all the research choices and actions which led to the research result (Kocaman,2024). Thus, the researcher maintained the credibility of this study (Please see Appendix I).

### **3.12 Chapter Summary**

At the beginning of this chapter, the researcher discussed the philosophical assumptions, interpretive paradigm, researcher role and the justification behind choosing a qualitative phenomenological research approach. Afterwards, the researcher documented the data collection procedures. Finally, the data analysis framework along with the steps taken by the researcher to ensure the credibility and the trustworthiness of this study was added in detail.

## **Chapter 4**

### **Results and Discussions**

#### **4.1 Introduction**

The main objective of this research is to explore the academic writing challenges of Bangladeshi STEM students and how they overcome these challenges. In order to achieve this objective, the researcher collected data from the participants. All the findings of this research will be presented in this chapter. This chapter is divided into two sections. Bangladeshi STEM students' academic writing challenges and perception will be presented in section one. Section two will discuss how Bangladeshi STEM students deal with these challenges and what are the usual strategies they follow to overcome these challenges. All the findings will be collected from the dominant themes of the interview questions.

#### **4.2 Academic writing challenges of Bangladeshi Female STEM students**

##### **4.2.1: Lack of vocabulary**

Mastering English vocabulary is a major challenge among non-native English language learners. Studies in Saudi Arabia (Mahjabeen et al., 2025), Turkey (Eren et al., 2024), Russia (Bolsunovskaya & Rymanova, 2020), China (Kuszel, 2025), Indonesia (Nawangsih et al., 2024), Malaysia (Suleiman et al., 2023) have shown that undergrad students from all discipline struggle with their vocabulary which eventually leads to poor academic performance and writing difficulties. Naturally, Bangladeshi STEM students are no exception and vocabulary is a major challenge for the majority of them. In this study, participants revealed they often lack knowledge in English vocabulary. Particularly, Students from Bangla medium background had less opportunity to learn and practice vocabulary which resulted superficial language skill in

later academic years. In the interview, participants shared their previous experience and long standing difficulties with vocabulary. As Afia said,

I did not learn many synonyms in my school. So when I submit assignments in Turnitin, it shows plagiarism with someone else. These times, I face a lot of problems with synonyms. I have been facing these vocabulary issues for a long time, since my first semester. (DU AFI 16).

Another participant Zaima shared how her limited vocabulary knowledge affects her writing quality. She said,

But the vocabulary issues are the real struggle. I often cannot find the proper word or the academic word. I know if I could replace a few words with better academic words it would sound more polished, but I often struggle with it. (DU ZAI 18).

Apparently, students' limited exposure and little practice of English vocabulary is found as one of the major reasons for their vocabulary weakness. Overall, Bangladeshi STEM students' inadequate vocabulary knowledge serves as one of the most common challenges in their academic writing.

#### **4.2.2: Over dependency on AI**

In today's digital world, technology is integrated in every aspect of our life including education. Currently, students use various digital tools for learning. Integration of these technologies in education brings revolutionary changes and helps students to improve their knowledge and skills (Alshreef & Saaty, 2025). However, the adverse effect of using technology too much can be seen among current students. Bangladeshi STEM students are using various digital tools for academic learning. Despite the assistance in a few areas like easy grammar checking or getting ideas from AI tools, students revealed an overwhelming dependence on AI which is limiting their cognitive and psychological capacity. In interviews students shared how the overuse of

AI is affecting their motivation to write and undermining academic writing skills. Sanzida claimed in her interview,

I feel this easy access to AI is actually ruining our writing skills. I accept the positive perks of these tools in education, but it definitely ruins my creativity and critical thinking in writing. Like now I often feel lazy and rather than doing research myself, I depend on AI. (DU SAN 50).

Another participant Meem shared that ChatGPT-like AI tools can easily produce writing which is becoming an easy way out for students and they are losing the practice of writing in general. However, there is also a risk of incorrect information and inauthentic reference as ChatGPT is known to make mistakes from time to time. She said,

Nowadays writing something from scratch by myself feels like an impossible task. Because AI tools like ChatGPT can easily help in these writing tasks. But honestly it does not provide the correct answer all the time. Sometimes it also gives false references. (DU MEE 48).

These findings are consistent with other studies where researchers share the potential risk of over-using AI tools in academic writing. For example, Chen and Gong's (2025) stated in their paper that Chinese university students expressed their concern over their over-reliance on AI tools and the authenticity of AI generated content in academic writing. Other studies in Saudi Arabia (Ozfidan et al., 2024), China (Bai & Wang, 2025; He, 2025), Indonesia (Harfiza et al., 2025; Budiyo et al., 2025) stated students' over-dependency on AI tools in academic writing is reducing critical thinking, limiting motivational impact and increasing ethical concern. The following studies from across the world confirmed over dependency on AI as an emerging concern for students' academic growth and development.

#### **4.2.3: Difficulties in organisations, logical flow of ideas and redundancy in writing**

Coherence and cohesion is an integral part of academic writing. Academic writing required coherent features and cohesive ties for connection and overall contextual unity of a text (Poudel, 2018). To date, numerous studies have reported coherence and cohesion as major difficulties for non-native English learners in academic writing. Studies conducted in Indonesia (Prasadini., 2022), Malaysia (Songjin, 2023), China (Wen et al., 2025), Saudi Arabia (Alanazi & curle, 2024), Russia (Bolsunovskaya & Rymanova, 2020), Egypt (Ead et al., 2023) revealed that students from these countries face significant challenges in composing coherent and cohesive writing. Likewise, previous research conducted on Bangladeshi undergraduate students documented their problems with coherence, cohesion and logical flow (Rahman & Hasan, 2019; Ahmed, 2024).

STEM participants of this study also reported that they face similar challenges. Afrin said, “I think producing a coherent piece of writing is difficult for me, as many times I lose track and my writing ends up becoming a bit messy” (DU AFR 22). Few participants further expressed their struggle to maintain the logical flow of the writing. The majority of students said they use transitional words for achieving cohesion, however, repeated use of common transitional words leads to redundancy in their writing. Neha stated,

Sometimes when I end up finishing a writing task, it looks disconnected like there is a lot of information put together but when someone reads it just does not flow like one piece. My instructor advises me to use transitional words to connect paragraphs, but many times I end up repeating the common one and my writing gets average grade. (DU NEH 22).

Overall, difficulty in maintaining coherence, cohesion, logical flow and redundancy in writing stood out as the significant area of concern among Bangladeshi STEM students in academic writing.

#### **4.2.4: Difficulty in writing different sections of academic paper**

Academic writing typically requires structured writing. Introduction, body and conclusion are some basic sections of academic writing tasks. Bangladeshi STEM students shared their experiences of facing difficulties in writing these sections in their academic writing task. Particularly, writing an engaging and concise introduction is found as the major weakness of Bangladeshi STEM undergraduate students. One of the participant Afia described her struggle with writing introduction,

With introduction, sometimes faculty want a catchy introduction. Like they want to have a complete idea about the assignment by reading the intro or want a summary of the report in the introduction. I sometimes face problems in this .... like writing a catchy introduction. (DU AFI 28).

Besides challenges in writing a compelling introduction, students often face difficulty in composing clear thesis statements. Few participants believed their lack of summarizing skills and poor language proficiency is making writing thesis statements and introductions difficult for them. Few of them further shared that they occasionally struggle to draw conclusions, draft other research segments like methodology, findings and keep writing concise and precise. Neha said, “Many times you cannot write a lot in reports, so you have to be particular in what you add. Here, writing concisely is the real challenge” (DU NEH 30).

These writing challenges are evident among other countries' students as well; reportedly Malaysian (Maznun et al., 2016), Filipino (Galdonex, 2024; De Pablo et al., 2025), Indonesian (Nenotek et al., 2022), Libyan (Aldabbus & Bhengazi, 2022). students encounter similar difficulties in writing academic papers.

Taken together, these findings suggest that Bangladeshi STEM students face some major difficulties in writing different sections of academic papers along with presenting concise and clear writing.

#### **4.2.5: Psychological challenges**

In the interviews, participants of this study expressed their psychological burden and repeating circle of Bangladeshi STEM undergraduate students' academic life. On many occasions, students' academic performance suffers due to various psychological issues. In academic writing, procrastination is the dominant habitual barrier in Bangladeshi STEM students' lives that affect their academic writing quality. Sanzida stated, "I want to write the perfect paper. But at the same time I keep feeling anxious and delay my work. And, end result, a last minute assignment barely holding my grade" (DU SAN 32).

From the interviews, multiple reasons came into light for procrastination which include perfectionism, poor writing skills, fear of writing, distraction and emotional overwhelm. Few participants further stated their overlapping academic schedule and time constraints create stress, emotional exhaustion and limit their capacity to give effort on their writing. Suma expressed frustration over this issue, "Quiz, assignment, group project and even final clashes on the same day. How am I going to finish writing all these and how am I going to maintain the standard?" (DU Sum 30).

However, these patterns are not only the story of Bangladeshi students; the existing body of research showed students across the world go through the same psychological challenges in

their academic life. Studies conducted in Pakistan (Fareed et al., 2021), Malaysia (Akhter et al., 2020), Indonesia (Yenti & Susanti, 2025; Fitriani et al., 2022), Taiwan (Izwandi, 2025), China (Chen, 2024) confirmed high level of writing anxiety and stress among students which resulted in avoidance behaviors, burnout and lack of confidence in academic writing. Therefore, psychological challenges undermine students' ability to engage in academic writing and affect their emotional wellbeing.

#### **4.2.6: Insufficient feedback, writing support and academic resources**

Lack of formative feedback, writing support and scarcity of academic resources emerge as one of the significant challenges for Bangladeshi STEM students in academic writing. Constructive feedback and writing supervision from course instructor/supervisor are great sources of support for improving one's academic writing skills (AlMarwani, 2020). However, Bangladeshi STEM students expressed unsatisfactory experiences in this regard. Many of the participants said they do not receive detailed feedback. Many times feedback is not clear to the students. One participant Afrin shared she received very brief feedback which usually failed to facilitate writing proficiency or sometimes no feedback from her instructor. She said,

I think most of the time it varies person to person. But typically feedback is not that helpful. For example, one teacher may write to improve this part or underline things like this. But these feedbacks actually do not help, rather make me confused. (DU AFR 34).

Furthermore, in many instances students feel uncomfortable to ask feedback or clear their confusion. The lack of communication between teacher and student is apparent from the data. Another participant Zaima stated, "And another issue is that as now I am in university, many times I actually feel shy to ask for feedback or explanation from the teacher" (DU ZAI 36).

This study identified students' unfamiliarity with open-interaction with teachers and fear of receiving negative feedback in earlier academic life as the underlying causes for these types of issues. This situation of Bangladeshi STEM students mirrors many other observations from the previous research. Lack of formative feedback, limited writing support from supervisor, insufficient teacher-student interaction, students' reluctance are some common concerns among Malaysian (Chen et al., 2025), Turkish (Alostath, 2021) and Sri Lankan (Herath & Silva, 2025) students.

Alongside feedback and writing support, inadequate academic resources are another major challenge for Bangladeshi students from all disciplines. STEM students who participated in this study said they struggle in finding academic resources like articles, journals, conference papers and books. They expressed their frustration over it as these academic materials are very important for strengthening the credibility and maintaining international standards of their writing. In many instances, academic sites have regional restrictions or paid versions, which make it harder for general Bangladeshi STEM students to access these resources. Tonni called this a norm in their academic life, "Not finding research papers, international journals are very normal to us. It's actually not about finding it, but more of not being able to access it" (DU TON 32).

Unfortunately, multiple prior research revealed limited access to academic resources is not only an issue for Bangladeshi Students. Studies conducted by Bakhou (2021), Hardianti & Sabata, (2025), Gerova & Ivanova (2023), Alostath (2021), Wen et al. (2025) also documented students facing great difficulty in accessing academic resources.

Ultimately, these findings address the impact of insufficient feedback, writing support and academic resources in Bangladeshi STEM students' academic writing performance and the need for immediate attention to resolve these challenges.

#### **4.2.7: Poor conceptual understanding, limited facility and formatting challenges**

“If our topic is not covered completely or a task came from an area which was not included in our syllabus, how am I supposed to complete that assignment?” (DU NEH 40).

This statements from Neha points toward one of the underlying causes of Bangladeshi STEM students’ academic writing challenge. Many times, STEM students do not face writing challenges due to their writing skills itself. Instead, their lack of conceptual understanding initiates their writing difficulties because when they are unclear about the topic or their subject-matter, naturally they struggle at the time of writing. Other research conducted on STEM discipline revealed STEM students' limited conceptual knowledge triggered many academic challenges and poor academic performance (Wang et al., 2025; Buriro et al., 2025). Alongside this, Bangladeshi STEM students' academic activities get hindered due to inadequate lab facilities. In the interview, Pushpa said about this issue, “We often end up getting incomplete or faulty results. So when we have to write the reports, we struggle because of this” (DU PUS 42).

Participants further listed formatting as another challenge for STEM writing. In STEM, there are many discipline-specific formatting conventions which are different from general courses. One participant Rabeya said her experience of facing unexpected formatting challenges in her thesis,

In my thesis I cannot use normal word doc, we have to use LaTeX software to write through coding. However, it is quite difficult to use as well. Last time when we were submitting our literature review it was repeatedly turning our 5 separate paragraphs into 1 paragraph. These types of challenges happen a lot which is pretty frustrating. (DU RAB 28).

However, she reported having no prior training or assistance to overcome these challenges. Another participant Meem shared another encounter where she had issues while adding visual elements in her lab report. She further said having no-assistance to handle such accounts, “These unexpected formatting issues are really frustrating. It just kills time and you cannot go to anybody to ask help for this” (DU MEE 26).

Students held the discipline responsible for these formatting issues and called for immediate attention. Altogether, students’ poor conceptual understanding, limited facility and formatting challenges bring academic setbacks and interrupt the writing process in academic life.

#### **4.2.8: Lack of writing practice in STEM discipline**

STEM disciplines primarily focus on the core STEM concept and encourage students to gain real-world experience and problem solving skills. Academic writing as a whole often gets overlooked in STEM disciplines. Multiple previous research, including Borg et al. (2023), Sharma (2018), labeled the lack of writing opportunities in STEM discipline as one of the core reasons for STEM students' academic writing challenge. In many instances, STEM students do not get sufficient assistance to learn and practice academic writing (Stefanile,2025). Parallel conditions have been observed in the Bangladeshi STEM context, as majority of participants said they do not write much. In the interviews, Bangladeshi STEM undergraduate student shared that they have very few writing tasks in their major. However, due to this little writing practice over time, they caught off guard when it comes to doing any major academic writing tasks like thesis or research paper. One participant Pushpa shared her perspective about writing practice in STEM and its consequence,

I don't think they priorities much on writing in STEM. Like they focus more on concepts like if we get the topic correctly in the paper. Before the thesis, we do not

really think much about our writing skills. But when we have to write the thesis, it gets difficult. (DU PUS 16).

Moreover, STEM students perceive academic writing as subordinate from STEM contents and treat it separately instead of looking at it as a holistic part of learning (Lane et al., 2022). In this study, STEM participants perceived academic writing as an important skill, however they also believed it was less important than the subject matter. STEM course instructors' lack of attention to language use also prompts Bangladeshi STEM students' indifferent attitude towards academic writing. Rabeya said, “They don’t care much about the use of language. Probably because there is not much writing, most of it is math” (DU RAB 18).

Overall, Bangladeshi STEM students' attitude and lack of academic writing practice are the biggest underlying factors for STEM students' mediocre writing and challenges associated with it.

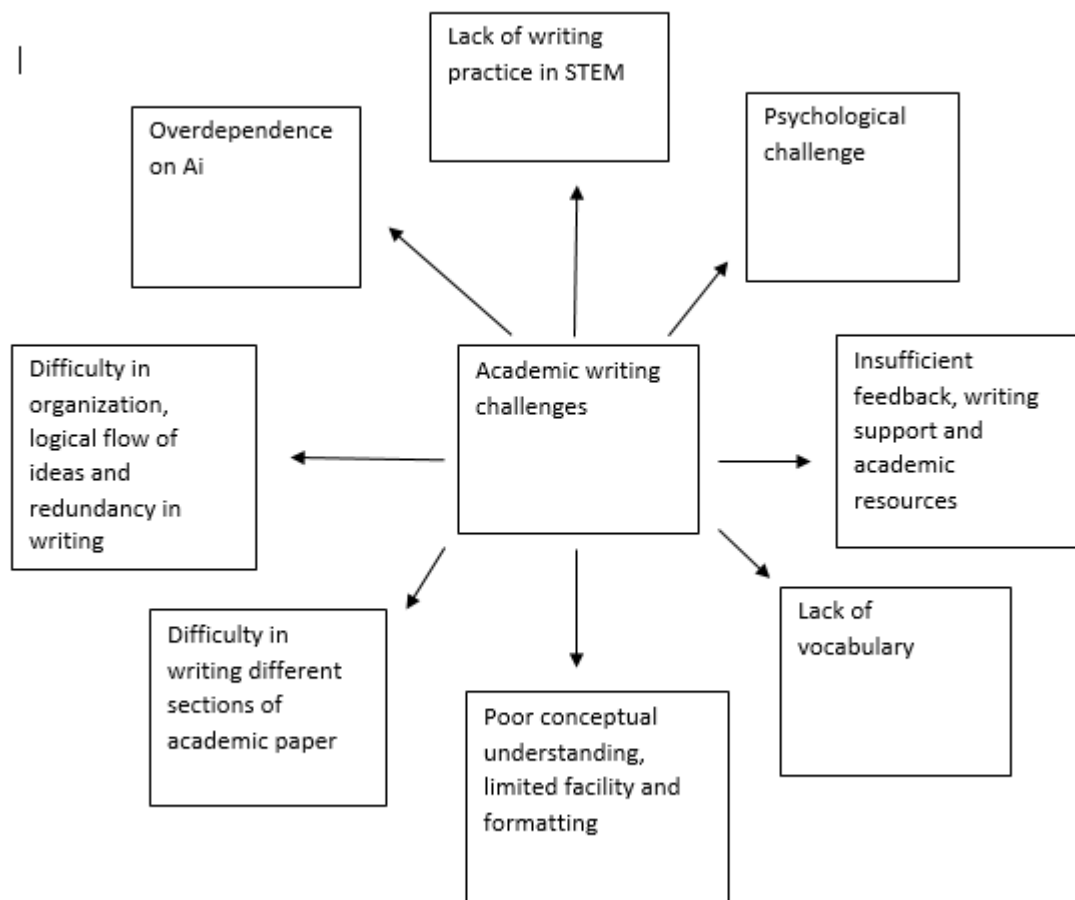


Figure 2: Emergent themes of the study

## 4.3 Overcoming the challenges of Academic writing

### 4.3.1: Extramural English activities

The traditional setup of learning a foreign language in the classroom through heavy books with complex grammar rules is now an outdated idea. Instead foreign language learners are now adopting various mediums to improve their language skills beyond the classroom setup. Extramural English activities (learning English outside of the classroom) are a popular alternative to traditional ways of learning English. Many non-native English language learners shared that their English language proficiency significantly increased by watching English movies, listening to music, playing games, reading for pleasure, browsing the internet and more. (Fachriyany & Murtafi'ah, 2023; Wouters et al., 2024.). These extramural English activities reportedly help to enhance English vocabulary, reduce learning anxiety and ensure learners' autonomy (Sundqvist,2024).

Similar trends of engaging extramural English activities to improve language proficiency are found among Bangladeshi STEM undergraduate students. One participant Tonni claimed that she learned more new vocabulary through watching English movies and series than memorizing them through books. She further labeled her previous experience of memorizing synonyms and antonyms to increase her English vocabulary as “torturous and frustrating” for students. Another participant Pushpa believed now everyone is exposed to various authentic English language contents on a daily basis on the internet, which can be an excellent source for improving one's English language skills. She said,

Now I think I use the internet most for improving my language skills. I don't even have to make any extra effort for that cause now there is so much content in English that is available on the internet. Whenever I browse the internet for fun or other reasons I automatically consume those contents which help me with new words, sentence structure, everyday expressions, pronunciation and accent (DU PUS 48).

Other participants also expressed similar practices like watching English movies, listening to music, gaming or the internet help them to develop their vocabulary, sentence structure and style, English comprehension which therefore improve their academic writing as well. Ultimately, engaging various extramural English activities increase STEM student mastery in English and their volunteer participation in the learning process.

#### **4.3.2: Use of Digital technology**

Using various digital tools for academic purposes are now common phenomena in the education sector across the world. Recently, students employ modern tools and technologies in accessing new information and academic resources, collaborating with peers and educators, producing academic contents and enhancing their overall learning experience. In particular, many recent studies have found extensive use of digital tools in academic writing. Various digital tools including Grammarly, Quilt bolt, digital writing apps, and AI sites now assist students with grammar, spelling, vocabulary, formatting, idea generation and research. Availability and efficiency of these tools made these a popular choice for students to produce high quality writing (Irfun, 2025; Hossain et al., 2025).

Likewise, Bangladeshi STEM students revealed they use various digital tools in academic writing. Integration of these improve their academic writing quality and help them to minimize mistakes in writing. All the participants stated they use apps like google docs, Grammarly or writing apps to check their grammar and spelling. Many of these apps can also be used to quickly find alternative vocabulary. They further reported that recent digital writing apps can help with writing organization, maintain coherence and writing format. Sanzida said in this regard,

Apps like Grammarly can even help with coherence and formatting. If you change your app set-up as academic, it gives instant feedback of how you can change your writing for better clarity and flow. It's really a game changer for my writing. (DU SAN 50).

Furthermore, participants named recent AI tools like ChatGPT and Perplexity as their “study-buddy”. Despite the ethical concerns and risk of over-reliance on AI, they highlight positive outcomes of AI like assisting in idea generation, research and correction in academic writing. Thus, it can be safely concluded that Bangladeshi STEM undergraduates' use of digital tools in academic writing substantially alleviate their writing difficulties, provide support and enhance their academic writing proficiency.

#### **4.3.3: Peer support**

Upon asking what they do when they encounter difficulties in academic writing, many of the participants mentioned peer support in their interviews. Rabeya mentioned she goes to her friends for help, “Referencing is a big hassle for me, I do ask my friend to help me with citation and reference” (DU RAB 52).

Few of the participants further revealed going to their peers/friends for writing advice is more convenient and easy for them, as they feel less nervous in comparison to any official consultation with their teacher. Exciting studies support students' experience as research found evidence that peer-support in language learning can reduce anxiety, build confidence, improve academic performance and foster collaboration (Namaziandost et al., 2024; Banstola, 2024). Few participants further added reading other's papers gives them new perspectives to look at and enrich their own understanding and writing. Suma said, “Sometimes I ask my classmate who is good at writing to read my paper and give feedback” (DU SUM 49).

Regarding the benefit of peer review, Deng et al. 's (2019) and Osman et al. 's (2022) research stated peer-review practice elicited self-reflection upon students' own writing and fostered their critical and analytical skills. Collectively, participants' accounts confirmed that peer-support and feedback practice assist Bangladeshi STEM students to overcome their academic writing challenges.

#### **4.4 Chapter summary**

This chapter presented all the findings of this study. This study found eight main themes which document academic writing challenges of STEM students. The emerging themes were lack of vocabulary, over dependency on AI, difficulty in writing organisation, maintaining logical flow and redundancy of writing, difficulties in writing different research section, formatting, lack of conceptual understanding, lab facilities and academic resources, insufficient feedback and writing support, psychological challenges and lack of writing practice in STEM discipline. In the second part, other three themes of students coping strategies are added which include involvement in extramural English activities, use of digital tools and peer support.

## **Chapter 5**

### **Conclusion and Implications**

#### **5.1 Introduction**

This study's main objective is to understand the academic writing challenges of Bangladeshi STEM students and how they overcome these challenges by engaging in in-depth interviews with the participants. The qualitative approach allows the researcher to gain individual perception of academic writing, the challenges and how STEM students counter these challenges in their academic journey.

#### **5.2 Contributions of the Study**

##### **5.2.1: Implications for knowledge**

The existing body of research presented multiple challenging aspects of academic writing in STEM and underlying causes of these issues (Russell et al., 2022; Chandran et al., 2022; Sravanthi, 2024; Rothinam & Maniam, 2025; Charoenpornsook & Thumvichitc, 2025; Migallos & Prina, 2023). Some researchers highlighted that many STEM students lack linguistic competence and organisation skills in academic writing that include limited general and technical vocabulary, lack of mastery in grammar, inability to compose coherent text and maintaining structure (Alanazi & Curle, 2024; Bolsunovskaya & Rymanova, 2020; Hamad & Haji's, 2025). While few other studies found students' beliefs and psychological problems, writing habits, classroom practice and limited guideline from teachers play a crucial role in exacerbating academic writing challenges (Berdanier & Zerbe, 2018; Sajjad et al., 2021; Ead et al., 2023). Above mentioned studies mainly focused on the STEM students' academic writing perceptions and challenges in countries like India, Malaysia, Philippine, Thailand, Indonesia, Egypt, Saudi Arabia and Russia. A few studies have been conducted on Bangladeshi students'

academic writing condition and challenges (Rahman et al.,2024; Younus, 2025; Chowdhury et al., 2025). These studies confirmed multiple number of writing challenges such as poor vocabulary and grammar, organisation challenge, reference and citation, lack of critical thinking, rote learning as some biggest challenges. However, up till date, no research has focused particularly Bangladeshi STEM students' academic writing situation, the challenges they face and how they overcome these difficulties. To fulfill this knowledge gap ,the researcher explored Bangladeshi STEM students' academic writing challenges and coping strategies and found limited vocabulary, difficulties in organisation, maintaining logical flow and redundancy in writing, difficulties in writing research section, over-reliance of AI , lack of conceptual understanding and academic resources, formatting challenges, insufficient feedback and lack of writing practice in STEM are the main berries in Bangladeshi STEM students' academic writing. This study further reported peer support, extramural English activities and integration of digital tools assist STEM students to overcome writing difficulties. Therefore, this study filled the existing gap and addressed Bangladeshi STEM students' challenges in academic writing and how they counter these challenges.

### **5.2.2: Implications for Theory**

This study presented a refined conceptual framework from the existing literature and strengthen the understanding in the field of academic writing research. The findings reinforce the concepts of linguistics and cognitive berries and instructional factors of Prapobratanakul (2024). It also supported Ferolino et al.'s (2022) concept of psychological challenges and Dyussembekova & Ti Wu's (2022) interdisciplinary barriers by highlighting the challenges of Bangladeshi STEM students. It further aligned with learners' attribute by Prapobratanakul (2024). Though no new theory emerged from the study, it confirmed the applicability of these concept in Bangladeshi STEM context.

### **5.2.3: Implications for Pedagogy**

Academic writing skill is very crucial for students' academic success and international opportunities. Unfortunately, in Bangladeshi context, Bangladeshi STEM students' academic writing skills do not meet the global standard. Bangladeshi STEM educators primarily focus on technical concepts and overlook students' writing and language use. This practice resulted in limited writing opportunities for students and students' indifferent attitude towards writing in STEM disciplines. A lot of the time, STEM students lack adequate training and feedback to improve their academic writing quality. This study further discovered students' conceptual gap, minimal lab facility and limited academic resources lead to poor writing performance. In some cases, STEM undergraduate students lacked readiness to manage discipline specific conventions in writing. In addition to these, many STEM institutions' practices and policies impose excessive workload on students that affect their mental health and academic engagement. The findings from the study calls for immediate considerations to resolve writing challenges in STEM. At this point, STEM policymakers and practitioners need to ensure a student -centered educational environment that facilitates academic learning and supports their emotional well-being. For developing academic writing skills, STEM institutions must provide students with more writing support and opportunities. Formative feedback and teachers' assistance are highly required to enhance their writing quality. Further, STEM educators need to confirm purposeful applications of digital writing tools. Overall, pedagogical reform that promotes active language learning is mandatory to refine academic writing skills among Bangladeshi STEM students.

### **5.3 Recommendations**

The findings of this study suggest a number of recommendations for future practice

1. This study draws major attention to the limited practice of academic writing in STEM disciplines. On many occasions, STEM students are not adequately prepared and aware about the importance of academic writing. Therefore, STEM disciplines urgently need to ensure that STEM students receive sufficient learning and practice opportunities. Including more writing courses, writing workshops and STEM educators attentiveness on academic writing can enhance STEM students' academic writing skills.
2. English language teaching -learning process in most Bangla medium educational institutions are still based on rote learning. Students struggle to express their own voice through speaking and writing due to the memorization based language practice. This long standing practice also does not contribute to fostering students' critical thinking which is crucial for their cognitive development and academic success. To overcome these challenges, initiatives from the authorities are not enough to bring practical changes. Thus, authorities and experts in this field need to give greater attention to reform Bangladesh educational practice.
3. Higher educational institutions need to ensure students friendly curriculum and policies that promote joyful learning. Many times excessive workload and exam-oriented education systems undermine students' ability to learn academic skills and hinder students' physical and mental wellbeing.
4. STEM educators should promote the effective and ethical use of digital technologies and AI tools among students in learning. Integrating these tools in academic can significantly help students with academic writing. However, clear guideline from educators and institution are needed to avoid any negative drawbacks.

## References

- Ahmad, I.S. (2017). *Doing Qualitative Research for Beginners: From Theory to Practice*. Singapore: Partridge Publishing.
- Ahmed, N. S. (2024). Bangladeshi students' challenges of English academic writing in an international university. *TESOL Bangladesh Journal*, 1(1), 103–126. <https://doi.org/10.69907/tbj.v1i1.64>
- Akhoul, B., & Bouhania, B. (2021, December 12–13). *Identifying key challenges facing Algerian EFL students in dissertation writing* [Paper presentation]. *Academic Writing at the Crossroads: Challenges and Perspectives*, Saida University, Saida, Algeria. [https://www.researchgate.net/publication/390746854\\_Academic\\_Writing\\_at\\_the\\_Crossroads\\_Challenges\\_and\\_Perspectives\\_1213\\_December\\_2021\\_Saida\\_Identifying\\_Key\\_Challenges\\_Facing\\_Algerian\\_EFL\\_Students\\_in\\_Dissertation\\_Writing](https://www.researchgate.net/publication/390746854_Academic_Writing_at_the_Crossroads_Challenges_and_Perspectives_1213_December_2021_Saida_Identifying_Key_Challenges_Facing_Algerian_EFL_Students_in_Dissertation_Writing)
- Akhtar, R. (2020). The Effects of ESL Student's Attitude on Academic Writing Apprehensions and Academic Writing Challenges. *International Journal of Psychosocial Rehabilitation*, 24(5), 5404–5412. <https://doi.org/10.37200/ijpr/v24i5/pr2020247>
- Al Younus, M. A. (2024). *English writing problems and remedies of Bangladeshi undergraduate learners*. *Journal of Applied Linguistics and Language Research*, 11(4), 120–140. <https://www.jallr.com/index.php/JALLR/article/view/1365>
- Alanazi, K., & Curle, S. (2024). *Challenges experienced by students studying medicine through English medium instruction*. *Frontiers in Education*, 9, Article 1364860. <https://doi.org/10.3389/feduc.2024.1364860> the University of Bath's research portal
- Aldabbus, S., & Almansouri, E. (2022). Academic writing difficulties encountered by university EFL learners. *British Journal of English Language Linguistics*, 10(3), 1–11. <https://doi.org/10.37745/bjel.2013/vol10n3111>

- Aldabbus, S., & Almansouri, E. (2022). Academic writing difficulties encountered by university EFL learners. *British Journal of English Language Linguistics*, 10(3), 1–11. <https://doi.org/10.37745/bjel.2013/vol10n3111>
- Alharahsheh, H. H., & Pius, A. (2020). A review of key paradigms: Positivism vs interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2(3), 39–43. <https://doi.org/10.36348/gajhss.2020.v02i03.001>
- Ali, H. I. H. (2020). Lecture comprehension difficulties experienced by Omani students in an English-medium engineering program. *Cogent Arts and Humanities*, 7(1), 1741986. <https://doi.org/10.1080/23311983.2020.1741986>
- AlMarwani, M. (2020). Academic writing: challenges and potential solutions. *Arab World English Journal*, 6, 114–121. <https://doi.org/10.24093/awej/call6.8>
- Alostath, K. (2021). *Graduate students' challenges in academic writing* (Master's thesis). Istanbul Aydın University. <https://doi.org/10.13140/RG.2.2.20113.92008>
- Alrashed, M., & Latif, M. M. M. A. (2025). Investigating Saudi university medical students' English language difficulties: a needs analysis study. *Frontiers in Medicine*, 11, 1492031. <https://doi.org/10.3389/fmed.2024.1492031>
- Alshreef, N., & Saaty, N. (2025). The influence of students' independent use of generative AI tools on the EFL writing Classroom: Recommendations for students, teachers, and policymakers. *International Journal of English Language Education*, 13(1), 152. <https://doi.org/10.5296/ijele.v13i1.22832>
- Arif, A., Hyder, S., Shah, R., Bs, F., & Ali, A. (2020). An investigation on academic writing problems encountered by undergraduate students of Shaheed Benazir Bhutto University, Sanghar Campus. *Journal of Literature, Languages and Linguistics*. <https://doi.org/10.7176/jlll/68-03>

- Arihasta, D. (2023). Non-English major undergraduate students' difficulties in argumentative writing at Mae Fah Luang university Thailand. *LLT Journal a Journal on Language and Language Teaching*, 26(2), 732–748. <https://doi.org/10.24071/llt.v26i2.6444>
- Averina, F. E., & Kanasya, A. V. (2025). Unravelling Thai EFL undergraduate students' motivation-engagement profiles in academic writing along with their challenges. *LLT Journal a Journal on Language and Language Teaching*, 28(1), 341–361. <https://doi.org/10.24071/llt.v28i1.8985>
- Aziz, F. I. A., & Ahmad, U. K. (2017). Persuasive Writing: How students argue. *Sains Humanika*, 9(4–2). <https://doi.org/10.11113/sh.v9n4-2.1356>
- Bai, Y., & Wang, S. (2025). Impact of generative AI interaction and output quality on university students' learning outcomes: a technology-mediated and motivation-driven approach. *Scientific Reports*, 15(1), 24054. <https://doi.org/10.1038/s41598-025-08697-6>
- Bailey, S. (2015). *Academic writing: A handbook for international students* (2nd ed.). Routledge.
- Bakhou, B. (2021, December 12-13). *Identifying Key Challenges Facing Algerian EFL Students in Dissertation Writing*. [paper presentation]. Academic Writing at the Crossroads: Challenges and Perspectives. University of Ahmed Draia – Adrar, Algeria. (PDF) "[Academic Writing at the Crossroads: Challenges and Perspectives](#)" 12/13 December 2021, Saida [Identifying Key Challenges Facing Algerian EFL Students in Dissertation Writing](#)
- Bangladesh Ministry of education. (n.d.). *Home-Ministry of Education*. [Home | Ministry of Education](#)
- Bangladesh Board of Technical Education. (n.d.). *Home-Bangladesh Technical Education Board*. [Home | Bangladesh Board of Technical Education](#)

- Banstola, P. R. (2024). An observational study on peer feedback practices in university level English language classrooms in Nepal. *Janapriya Journal of Interdisciplinary Studies*, 13(1), 41–55. <https://doi.org/10.3126/jjis.v13i1.75522>
- Berdanier, C. G. P., & Zerbe, E. (2018). *Correlations between graduate student writing concepts and processes and certainty of career trajectories. Frontiers in Education: Fostering innovation through diversity, FIE 2018 – Conference Proceedings* (Article 8658678). Institute of Electrical and Electronics Engineers. <https://doi.org/10.1109/FIE.2018.8658678>
- Bolsunovskaya, L. M., & Rymanova, I. E. (2020). Academic Writing: Difficulties and Possible Solutions for Engineering Students. *Vysshee Obrazovanie V Rossii = Higher Education in Russia*, 29(10), 77–85. <https://doi.org/10.31992/0869-3617-2020-29-10-77-85>
- Borg Preca, C., Baldacchino, L., Briguglio, M., & Mangion, M. (2023). Are STEM Students Creative Thinkers? *Journal of Intelligence*, 11(6), 106.
- British Council Bangladesh. (n.d.). *British Council Bangladesh*. [British Council | Bangladesh](#)
- Budiyono, H. (2025). Exploring Long-Term Impact of AI writing Tools on independent writing Skills: A case study of Indonesian language education students. *International Journal of Information and Education Technology*, 15(5), 1003–1013. <https://doi.org/10.18178/ijiet.2025.15.5.2306>
- Buriro, N. D. G. S., Fatima, N. S., & Bashir, N. S. (2025). Investigating the English language needs of Pakistani undergraduate medical students: an ESP study in a public sector university. *Social Science Review Archives*, 3(2), 91–98. <https://doi.org/10.70670/sra.v3i2.594>
- C., Chen, M., & Yan, F. (2025). The challenges and strategies of Chinese postgraduate students in academic writing. *Cogent Education*, 12(1). <https://doi.org/10.1080/2331186x.2025.2488544>

- Chandran, G A/P., Rengasamy, A/P Y. G. H. H., Yunus, M. M., & Rafiq, K. R. M. (2022), Reviewing ESL Roles in STEM Education: Scaffolding STEM Learners' English Language Competency. *International Journal of Academic Research in Business and Social Sciences*. 12(6), 86 – 101.
- Charoenpornsook, V., & Thumvichit, A. (2025). Unveiling engineering students' challenges and coping strategies in English-medium instruction: A Q methodology study. *Asian-Pacific Journal of Second and Foreign Language Education*, 10(1), 1-25. <https://doi.org/10.1186/s40862-024-00307-8>
- Chauhan, P. (2022). Fundamentals of Academic Writing: A Literature review. *Journal of NELTA*, 27(1–2), 161–180. <https://doi.org/10.3126/nelta.v27i1-2.53201>
- Chen, X. (2023). Writing Anxiety in Chinese Non-English Major EFL Undergraduates: Causes and Consequences. *Lecture Notes in Education Psychology and Public Media*, 14(1), 192–200. <https://doi.org/10.54254/2753-7048/14/20230982>
- Chen, X., Narayanan, G., & Ismail, N. (2025). A Systematic Literature Review: Malaysia's postgraduate students' challenges and strategies in academic English writing. *Quantum Journal of Social Sciences and Humanities*, 6(4), 641–652. <https://doi.org/10.55197/qjssh.v6i4.786>
- Chen, Z. (2024). A study of Chinese undergraduate students' English Language Speaking Anxiety, Expectancy-Value Beliefs and Spoken English Proficiency. *SAGE Open*, 14(1). <https://doi.org/10.1177/21582440231219312>
- Chowdhury, T. A., Hossain, M. S. H., & Rahman, S. (2025). Challenges of effective English writing for Bangladeshi tertiary-level students. *TESOL Bangladesh Journal*, 125–147. <https://doi.org/10.69907/tbj.v2i1.89>
- Creswell, J.W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (2nd Ed.). Thousand Oaks, CA: Sage Publications Inc.

- De Pablo, J. D., Esmeralda, P. a. A., & Isaran, P. B., Jr. (2025). Research proficiency, challenges, and engagement of BSED science students. *International Journal of Research and Innovation in Social Science*, IX(VIII), 3893–3914. <https://doi.org/10.47772/ijriss.2025.908000314>
- Deng, Y., Kelly, G. J., & Deng, S. (2019). The influences of integrating reading, peer evaluation, and discussion on undergraduate students' scientific writing. *International Journal of Science Education*, 41(10), 1408–1433. <https://doi.org/10.1080/09500693.2019.1610811>
- Díaz-Rodríguez, Y. L., Quintana-López, L. A., & de León-Riera, I. F. (2022). The value of the English language in the current context of medical sciences. *Education Médica Superior*, 36(2), e2530.
- DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, 40(4), 314–321. <https://doi.org/10.1111/j.1365-2929.2006.02418.x>
- Dunn, S. L. G., Haviland, H. F., & Gallagher, D. L. (2023). The importance of local long-duration STEM mentorship as a global mechanism for increasing diversity at all levels of education. *Frontiers in Astronomy and Space Sciences*, 10. <https://doi.org/10.3389/fspas.2023.1134836>
- Dyussebekova, A., & Wu, T. (2022). What are the Perceptions of STEM Students Regarding Writing Practices in a University in Kazakhstan? *Journal of Student Research*, 11(1). <https://doi.org/10.47611/jsr.v11i1.1569>
- Ead, H. A., Fahmy, H., & Elbadry, A. (2023). Academic writing challenges faced by chemistry doctoral students: A self-study informed by three writing theories. *International Journal of Education and Learning*, 5(2), 113–123. <https://doi.org/10.31763/ijele.v5i2.1248>

- Eren, E. U., Atay, D., Balçı, L. A., Sevim, Y., & Aslan, F. E. (2024). The English Language Needs of Health Sciences Students in Turkey. *Batı Anadolu Eğitim Bilimleri Dergisi*, 15(2), 1948–1968. <https://doi.org/10.51460/baebd.1436231>
- Fachriyany, A., & Murtafi'ah, B. (2024). A Survey of an Exposure to Extramural English Activities among EFL Undergraduate Students. *Edulangue*. <https://doi.org/10.20414/edulangue.v6i2.8770>
- Fareed, M., Khan, I., & Akhtar, H. (2021). The Causes of English Writing Anxiety among Pakistani ESL Students: Perceptions of Teachers and Students. *Pakistan Journal of Humanities and Social Sciences*, 9(1), 21–27. <https://doi.org/10.52131/pjhss.2021.0901.0109>
- Fareen, J. A. M. (2025). English language use and usage in formal and social contexts: A critical review. *Sambodhi (UGC Care Journal)*, 43(3), 163–170. [https://www.researchgate.net/publication/391059091\\_ENGLISH\\_LANGUAGE\\_USE\\_AND\\_USAGE\\_IN\\_FORMAL\\_AND\\_SOCIAL\\_CONTEXTS\\_-\\_A\\_CRITICAL\\_REVIEW](https://www.researchgate.net/publication/391059091_ENGLISH_LANGUAGE_USE_AND_USAGE_IN_FORMAL_AND_SOCIAL_CONTEXTS_-_A_CRITICAL_REVIEW)
- Ferolino, W. J., Gattoc, J. P., Paradiang, E., & Miranda, A. (2022). Factors on Thesis Writing Anxiety Among Science, Technology, Engineering, and Mathematics Students. *Psychology and Education: A Multidisciplinary Journal*, 4(4), 374-382. <https://doi.org/10.5281/zenodo.7072870>, ISSN 2822-4353
- Fitriani, N., Sabarun & Qamariah, Z. (2022). EFL Students' perceptions of the causes of scientific writing Anxiety. *IDEAS Journal on English Language Teaching and Learning Linguistics and Literature*, 10(1), 287–299. <https://doi.org/10.24256/ideas.v10i1.2637>
- Fu, K., & Mok, Z. H. (2025). Understanding the Chinese international student experiences, expectations, challenges, and support interventions in UK higher education: YU-WRITE

- Journal of Graduate Student Research in Education*, 4(1).  
<https://doi.org/10.25071/28169344.117>
- Gabi, C. (2022). *Academic writing*. Altralogue Publishing.
- Galdonez, D. P. (2025). Exploring the experiences of STEM students in writing research: Insights, challenges, and strategies. *Journal of Basic Education Research*, 6(1), 9–16.  
<https://doi.org/10.37251/jber.v6i1.1150>
- Gao, J. (2022). Scales assessing L2 speaking anxiety: Development, validation, and application. *Frontiers in Psychology*, 13, 972671.  
<https://doi.org/10.3389/fpsyg.2022.972671>
- Gerova, G., & Ivanova, I. (2023). University students and instructors' perceptions of challenges in academic writing. *Lyuboslovie*, 23, 36–55. <https://doi.org/10.46687/wmgb7773>
- Hamad, A. A., Mustaffa, D. B., Alnajjar, A. Z., Amro, R., Deameh, M. G., Amin, B., & Alkhawaldeh, I. M. (2025). Decolonizing medical education: a systematic review of educational language barriers in countries using foreign languages for instruction. *BMC Medical Education*, 25(1), 701. <https://doi.org/10.1186/s12909-025-07251-2>
- Hamad, N. K. M. & Haji, M. N. (2025). Investigating academic writing challenges of Bachelor of science students in Soran University. *Twejer*, 7(4), 458–483.  
<https://doi.org/10.31918/twejer.2574.16>
- Hamid, M. O., & Al Amin, M. (In press). English as a medium of instruction in Bangladeshi higher education: A policy perspective. In J. McKinley & N. Galloway (Eds.), *English-medium instruction practices in higher education: International perspectives*. London: Bloomsbury
- (PDF) *English as a medium instruction in Bangladeshi higher education: A policy perspective*. Available from:

- [https://www.researchgate.net/publication/366364397\\_English\\_as\\_a\\_medium\\_instruction\\_in\\_Bangladeshi\\_higher\\_education\\_A\\_policy\\_perspective](https://www.researchgate.net/publication/366364397_English_as_a_medium_instruction_in_Bangladeshi_higher_education_A_policy_perspective) [accessed Jan 08 2026].
- Hardianti, S., & NSabata, Y. (2025). The Effectiveness of the Academic Writing Course on The Writing Techniques of English Language Education Students. *Qalam Jurnal Ilmu Kependidikan*, 14(1), 62–67. <https://doi.org/10.33506/jq.v14i1.4536>
- Harfiza, J. H., Rachman, D., & Rahmawati, Y. (2025). Exploring student perceptions on AI integration in Academic English writing skill development. *Borneo Educational Journal (Borju)*, 7(2), 367–381. <https://doi.org/10.24903/bej.v7i2.2104>
- Hasan, M. K. (2019). Academic Writing Difficulties of Bangladeshi Students at a Higher Institution Academic Writing Difficulties of Bangladeshi Students at a Higher Institution in Malaysia. *Journal of Research and Multidisciplinary*.
- He, M. (2025). The Impact and Challenges of AI on Students' Writing Skills--Take ChatGPT for example. *SHS Web of Conferences*, 220, 04004. <https://doi.org/10.1051/shsconf/202522004004>
- Herath, H. M. N. N. (2025). Uncovering the causes of academic writing challenges among undergraduates: a case study of three Science-Based faculties at a state university in Sri Lanka. *KDU Journal of Multidisciplinary Studies*, 7(2), 102–115. <https://doi.org/10.4038/kjms.v7i2.209>
- Hiew, W., Tibok, R. P., Ngui, W., Gabda, D., & Suyansah, Q. (2021). Science Graduate Employability and English Language Proficiency: Findings from a Malaysian Public University. *International Journal of Learning Teaching and Educational Research*, 20(7), 23–43. <https://doi.org/10.26803/ijlter.20.7.2>
- Hoque, M. N., & Alam, M. (2020). STEM education and the development of Bangladesh: Objectives, needs and reality. *Journal of the Institute of Bangladesh Studies*, 43, (n.p.).

<https://www.researchgate.net/publication/360181052> STEM Education and the Development of Bangladesh Objectives Needs and Reality

- Hossain, Z., Çelik, Ö., & Hınız, G. (2025). Exploring EFL Students' AI Literacy in Academic Writing: Insights into Familiarity, Knowledge and Ethical Perceptions. *Kuramsal Eğitimbilim*, 18(1), 157–181. <https://doi.org/10.30831/akukeg.1538011>
- Hussain, I., Hussain, S., Khan, A. S., & Khan, S. (2025). Evaluating the impact of AI-assisted tools on academic writing skills among university students in Pakistan. *Journal of Applied Linguistics and TESOL*, 8(4), Article 1399. <https://doi.org/10.63878/jalt1399>
- Irfun, I., Nurjaya, M., & Maswatu, I. (2025). The influence of artificial intelligence on scientific writing in the academic writing: Benefits, challenges, and ethical considerations. *Assoeltan Indonesian Journal of Community Research and Engagement*, 3(2), 81–86. <https://doi.org/10.70610/edujavare.v3i2.960>
- Islam, M. T., Hasan, M. K., & Akhand, M. M. (2025). Challenges in English-medium instruction classes among engineering major students at Bangladeshi private universities. *Studies in English Language and Education*, 12(1), 285–300. <https://doi.org/10.24815/siele.v12i1.38407>
- Izwandi, A. A. (2025). Undergraduate students' perceptions of writing anxiety in English Academic writing in Taiwan. *International Journal of Innovation and Education Research*, 4(1), 23–34. <https://doi.org/10.33369/ijier.v3i2.41924>
- Jamil, A., Jamil, N., Azeem, Z., Mustafa, G., Parveen, S., & Dildar, U. (2024). Nursing Students' Attitude and Motivation towards Learning English Communication Skills at Nursing College, Lahore. *NURSEARCHER (Journal of Nursing & Midwifery Sciences)*, 02–07. <https://doi.org/10.54393/nrs.v4i03.109>
- Kader, M. A., & Salam, M. A. (2018). A comprehensive study on service quality and satisfaction level to the English medium education system in Bangladesh. *International*

- Journal of Contemporary Research and Review*, 9(07), 20850–20866.  
<https://doi.org/10.15520/ijcrr/2018/9/07/541>
- Kakepoto, I., Akhter, M. S., & Talpur, Q. (2022). Identifying English language problems of novice engineering students. *Global Social Sciences Review*, VII(I), 212–222.  
[https://doi.org/10.31703/gssr.2022\(vii-i\).21](https://doi.org/10.31703/gssr.2022(vii-i).21)
- Kalola, E. E. (2022). *Exploring the current English language needs of medical students in the School of Medicine at Hage Geingob UNAM campus* (Master's thesis, Namibia University of Science and Technology). Institutional Repository of Namibia University of Science and Technology. <http://ir.nust.na:8080/jspui/handle/10628/924>
- Kelly, G. J. (2008). *Inquiry, activity, and epistemic practice*. In R. A. Duschl & R. E. Grandy (Eds.), *Teaching scientific inquiry: Recommendations for research and implementation* (pp. 99–117). Sense Publishers. (PDF) Kelly, G. J. (2008). *Inquiry, Activity, and Epistemic Practice*. In R. Duschl & R. Grandy (Eds.) *Teaching Scientific Inquiry: Recommendations for Research and Implementation* (pp. 99-117; 288-291). Rotterdam: Sense Publishers.
- Khati, A. R. (2024). Academic Writing Challenges and Encouragements: Perspectives of university Teachers in Far Western University. *Far Western Review*, 2(1), 42–56.  
<https://doi.org/10.3126/fwr.v2i1.70497>
- Kımsesiz, F. (2024). Reflections from learners of English as a foreign language in a multicultural non-native context. *Acuity: Journal of English Language Pedagogy, Literature, and Culture*, 9(1), 1-16. DOI: 10.35974/acuity.v9i1.2900
- Kocaman, R. (2024). A practical guideline for addressing data trustworthiness in qualitative research. In *Advances in library and information science (ALIS) book series* (pp. 317–346). <https://doi.org/10.4018/979-8-3693-3069-2.ch011>

- Kuszel, B. (2025). Common Writing Challenges in Academic English among Chinese Nursing Undergraduates. *Journal of English for Academic and Specific Purposes (JEASP)*, 8(2). <https://doi.org/10.18860/jeasp.v8i2.36503>
- Lane, S., Banuazizi, A., Effron, M., Roldan, L., Ruff, S., Stickgold-Sarah, J., Trice, M., & Karatsolis, A. (2022). Mapping the relationship of disciplinary and writing concepts: Charting a path to deeper WAC/WID integration in STEM. *Across the Disciplines*, 19(1–2), 122–141. <https://doi.org/10.37514/atd-j.2022.19.1-2.08>
- Ling, Jill. (2023). Enhancing Language Proficiency in STEM: A Review of Challenges, and Best Practices in English Language Learning for STEM Students. *International Journal of Modern Languages And Applied Linguistics*. 7. 79-92.
- Howard, L. & Bruce L. B. (2018). *Qualitative Research Methods for the Social Sciences*. 9th ed. Pearson.
- Mahjabeen, A., Abbas, S. G., & Tanveer, Z. (2025). Writing difficulties in English as a foreign language among Arab students at the university level: A case study. *Multidisciplinary Journal of Emerging Needs of Curriculum*, 2(1), 24–46
- Márquez, M. C., & Porras, A. M. (2020). Science Communication in Multiple Languages Is Critical to Its Effectiveness. *Frontiers in Communication*, 5. <https://doi.org/10.3389/fcomm.2020.00031>
- Maznun, M. D. B., Monsefi, R., & Nimehchisalem, V. (2017). Undergraduate ESL students' difficulties in writing the introduction for research reports. *Advances in Language and Literary Studies*, 8(1), 9. <https://doi.org/10.7575/aiac.all.v.8n.1p.9>
- Melody, M., Claretah, M., Daimond, D., Young, M., Misheck, M., & Chikuvadze, P. (2025). *Mastering Academic Writing Skills: A handbook for university students*. <https://doi.org/10.9734/bpi/mono/978-81-991363-7-3>

- Migallos, K., & Parina, J. C. M. (2023). *Core language skills significant among engineering graduates to succeed in the global workplace. MEXTESOL Journal*, 47(1), 1-14. [ERIC - EJ1381152 - Core Language Skills Significant among Engineering Graduates to Succeed in the Global Workplace, MEXTESOL Journal, 2023](#)
- Milton, J. D., & Uddin, M. A. (2023). A case study on writing difficulties specifically focusing on product and process-oriented writing considering undergraduate students of Cox's Bazar, Bangladesh. *Scope Journal*, 13(1), 170–180.
- Moon, A., Gere, A. R., & Shultz, G. V. (2018). Writing in the STEM classroom: Faculty conceptions of writing and its role in the undergraduate classroom. *Science Education*, 102(5), 1007–1028. <https://doi.org/10.1002/sce.21454>
- Mustafa, B. M., & Shahab, M. L. (2024). Kurdish EFL Undergraduates' Academic Writing: Discussing the Main Writing Difficulties and Potential Solutions. *TESOL Today.*, 1(1), 31–44. <https://doi.org/10.53898/tesol2024114>
- Mustafa, B. M., & Shahab, M. L. (2024). Kurdish EFL Undergraduates' Academic Writing: Discussing the main writing difficulties and potential solutions. *TESOL Today.*, 1(1), 31–44. <https://doi.org/10.53898/tesol2024114>
- Namaziandost, E., Behbahani, H. K., & Naserpour, A. (2024). Peer support in language learning: Mitigating anxiety, enhancing achievement, cultivating growth mindsets, and increasing enjoyment. *Journal of Applied Learning and Teaching*, 7(2), 296–313. <https://doi.org/10.37074/jalt.2024.7.2.40>
- Nawangsih, N., Fajaryani, N., & Abrar, M. (2024). Navigating Academic Writing: EFL Students Teachers' Challenges and solutions. *Edukasi Jurnal Pendidikan Dan Pengajaran*, 11(02), 6–22. <https://doi.org/10.19109/6gkfyw37>

- Nenotek, S. A., Tlonaen, Z. A., & Manubulu, H. A. (2022). Exploring university students' difficulties in writing English academic essay. *AL-ISHLAH Jurnal Pendidikan*, 14(1), 909–920. <https://doi.org/10.35445/alishlah.v14i1.1352>
- Newaz, M. T., Faruquee, M., & Farha, S. (2013). Vocational education and training in Bangladesh: Why it is not working? *International Journal of Research Studies in Education*, 2(4). <https://doi.org/10.5861/ijrse.2013.261>
- Nunn, R., Brandt, C., & Deveci, T. (2018). Transparency, subjectivity and objectivity in academic texts. *English Scholarship Beyond Borders*, 4(1), 71–102. (PDF) [Transparency, Subjectivity and Objectivity in Academic Texts](#)
- Ochieng, D. (2019). [The Progress of Digital Technologies in Solving Chronic Education Challenges: The Case of Citation and Referencing Errors](#). *Journal of Learning and Teaching in Digital Age*. 4(2), 33-41. (PDF) [The Progress of Digital Technologies in Solving Chronic Education Challenges: The Case of Citation and Referencing Errors](#)
- Oranga, J., & Matere, A. (2023). Qualitative Research: Essence, types and Advantages. *OALib*, 10(12), 1–9. <https://doi.org/10.4236/oalib.1111001>
- Osman, A., Al-Badriyeh, D., Hussain, F. N., Riaz, S., Elewa, H., & Mraiche, F. (2022). The design and implementation of an undergraduate health professional degree elective course on scientific writing, peer assessment, and critical appraisal. *Currents in Pharmacy Teaching and Learning*, 14(6), 765–772. <https://doi.org/10.1016/j.cptl.2022.06.008>
- Othman, N. A., Mohamed, M. N. A., Powzi, N. F. A., & Jamari, S. (2022). A Case Study of English Language Learning Strategies used by Engineering Students in Malaysia. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(1), 261–269. <https://doi.org/10.47405/mjssh.v7i1.1216>

- Ozfidan, B., El-Dakhs, D. a. S., & Alsalim, L. A. (2024). The use of AI tools in English academic writing by Saudi undergraduates. *Contemporary Educational Technology*, 16(4), ep527. <https://doi.org/10.30935/cedtech/15013>
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (3rd ed.). SAGE Publications.
- Pazilah, F. N., Ling, J. P. W., & Ong, S. L. (2023). Enhancing language proficiency in STEM: A review of challenges and best practices in English language learning for STEM students. *International Journal of Modern Languages and Applied Linguistics*, 7(4), 79–92.
- Pervin, N., & Mokhtar, M. (2022). The Interpretivist Research Paradigm: A Subjective Notion of a Social Context. *International Journal of Academic Research in Progressive Education and Development*, 11(2), 419–428.
- Poudel, A. P. (2018). Academic writing: Coherence and cohesion in paragraph. Retrieved from [\(PDF\) Academic Writing: Coherence and Cohesion in Paragraph](#)
- Prapakorn, N., & Phusavat, K. (2025). Unveiling engineering students' challenges and coping strategies in English-medium instruction: A Q methodology study. *Asian-Pacific Journal of Second and Foreign Language Education*, 10(1), Article 8. <https://doi.org/10.1186/s40862-024-00307-8>
- Prapobratnakul, C. (2024). Thai EFL undergraduate engineering students' perspectives on academic writing: Challenges and strategies. *PASAA: Journal of Language Teaching and Learning in Thailand*, 68, 1–31. <https://files.eric.ed.gov/fulltext/EJ1436061.pdf>
- Prasadini, N. N., Brilianti, A. E., Ramadhanti, S. F., & Efridiani, R. (2025, May). *Unveiling the challenges of academic writing: Perspectives from students and lecturers*. Paper presented at the 5th International Conference on Linguistics and Language Teaching: Language Education, Linguistics, and Cultural Studies in the Disruptive Era.

- Raddon, A. (n.d.). *Early stage research training: Epistemology and ontology in social science research*. University of Leicester.  
<https://www2.le.ac.uk/colleges/ssah/documents/research-training-presentations/EpistFeb10.pdf>
- Rafa, R., T. (2024). *A Qualitative Study on the Challenges Faced by Bangladeshi STEM Graduates in Speaking in English*. [B.A. in English thesis, Brac University]. Bracu IR.  
[A qualitative study on the challenges faced by Bangladeshi STEM graduates in speaking in English](#)
- Rahman, M. M., & Singh, M. K. M. (2021). English Medium university STEM teachers' and students' ideologies in constructing content knowledge through translanguaging. *International Journal of Bilingual Education and Bilingualism*, 25(7), 2435–2453.  
<https://doi.org/10.1080/13670050.2021.1915950>
- Rahman, M. M., Hossain, M. A., & Uddin, M. M. (2024). Challenges in academic writing for undergraduate students in Bangladesh. *European Journal of Teaching and Education*, 6(4), 49–77. <https://doi.org/10.33422/ejte.v6i4.1418>
- Rahman, M., & Hasan, K. (2019). *Academic writing difficulties of Bangladeshi students at a higher institution in Malaysia*. *Journal of Research and Multidisciplinary*, 2(2), 145–171. <https://doi.org/10.5281/jrm.v2i2.19>
- Ravshanova, S. (2024). Why English became the global language. *International Journal of Artificial Intelligence*, 4(10), 757–760.  
<https://www.academicpublishers.org/journals/index.php/ijai/article/view/2115>
- Rejepova, G. (2025). The global dominance of English in science, business, and academia. *Образование и наука в XXI веке*, 2(63-3).

- Rothinam, N., & Maniam, M. (2025). English Language Needs of Medical Students for their Professional Careers. *International Journal of Academic Research in Business and Social Sciences*, 15(8). <https://doi.org/10.6007/ijarbss/v15-i8/26174>
- Roy, S., Pervin, N., & Hasan, M. K. (2024). Causes of tertiary students' failure in projecting voice in academic writing and possible solutions: instructor and learner perceptions. *International Journal of Learning Teaching and Educational Research*, 23(11), 113–140. <https://doi.org/10.26803/ijlter.23.11.6>
- Russell, B., Barron, C., Kim, H., & Jang, E. E. (2022). A mixed-method investigation into international university students' experience with academic language demands. *Frontiers in Education*, 7. <https://doi.org/10.3389/feduc.2022.934692>
- Russell, C. K., & Gregory, D. M. (2003). Evaluation of qualitative research studies. *Evidence-based nursing*, 6(2), 36–40. <https://doi.org/10.1136/ebn.6.2.36>
- Sajjad, M., El-Sayed, A., & Hassan, H. (2021). Factors Influencing Research Skills and Challenges Faced by Chemistry Doctoral Students in Egyptian Universities. *International Journal of Learning, Teaching and Educational Research*, 20(4), 1-18
- Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9), 9–16.
- Shanahan, T., & Shanahan, C. (2012). What is disciplinary literacy and why does it matter? *Topics in Language Disorders*, 32(1), 7–18.
- Sharma, S. (2018). Internationalizing writing in the STEM disciplines. *Across The Disciplines*, 4(1), 26-47. <https://www.researchgate.net/publication/329139939>

- Sharmin, N. (2022). A qualitative exploration of Bangladeshi STEM students English speaking. [B. A. in English thesis, Brac university]. Bracu IR. <http://hdl.handle.net/10361/16617>
- Shaxrizoda, R. (2024). Why English become the global language. *INTERNATIONALJOURNALOFARTIFICIALINTELLIGENCE*, 4(10), 757-760. [View of WHY ENGLISH BECAME THE GLOBAL LANGUAGE](#)
- Shoozan, A., & Mohamad, M. (2024). Application of interview protocol Refinement framework in systematically developing and refining a semi-structured interview protocol. *SHS Web of Conferences*, 182, 04006. <https://doi.org/10.1051/shsconf/202418204006>
- Snoder, P. (2018). Extramural English in teaching and learning: From theory and research to practice. *ELT Journal*, 73(1), 95–97. <https://doi.org/10.1093/elt/ccy051>
- Songjin, H., Amini, M., Kaur, M., & Ghassemiazghandi, M. (2023). International EFL learners' perceptions about factors leading to English academic writing difficulties in a private university in Malaysia. *International Online Journal of Language, Communication, and Humanities*, 6(1), 16–33. <https://doi.org/10.47254/insaniah.v7i1.154>
- Sravanthi, V. (2024). The Role of English in STEM Education: Bridging Knowledge Gaps-An Analysis. *International Journal of Research Publication and Reviews*, 5(10), 5073–5080. <https://doi.org/10.55248/gengpi.5.1024.3121>
- Sreejak, T. (2024). *An investigation of graduate students' vocabulary problems in academic writing. Fa Nuea Journal*, 15(2), 61–80. [\(PDF\) An Investigation of Graduate Students' Vocabulary Problems in Academic Writing](#)

- Stefanile, A. (2025). Development and implementation of a scientific writing course for undergraduate STEM students. *Journal of STEM Education Innovations and Research*, 26(4), 6–13. <https://doi.org/10.63504/jstem.v26i4.2775>
- Sulaiman, N., Ganapathy, N. N. D. F., Ghazali, I. M., Azhari, S. H. A., & Azmi, A. S. (2023). Undergraduate Students' Self-PERceived Difficulties in Academic Writing. *International Journal of Academic Research in Business and Social Sciences*, 13(10). <https://doi.org/10.6007/ijarbss/v13-i10/18786>
- Sulaiman, N., Ganapathy, N. N. D. F., Ghazali, I. M., Azhari, S. H. A., & Azmi, A. S. (2023). Undergraduate Students' Self-PERceived Difficulties in Academic Writing. *International Journal of Academic Research in Business and Social Sciences*, 13(10). <https://doi.org/10.6007/ijarbss/v13-i10/18786>
- Sultana, N., Kahwaji, H., & Kurup, P. M. (2021). The Influence of Teaching English in STEM Education for ESL Learners amidst a Changing World after COVID19. *International Journal of Learning and Teaching*, 175–180. <https://doi.org/10.18178/ijlt.7.2.175-180>
- Sulashvili, N., Khusseyn, V., Hussin, D., Gabunia, L., Gorgaslidze, N., Sulashvili, M., Giorgobiani, M., Zarnadze, I., Zarnadze, S., & Aphkhazava, D. (2025c). Perspectives on English language acquisition, role and its impact in enhancing on education mobility, socio-cultural, institutional integration and medical labor market integration in Europe and worldwide in the context of educational globalization. *Georgian Scientists*, 7(4), 59–96. <https://doi.org/10.52340/gs.2025.07.04.03>
- Sundqvist, P. (2024). Extramural English as an individual difference variable in L2 research: Methodology matters. *Annual Review of Applied Linguistics*, 44, 79–91. <https://doi.org/10.1017/s0267190524000072>

- Tabassum, R. (2025). *Linguistic barriers and socioeconomic mobility: the impact of language on the Bihari community in Geneva Camp*. [Master's thesis, Brac University]. Bracu IR. <http://hdl.handle.net/10361/25921>
- The University of Sydney. (2025, July 14). *Writing*. <https://www.sydney.edu.au/students/writing.html>
- Thompson, R. J., Jr., Finkenstaedt-Quinn, S. A., Shultz, G. V., Gere, A. R., Schmid, L., Dowd, J. E. & Reynolds, J. A. (2021). How faculty discipline and beliefs influence instructional uses of writing in STEM undergraduate courses at research-intensive universities. *Journal of Writing Research*, 12(3). <https://doi.org/10.17239/jowr-2021.12.03.04>
- Turba, R., Thoré, E., SJ, Bertram, M. G., Bridg, H., Sabet, S. S., Gamboa, M., Ríos-Orjuela, J. C., Takola, E., Jose, C. S., Clara, S. F. A., & Marín, C. (2025). Global North-South science inequalities due to language and funding barriers. *Zenodo (CERN European Organization for Nuclear Research)*. <https://doi.org/10.5281/zenodo.14902147>
- Wang, X., Wang, J., Xu, S., & Xu, S. (2025). Concept mapping in STEM education: a meta-analysis of its impact on students' achievement (2004–2023). *International Journal of STEM Education*, 12(1). <https://doi.org/10.1186/s40594-025-00554-2>
- Wati, A., Nurhadi, K., & Hakim, A. L. (2024). Exploring undergraduate students' difficulties in EFL academic writing. *Concept Community Concern for English Pedagogy and Teaching*, 10(1), 1–13. <https://doi.org/10.32534/jconcept.v10i1.5686>
- Wei, Y., Sulaiman, N. A., & Ismail, H. H. (2024). Overcoming Academic Writing Challenges: English Language learning strategies for Chinese international high school students in blended learning environments. *Theory and Practice in Language Studies*, 14(10), 3285–3294. <https://doi.org/10.17507/tpls.1410.32>

- Wen, C., Chen, M., & Yan, F. (2025). The challenges and strategies of Chinese postgraduate students in academic writing. *Cogent Education*, 12(1).  
<https://doi.org/10.1080/2331186x.2025.2488544>
- Wouters, M., Bollansée, L., Prophète, E., & Peters, E. (2024). The relationship between extramural English and learners' listening comprehension, reading comprehension, motivation, and anxiety. *Vigo International Journal of Applied Linguistics*, 21.  
<https://doi.org/10.35869/vial.v0i21.4570>
- Yenti, N. D., & Susanti, N. R. (2025). Students' writing anxiety in academic writing practice. *ELP (Journal of English Language Pedagogy)*, 10(1), 36–44.  
<https://doi.org/10.36665/elp.v10i1.988>
- Zhang, M., & Li, S. (2025). The AI-integrated English learning of Chinese university students: Preference, effectiveness and challenge. *English Language and Literature Studies*, 15(3), 91–98. <https://doi.org/10.5539/ells.v15n3p91>

## **Appendix A: Letter of consent for participants**

Dear participants,

My name is Luthfunnaher. I am an undergraduate student; majoring in ELT & applied linguistics at the department of English & Humanities, Brac university, Dhaka, Bangladesh.

Currently I am doing my undergraduate thesis. My research topic is Academic writing challenges of Bangladeshi STEM (Science, Technology, Engineering, Mathematics) students. The main purpose of this study is to explore Bangladeshi STEM students' academic writing challenges and how they overcome those challenges. To achieve this objective, semi-structured interviews will be conducted by the researcher. For being a part of this study, you will be invited to join a zoom meeting with the researcher. This interview session will be recorded only for this study purpose and will remain confidential.

If you are interested in participating in this research, please read the following details in the consent form and sign it. Your cooperation in conducting the study will be highly appreciated.

Thanking you

Luthfunnaher

B.A. student in ELT & Applied Linguistics at the Department of English & Humanities, BRAC University, Dhaka

Phone No. 01943288557 Email: [luthfunnaher@g.bracu.ac.bd](mailto:luthfunnaher@g.bracu.ac.bd)

### Research Participation consent form

Please read the following statements and tick in the box

1. I have read the descriptions and understand the research topic and data collection methods.

☐

2. I am voluntarily participating in the research and have freedom to withdraw at any time.

3. I agree to attend the interview session with the researcher.

4. The research has my permission to record the interview session and contact me through phone or email for any future query.

Name

Signature

Date

Phone

Email address

## **Appendix B: Interview questions for participants**

| Interview Questions( IQs) | Background Information | Research Question 1 | Research Question 2 |
|---------------------------|------------------------|---------------------|---------------------|
|                           |                        |                     |                     |

|                                                                                                                       |   |  |  |
|-----------------------------------------------------------------------------------------------------------------------|---|--|--|
| 1.Can you kindly introduce yourself and share your current academic level ?                                           | X |  |  |
| 2. Can you share about your past academic background? Are you from Bangla or English medium school?                   | X |  |  |
| 3. Do you like to practice English? Can you tell me about your past experiences of learning English?                  | X |  |  |
| 4. Were you encouraged as a child to read and write in English in school and home?                                    | X |  |  |
| 5. In your past school and college life, what are your writing experiences?                                           | X |  |  |
| 6. Did you have chances to interact in your writing classes in your past?                                             | X |  |  |
| 7. Were you encouraged to think before you do writing tasks?                                                          | X |  |  |
| 8. Can you kindly share your usual writing habit and the types of writing you do in general?                          | X |  |  |
| 9.What do you think academic writing means? Do you have any prior experience with academic writing before university? | X |  |  |

|                                                                                                                                                      |   |   |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|
| 10.Do you think academic writing is important for STEM discipline? Is there any difference you notice in academic writing that is exclusive in STEM? | X |   |  |
| 11.What type of writing task are you usually required to perform for your courses?                                                                   | X |   |  |
| 12.Do you face any challenges while performing these writing tasks?                                                                                  |   |   |  |
| LINGUISTIC BARRIERS                                                                                                                                  |   |   |  |
| 13.Do you ever struggle with grammar accuracy?                                                                                                       |   | X |  |
| 14.Do you ever struggle to find the right word/vocabulary while writing?                                                                             |   | X |  |
| 15.Are there any other linguistic challenges you face while writing?                                                                                 |   | X |  |
| COGNITIVE BARRIER                                                                                                                                    |   |   |  |
| 16.How do you usually plan your writing?                                                                                                             |   | X |  |
| 17.Have you ever faced challenges in organizing your writing and expressing complex ideas in your field?                                             |   | X |  |

|                                                                                                                  |  |   |  |
|------------------------------------------------------------------------------------------------------------------|--|---|--|
| 18.Do you ever struggle to maintain the structure of your writing?                                               |  | X |  |
| 19.Have you ever faced difficulty writing an introduction, thesis statement or conclusion in your writing tasks? |  | X |  |
| 20.Do you ever struggle to make a coherent and cohesive writing piece?                                           |  | X |  |
| 21.Is using transitional words or connecting paragraphs difficult for you?                                       |  | X |  |
| 22.Are there any other issues for which you struggle with your writing?                                          |  | X |  |
| INTERDISCIPLINARY BARRIER                                                                                        |  |   |  |
| 23.Did you have taught or given enough guidelines on how to perform the writing tasks of your courses?           |  | X |  |
| 24.Do you see any different writing format or style in your discipline? How did you adjust with it?              |  | X |  |
| 25.Do you face any difficulty adjusting with these?                                                              |  | X |  |
| 26.Is including technical terms or jargons in your writing difficult for you                                     |  | X |  |

|                                                                                                                           |  |   |  |
|---------------------------------------------------------------------------------------------------------------------------|--|---|--|
| 27.Is including pictures, diagrams or visual elements challenging for you?                                                |  | X |  |
| 28.Is including citation and reference in your writing difficult for you?                                                 |  | X |  |
| Psychological Factors                                                                                                     |  |   |  |
| 29.Have you ever felt stuck or stressed because of the writing tasks?                                                     |  | X |  |
| 30.Have you ever struggled with self-doubt and anxiety in writing?                                                        |  | X |  |
| 31.Does workload limit your effort into writing tasks?                                                                    |  | X |  |
| Instructional factors                                                                                                     |  |   |  |
| 32.How do your instructors teach and guide you in writing tasks?                                                          |  | X |  |
| 33.What kind of feedback do you usually receive in your writing? Do you face any challenges to incorporate that feedback? |  | X |  |
| 34.Do you think writing is given enough importance in your STEM courses? Why or why not?                                  |  | X |  |

| STUDENTS' STRATEGIES                                                                                                                                   |  |  |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|
| 35.How do you utilize your learning from general English courses in your STEM related writing task and how do you adjust your writing approach for it? |  |  | X |
| 36.What type of materials do you use to improve your writing in your discipline?                                                                       |  |  | X |
| 37.How do you try to overcome any linguistic challenges that you faced during academic writing?                                                        |  |  | X |
| 38.Do you follow any particular strategies to organise your writing and maintain the logical flow?                                                     |  |  | X |
| 39.Do you use any digital tools to improve your writing?                                                                                               |  |  | X |
| 40.For what you usually use these digital tools or AI in your writing?                                                                                 |  |  | X |
| 41.Do you think this technology is helping you to improve your academic writing skill?                                                                 |  |  | X |
| 42.Do you think there is any negative impact of using these technologies in writing?                                                                   |  |  | X |

|                                                                                                                                    |  |  |   |
|------------------------------------------------------------------------------------------------------------------------------------|--|--|---|
| 44.Do you get enough resources such as access to science journals, publications available ?                                        |  |  | X |
| 45.Have you ever reached out to your teacher, TA or peers for writing advice?                                                      |  |  | X |
| 46.Do you get enough institutional support for improving your academic writing skills?                                             |  |  | X |
| 47.In your perspective, what are some changes or initiatives that can help STEM students to improve their academic writing skills? |  |  | X |

## Appendix C: Sample interview of participant

### Notational Convention of the Interview Transcripts

|   | Notation | Meaning        |
|---|----------|----------------|
| 1 | DU       | Discourse unit |

|   |               |                                                                                                                |
|---|---------------|----------------------------------------------------------------------------------------------------------------|
| 2 | I             | Interviewer                                                                                                    |
| 3 | [ ]           | For showing action ( Laughs)                                                                                   |
| 4 | .             | Small pause                                                                                                    |
| 5 | ...           | Long pause (If in the middle of the sentence)<br>Incomplete Sentence (If at the end of the sentence)           |
| 6 | Umm           | Thinking in speech                                                                                             |
| 7 | Ahh           | Hedging in speech                                                                                              |
| 8 | DU AFIA<br>43 | DU <Space> student name's first three alphabets <Space> DU number DU<br>AFIA 43 refers to Afia's DU number 43. |

### Sample interview of Afia

| SL<br>number | Participants | DU                                                                                                                                           |
|--------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1            | I            | Thank you for joining this interview with me. Let's get started.<br>Can you kindly introduce yourself and share your current academic level? |

|    |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2  | Afia | Sure. I am Afia. I am in the Microbiology program. This is my last semester. I have already started my thesis. Soon I'll be a graduate.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 3  | I    | Can you share your past academic background? Your school, college and medium of education.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4. | Afia | My school and college were both Bangla medium. So, English medium learning style was totally new to me when I was admitted to Brac university.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5  | I    | Ok, were you encouraged to learn English as a child and what was the English language learning practice in your childhood?                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 6  | Afia | Ahh...In school, English language was not practiced that way....we did not practice much beyond academic books or syllabus. But in college, English classes used to be interesting. Our teacher always encouraged us to read outside books and watch movies. At home, my mother especially always used to encourage me to read English books. But I did not want to read at that time as it was not as interesting as reading Bangla books []. But I was encouraged. I was always told to read English books and newspapers or practice writing diary in English. So, I used to get encouraged. |
| 7  | I    | Ok, when you used to get writing tasks in your school and college, what was the writing practice? Did you get time to think before you do those writing tasks?                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 8  | Afia | Ahh...in school, it was totally memorisation. we had a fixed the syllabus and we only memorized it. But in college, we were given time or told how it would be ...it was not fixed. So, I had to go through a thinking process and used to think how I am going to practice for it. In college, we had this experience but not in school.                                                                                                                                                                                                                                                       |
| 9  | I    | Oh, alright. Can you share if you do any writing except your usual writing or writing tasks assigned from your university?                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 10 | Afia | Not really. My usual writing is assignment, lab reports. I am writing my thesis proposal right now. I do not write much except for my academic tasks at this moment.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 11 | I    | Ok, Can you tell me what you understand academic writing means? And were you familiar with academic writing before coming to university?                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 12 | Afia | Ahh...no, I was not actually familiar with academic writing before coming to uni. Academic writing follows a structure and maintains a format, like there is a standard....it goes step by step....I never experienced it before. When I was first admitted into Brac university, I got to do course Eng 101. That's my first time knowing the format of academic writing.                                                                                                                                                                                                                      |

|    |      |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13 | I    | What are the writing tasks you are usually required to do for your university?                                                                                                                                                                                                                                                                                                                                          |
| 14 | Afia | Usually I have a lot of assignments and lab reports. These days I have to do some writing for my thesis. But I don't have to do much writing except my assignments. And for the assignment, what I have to take care of is the organisation of the topic. Like, how can I write the assignments in an organised way step by step. And, sometimes I make grammar mistakes as I am from the Bangla medium. That's it.     |
| 15 | I    | Ok, do you ever struggle with vocabulary like do you feel like you can't find the appropriate word while writing?                                                                                                                                                                                                                                                                                                       |
| 16 | Afia | Yes, except grammar I face a lot of issues with vocabulary. Because I did not learn much synonyms in my school. So when I submit assignments in Turnitin, it sometimes shows AI or sometimes it shows plagiarism with someone else. These times, I face a lot of problems with synonyms. I have faced these vocabulary issues for a long time, since my first semester. But now I am slowly trying to cope up with it . |
| 17 | I    | Are you using any particular strategy to cope up with your vocabulary?                                                                                                                                                                                                                                                                                                                                                  |
| 18 | Afia | Not really, I am not using any particular strategy. Now I tried to watch a lot of English series and read books. I think these work more than trying to learn vocabulary academically. Just for the sake of learning vocabulary...I think these help me to improve my vocabulary.                                                                                                                                       |
| 19 | I    | Alright. Do you plan before doing the writing tasks? Like making outlines or mapping, or anything else?                                                                                                                                                                                                                                                                                                                 |
| 20 | Afia | If i be honest, actually we don't get the time to do this now []. There is so much work, lab report, assignment, thesis continuously ...I just write instantly. But yes, In my first and second semester, when there was not so much pressure, I used to plan beforehand. Nowadays I don't do this anymore.                                                                                                             |
| 21 | I    | So, workload is affecting how much effort you can give into your writing tasks?                                                                                                                                                                                                                                                                                                                                         |
| 22 | Afia | Yes, workload really affects my planning and my writing, because all the tasks are so continuous, there's no gap. So, due to the workload, I don't do much prior planning.                                                                                                                                                                                                                                              |
| 23 | I    | Is time management difficult as well as there's so much pressure?                                                                                                                                                                                                                                                                                                                                                       |
| 24 | Afia | Yes. Time management is also very difficult. As writing tasks pile up one after another. Also, like this semester, my midterm and final                                                                                                                                                                                                                                                                                 |

|    |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |      | are clashing on the same day. So, yes, time management is a huge challenge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 25 | I    | Ok , academic writing often requires following structure .Do you ever face challenges in this?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 26 | Afia | Ahh...Sometimes I face challenges in formatting. Like adding pictures, sometimes faculty demand the assignment to be visually interesting. I sometimes face problems with this.                                                                                                                                                                                                                                                                                                                                                                                                      |
| 27 | I    | Do you ever face issues with writing an introduction, conclusion or creating a thesis statement?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 28 | Afia | Oh, yes. With introduction, sometimes faculty want a catchy introduction. Like they want to have a complete idea about the assignment by reading the intro or want a summary of the report in the introduction. I sometimes face problems in this ... like writing a catchy introduction. After writing the whole assignment, conclusion is not usually a problem with me. And there is another problem I faced which is transition. Like what word would be the best for the smooth transition from one line to another. So, introduction and transition are the two issues I face. |
| 29 | I    | Alright. Microbiology is your major. Do you ever face any challenges which are discipline specific? Like any challenges you face doing writing tasks in your discipline for which you were not prepared beforehand?                                                                                                                                                                                                                                                                                                                                                                  |
| 30 | Afia | Umm...problems like these ...As I am from Bangla medium background, I don't know many terms. I know the Bangla term, I know how to write it in Bangla, but I don't know the English term. I feel like I fell behind those who studied in English medium. They already learn these in English. I think these are my lacking from my school, college days. If I were taught English terminology alongside Bangla, I might not face these issues now.                                                                                                                                   |
| 31 | I    | Do you ever face issues with referencing or citation?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 32 | Afia | No. I don't face problems with referencing or citation. Actually when I did the course Eng 102 in my residential semester, one week was assigned for reference and citation. I learned it back then and I do not have any problem with it anymore.                                                                                                                                                                                                                                                                                                                                   |
| 33 | I    | Sometimes students feel stuck and demotivated due to the pressure of writing tasks and workload. Do you ever face issues like these?                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 34 | Afia | Yes, many times [ ]. Often it happens that a lot of writing tasks pile up together. And most of the time I feel anxious because of this. But I do what I should not do.I keep everything aside and sleep [ ]. And try to do it with a fresh mind.                                                                                                                                                                                                                                                                                                                                    |

|    |      |                                                                                                                                                                                                                                                                                                                                    |
|----|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 35 | I    | Ok [ ]. Do you get enough feedback from your teacher/ instructor to improve your academic writing? And what type of feedback do you usually get?                                                                                                                                                                                   |
| 36 | Afia | To be honest, really good feedback ...like feedback for improvement...we don't usually get feed like these. What we get is .it may have been written like 'improve this' or 'It can be better' things like that. But if I were told what specifically I should improve or what I should do that would be better feedback, I think. |
| 37 | I    | Do you think academic writing is given enough importance in STEM disciplines and students are now getting proper training for their future?                                                                                                                                                                                        |
| 38 | Afia | I think they don't give that much focus in writing. In STEM they focus on the technical part. Most times they do not prioritize the writing format or how you write it. Rather, they care more about what you write in STEM. This is my perspective.                                                                               |
| 39 | I    | Can you apply your learning from general courses to your STEM related course's writing?                                                                                                                                                                                                                                            |
| 40 | Afia | Yes, I think it helps. As I said, I learn the reference and citation from general English courses, which help me with my stem courses. Besides this Umm... I think if I were taught how I should write my stem tasks and the technical part a bit beforehand, I think it would be more helpful.                                    |
| 41 | I    | Have you ever used any type of materials to improve your academic writing?                                                                                                                                                                                                                                                         |
| 42 | Afia | Yes. I try to read journals, published papers, and review papers on the internet. But sometimes these are in the paid version which I cannot access. I often face issues with this. I try to practice with what is available to me.                                                                                                |
| 43 | I    | Do you use any digital tools for doing your academic writing tasks?                                                                                                                                                                                                                                                                |
| 44 | Afia | Yes, a lot. I used a lot of chat gpt which I know I should not use [ ]. Sometimes I cannot believe that I spent most of my university life without this. But now I use AI tools a lot.                                                                                                                                             |
| 45 | I    | Ok. As you said you used AI a lot, in which sector do you use AI tools the most ?                                                                                                                                                                                                                                                  |
| 46 | Afia | I usually do it to clear my concept. Sometimes it happens that we are given an assignment on a topic which is not discussed in the class. Or it is not in the lecture slide or the referred book. These times I usually give the topic to AI and ask it to teach me the topic. So mostly for discussion, I used AI.                |

|    |      |                                                                                                                                                                                                                                                                                                                                                                                       |
|----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 47 | I    | Do you use any technology for writing like organising or paraphrasing, things like this?                                                                                                                                                                                                                                                                                              |
| 48 | Afia | I used to use technology for paraphrasing. Then I noticed that sometimes it becomes non-academic or inaccurate after paraphrasing with tools. It affected my writing performance a lot in the residential semester. After that I stopped using the tool and did it myself. I use synonymous words or different sentences. If I cannot do it sometimes I omit the sentence [].         |
| 49 | I    | Ok. as you said you used AI and technology frequently. Do you ever feel using this negatively affects your writing skills rather than helping to improve it?                                                                                                                                                                                                                          |
| 50 | Afia | Yes. A lot. Now sometimes I don't feel like writing at all and feel like Chat gpt can do this easily. I think I used to write better before it. I somewhat feel like it kinda ruins my writing skill.                                                                                                                                                                                 |
| 51 | I    | Do you ever go to your teacher/instructor or friends for writing advice? And do you think you have enough institutional help available to improve your academic writing skill?                                                                                                                                                                                                        |
| 52 | Afia | Yes. There are official consultation hours from our faculties and TAs. But usually I could not go to these hours but if we ask in the class or after class, most of them try to help. But honestly I usually go to my friends. I have some friends who are from the English medium. They help a lot with my vocabulary.                                                               |
| 53 | I    | At last I want to know your perspective. What do you think, what type of changes or initiatives can help to improve STEM students' academic writing skill?                                                                                                                                                                                                                            |
| 54 | Afia | Umm...i think if our instructors offered more writing focused courses...or give a clearer guideline...like give us access to a sample paper from which we can learn and follow. And there can be a workshop for writing practice. Often there are workshops for many things. like different skills. I think universities can arrange workshops for developing academic writing skill. |
| 55 | I    | This interview ends here. Thank you again for joining me today.                                                                                                                                                                                                                                                                                                                       |
| 56 | Afia | Thank you as well.                                                                                                                                                                                                                                                                                                                                                                    |
| 57 | I    | Good bye.                                                                                                                                                                                                                                                                                                                                                                             |



## Appendix D: Sample of coding template by the researcher

| Interview Questions<br><br>(1)                                                                                                                   | Subordinate key word of question<br><br>(2) | Subordinate main point from the conversation<br><br>(3) | Elaborated examples from verbal evidence to support the subordinate main point<br><br>(4)                                                        | Occurrence of main idea transferred into the form as key word(s)<br><br>(5) | Frequency of occurrence<br><br>(6) | Ordering of discourse unit<br><br>(7) |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------|---------------------------------------|
|                                                                                                                                                  |                                             |                                                         |                                                                                                                                                  |                                                                             |                                    |                                       |
| Thank you for joining this interview with me. Let's get started.<br><br>Can you kindly introduce yourself and share your current academic level? | *Introduction and current academic level    | *AFIA year<br>*Final microbiology student               | "I am AFIA I am in the Microbiology program. This is my last semester. I have already started my thesis. Soon I'll be a graduate."               | *Participant self-introduction                                              | 1                                  | DU AFI 2                              |
| Can you share your past academic background? Your school, college and medium of education.                                                       | *Past academic background                   | *Bangla Medium background                               | "My school and college were both Bangla medium. So, English medium learning style was totally new to me when I was admitted to Brac university." | *Educational Background                                                     | 1                                  | DU AFI 4                              |

|                                                                                                                        |                                                                                                   |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                          |                            |          |
|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------|
| Were you encouraged to learn English as a child and what was the English language learning practice in your childhood? | <p>*English language learning practice in childhood</p> <p>*Encouragement in learning English</p> | <p>*Follow academic books and syllabus in school</p> <p>*Encouraged to read English book and watch movies in English during college</p> <p>*Mother's encouragement to read English book</p> | <p>"Ahh...In school, English language was not practiced that way....we did not practice much beyond academic books or syllabus. But in college, English classes used to be interesting. Our teacher always encouraged us to read outside books and watch movies. At home, my mother especially always used to encourage me to read English books. But I did not want to read at that time as it was not as interesting as reading Bangla books [. But I was encouraged. I was always told to read English books and newspapers or practice writing diary in English. So, I used to get encouraged."</p> | <p>*Limited English Practice in school.</p> <p>*get encouraged from college teacher and to practice English through diverse mediums.</p> | <p>1</p> <p>1</p>          | DU AFI 6 |
| When you used to get writing tasks in your school and college, what was the writing practice?                          | <p>*Writing practice in school and college</p>                                                    | <p>*Memorize everything and fixed syllabus in School</p> <p>* Thinking was needed in college</p>                                                                                            | <p>"Ahh...in school, it was totally memorization. like we had fixed the syllabus and we only memorized it. But in college, we were given time or told how it would be ...it was not fixed. So, I had to go through a thinking process and used to</p>                                                                                                                                                                                                                                                                                                                                                   | <p>*Memorization based practice in school</p> <p>*Fixed syllabus</p> <p>*Encouraged to do critical</p>                                   | <p>1</p> <p>1</p> <p>1</p> | DU AFI 8 |

|                                                                                                                                      |                                                                          |                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                              |                                                              |        |           |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------|-----------|
|                                                                                                                                      |                                                                          |                                                                                                                                | think how I am going to practice for it. In college, we had this experience but not in school.”                                                                                                                                                                                                                                                                              | thinking in college                                          |        |           |
| Can you share if you do any writing except your usual writing or writing tasks assigned from your university?                        | *Usual writing habit                                                     | *Do not write much except academic writing tasks.                                                                              | “Not really. My usual writing is assignment, lab reports. I am writing my thesis proposal right now. I do not write much except for my academic tasks at this moment.”                                                                                                                                                                                                       | *Limited writing practice                                    | 1      | DU AFI 10 |
| Can you tell me what you understand academic writing means? And were you familiar with academic writing before coming to university? | *Meaning of academic writing<br>*Prior familiarity with academic writing | *Was not familiar with academic writing before university<br>* Academic writing follows structure and maintain standard format | “Ahh...no, I was not actually familiar with academic writing before coming to uni. Academic writing follows a structure and maintains a format, like there is a standard....it goes step by step....I never experienced it before. When I was first admitted into Brac university, I got to do course Eng 101 .That's my first time knowing the format of academic writing.” | *Academic writing definition                                 | 1      | DU AFI 12 |
| What are the writing tasks you are usually required to do for your university?                                                       | *Required writing tasks                                                  | *Writing task description<br>* Limited writing opportunities                                                                   | “Usually I have assignments and lab reports. These days I have to do some writing for my thesis. But I don't have to do much writing except                                                                                                                                                                                                                                  | *Writing task description<br>* Limited writing opportunities | 1<br>2 | DU AFI 14 |

|                                                                                                                  |                            |                                            |                                                                                                                                                                                                                                                                                                       |                                         |   |           |
|------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---|-----------|
|                                                                                                                  |                            | * Difficulty in organising writing         | my assignments. And for the assignment, what I have to take care of is the organization of the topic. Like, how can I write the assignments in an organised way step by step. And, sometimes I make grammar mistakes as I am from the Bangla medium. That's it.                                       | * Writing organization difficulty.      | 1 |           |
| 1. Do you ever struggle with vocabulary like do you feel like you can't find the appropriate word while writing? | *Vocabulary struggle       | *Not knowing enough synonyms               | "I did not learn many synonyms in my school. So when I submit assignments in Turnitin, it sometimes shows AI or sometimes it shows plagiarism with someone else. These times, I face a lot of problems with synonyms. I have faced these vocabulary issues for a long time, since my first semester." | *Not knowing enough synonyms/vocabulary | 1 | DU AFI 16 |
| 2. Are you using any particular strategy to cope up with your vocabulary?                                        | *Strategies for vocabulary | *watching English series and reading books | "Not really, I am not using any particular strategy. Now I tried to watch a lot of English series and read books. I think these work more than trying to learn vocabulary academically. Just for the sake of learning vocabulary...I think these                                                      | *Vocabulary development strategies      | 1 | DU AFI 18 |

|                                                                                                   |                             |                                                        |                                                                                                                                                                                                                                                                                                               |                                         |        |           |
|---------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------|-----------|
|                                                                                                   |                             |                                                        | help me to improve my vocabulary”                                                                                                                                                                                                                                                                             |                                         |        |           |
| 2. Do you plan before doing the writing tasks? Like making outlines or mapping, or anything else? | *Planning before writing    | *Not enough time for prior planning.                   | “If I be honest, actually we don't get the time to do this now []. There is so much work, lab report, assignment, thesis continuously ...I just write instantly. But yes, in my first and second semester, when there was not so much pressure, I used to plan beforehand. Nowadays I don't do this anymore.” | * Not enough time for prior planning.   | 1      | DU AFI 20 |
| 3. So, workload is affecting how much effort you can give into your writing tasks?                | *workload's on writing task | *Continuous workload left no time for writing planning | “workload really affects my planning and my writing, because all the tasks are so continuous, there's no gap. So, due to the workload, I                                                                                                                                                                      | *Excessive workload<br>* Time constrain | 1<br>1 | DU AFI 22 |

|                                                                                                  |                                                                                         |                                                                                |                                                                                                                                                                                                                                                                                                    |                                                                               |            |              |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------|--------------|
|                                                                                                  |                                                                                         |                                                                                | don't do much prior planning.”                                                                                                                                                                                                                                                                     |                                                                               |            |              |
| 4. Is time management difficult as well as there's so much pressure?                             | *Time management difficulty                                                             | *Time management is a huge challenge                                           | “Yes. Time management is also very difficult. As writing tasks pile up one after another and time is very limited. So, yes, time management is a huge challenge.”                                                                                                                                  | *Time constrain<br><br>*Time management difficulty                            | 2<br><br>1 | DU AFI<br>24 |
| academic writing often requires following structure .Do you ever face challenges in this?        | *Challenges in following structure                                                      | *Formatting challenges (adding visual)<br><br>*Visually interesting assignment | “Ahh...Sometimes I face challenges in formatting. Like adding pictures, sometimes faculty demand the assignment to be visually interesting. I sometimes face problems with this.”                                                                                                                  | *Formatting challenges<br><br>*Visually interesting assignment                | 1<br><br>1 | DU AFI<br>26 |
| Do you ever face issues with writing an introduction, conclusion or creating a thesis statement? | *Introduction, conclusion or thesis statement writing issues<br><br>*Transition Problem | *Problem in writing introduction<br><br>*Transition problem                    | “Oh, yes. With introduction, sometimes faculty want a catchy introduction. Like they want to have a complete idea about the assignment by reading the intro or want a summary of the report in the introduction. I sometimes face problems in this ... .like writing a catchy introduction. -----” | *Problem in writing introduction<br><br>*Difficulty in coherence and cohesion | 1<br><br>1 | DU AFI<br>28 |

|                                                                                                                                                                                |                                 |                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                      |                   |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|
| Do you ever face any challenges which are discipline specific? Like any challenges you face doing writing tasks in your discipline for which you were not prepared beforehand? | *Discipline specific challenges | <ul style="list-style-type: none"> <li>* Not knowing English terminology</li> <li>* Pervious Bangla educational background</li> </ul> | “Umm...problems like these ...As I am from Bangla medium background, I don't know many terms. I know the Bangla term, I know how to write it in Bangla, but I don't know the English term. I feel like I fell behind those who studied in English medium. They already learn these in English. I think these are my lacking from my school, college days. If I were taught English terminology alongside Bangla, I might not face these issues now.” | <ul style="list-style-type: none"> <li>* Lack of disciplinary vocabulary</li> <li>*Pervious Bangla educational background</li> </ul> | <p>1</p> <p>1</p> | DU AFI 30 |
| Do you ever face issues with referencing or citation?                                                                                                                          | *Referencing or citation issues | *No problem in referencing and citation                                                                                               | “No. I don't face problems with referencing or citation. Actually when I did the course Eng 102 in my residential semester, one week was assigned for reference and citation. I learned it back then and i do not have any problem with it anymore. But finding reference is a regular challenge. Even though we have some access through university, but many time                                                                                  | *No problem in referencing and citation                                                                                              | 1                 | DU AFI 32 |

|                                                                                                                                          |                                                        |                                        |                                                                                                                                                                                                                                                                                                                                      |                                        |   |           |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---|-----------|
|                                                                                                                                          |                                                        |                                        | we cannot access it due to paid version or regional restriction.”                                                                                                                                                                                                                                                                    |                                        |   |           |
| Sometimes students feel stuck and demotivated. Do you ever face issues like these?                                                       | *Stuck feeling and demotivation                        | *Anxiety due to pile up writing tasks. | “Yes, many times [ ]. Often it happens that a lot of writing tasks pile up together. And most of the time I feel anxious because of this. But I do what I should not do. I keep everything aside and sleep [ ]. And try to do it with a fresh mind.”                                                                                 | *Anxiety due to pile up writing tasks. | 1 | DU AFI 34 |
| Do you get enough feedback from your teacher/ instructor to improve your academic writing? And what type of feedback do you usually get? | *Feedback for writing improvement<br>*Type of feedback | *Not enough/useful feedback            | “To be honest, really good feedback ...like feedback for improvement...we don’t usually get feed like these. What we get is .it may have been written like ‘improve this’ or ‘It can be better’ things like that. But if I were told what specifically I should improve or what I should do that would be better feedback, I think.” | *Not enough/useful feedback            | 1 | DU AFI 36 |
| Do you think academic writing is given enough importance in STEM disciplines and students are now getting proper                         | *Academic writing importance in STEM                   | *Do not give enough focus in writing   | “I think they don’t give that much focus in writing. In STEM they focus on the technical part. Most times they do not prioritize the writing format or how you write it. Rather, they care                                                                                                                                           | *Do not give enough focus in writing   | 1 | DU AFI 38 |

|                                                                                         |                                      |                                              |                                                                                                                                                                                                                          |                                              |   |           |
|-----------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---|-----------|
| training for their future?                                                              |                                      |                                              | more about what you write in STEM. This is my perspective.”                                                                                                                                                              |                                              |   |           |
| Can you apply your learning from general courses to your STEM related course’s writing? | *Interdisciplinary use of learning   | *Sometime useful.                            | “Yes, I think it helps. As I said, I learn the reference and citation from general English courses, which help me with my stem courses.”                                                                                 | * Sometime useful                            | 1 | DU AFI 40 |
| Have you ever used any type of materials to improve your academic writing?              | *Use of materials to improve writing | *Read journal, publication and review paper. | “Yes. I try to read journals, published papers, and review papers on the internet.”                                                                                                                                      | *Read journal, publication and review paper. | 1 | DU AFI 42 |
| Do you use any digital tools for doing your academic writing tasks?                     | *Digital tool for academic writing   | *AI tools and ChatGPT                        | “Yes, a lot. I used a lot of ChatGPT which I know I should not use[ ]. Sometimes I can not believe that I spent most of my university life without this. But now I use AI tools a lot.”                                  | *AI tools and ChatGPT                        | 1 | DU AFI 44 |
| As you said you used AI a lot, in which sector do you use AI tools the most ?           | *Sector of using Chatgpt             | *Understanding concept                       | “I usually do it to clear my concept. Sometimes it happens that we are given an assignment on a topic which is not discussed in the class. Or it is not in the lecture slide or the referred book. These times I usually | *Understanding concept                       | 1 | DU AFI 46 |

|                                                                                                               |                                                                                   |                                                                        |                                                                                                                                                                                                                                                                                                                             |                                                                        |            |           |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------|-----------|
|                                                                                                               |                                                                                   |                                                                        | give the topic to AI and ask it to teach me the topic. So mostly for discussion, I used AI.”                                                                                                                                                                                                                                |                                                                        |            |           |
| Do you use any technology for writing like organising or paraphrasing ,things like this?                      | *Technology use for writing                                                       | *Used technology for paraphrasing before<br><br>*Got inaccurate result | “I used to use technology for paraphrasing. Then I noticed that sometimes it becomes non-academic or inaccurate after paraphrasing with tools. It affected my writing performance a lot in the residential semester. After that I stopped using the tool and did it myself. I use synonymous words or different sentences.” | *Used technology for paraphrasing before<br><br>*Got inaccurate result | 1<br><br>1 | DU AFI 48 |
| As you said you use AI and technology frequently in writing. Do you ever feel these have any negative impact? | *Negative impact of AI and technology in writing                                  | *Lost motivation to write<br><br>*Ruins writing skill                  | “Yes. A lot. Now sometimes I don't feel like writing at all and feel like Chat gpt can do this easily. I think I used to write better before it. I somewhat feel like it kinda ruins my writing skill.”                                                                                                                     | *Lost motivation to write<br><br>*Ruins writing skill                  | 1<br><br>1 | DU AFI 50 |
| Do you ever go to your teacher/instructor or friends for writing advice? And do you think you have enough     | *Writing advice from instructor/teacher and friends<br><br>*Institutional support | *Institutional support available<br><br>*supportive friend             | “Yes. There are official consultation hours from our faculties and TAs. But usually I could not go to these hours but if we ask in the class or after class, most of them try to help. But                                                                                                                                  | *Institutional support available<br><br>*supportive friend             | 1<br><br>1 | DU AFI 52 |

|                                                                                                                   |                                                                                    |                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                               |                  |           |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------|-----------|
| institutional help available to improve your academic writing skill?                                              |                                                                                    |                                                                                               | honestly I usually go to my friends. I have some friends who are from the English medium. They help a lot with my vocabulary.”                                                                                                                                                                                                                                                    |                                                                                               |                  |           |
| What do you think, what type of changes or initiatives can help to improve STEM students’ academic writing skill? | *Necessary changes or initiatives to improve STEM students’ academic writing skill | *Writing focused courses<br>*Clear guideline<br>*Access to sample papers<br>*Writing workshop | “I think if our instructors offered more writing focused courses...or give a clearer guideline...like give us access to a sample paper from which we can learn and follow. And there can be a workshop for writing practice. Often there are workshops for many things. Like different skills. I think universities can arrange workshops for developing academic writing skill.” | *Writing focused courses<br>*Clear guideline<br>*Access to sample papers<br>*Writing workshop | 1<br>1<br>1<br>1 | DU AFI 54 |

## Appendix E: Sample theme generation template

|                                                  |                                                                              |                                                                                                                |                                                                                                    |                                                                                                               |                                                             |                                                                                                                                                                      |                                                                                  |                                                |                                                                 |           |                                                                                                                                                                   |
|--------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Research question1:                              | What are the challenges Bangladeshi STYEM students face in academic writing? |                                                                                                                |                                                                                                    |                                                                                                               |                                                             |                                                                                                                                                                      |                                                                                  |                                                |                                                                 |           |                                                                                                                                                                   |
| Interview question                               | Do you ever struggle with grammar and vocabulary?                            |                                                                                                                |                                                                                                    |                                                                                                               |                                                             |                                                                                                                                                                      |                                                                                  |                                                |                                                                 |           |                                                                                                                                                                   |
| Afia                                             | Rabeya                                                                       | Afrin                                                                                                          | Zaima                                                                                              | Pushpa                                                                                                        | Sanjida                                                     | Neha                                                                                                                                                                 | Suma                                                                             | Tonne                                          | Meem                                                            | Subthemes | Themes                                                                                                                                                            |
| Limited vocabulary (AFI 16)                      | Limited vocabulary (RAB 16)                                                  | Limited vocabulary (AFR 14)                                                                                    | Limited vocabulary (ZAI 18)                                                                        | Limited vocabulary (PUS 16)                                                                                   | Limited vocabulary (SAN 14)                                 | Limited vocabulary (NEH 16)                                                                                                                                          | Limited vocabulary (SUM 14)                                                      | Limited vocabulary (TON 16)                    | Limited vocabulary (MEE 16)                                     |           | Students lack English vocabulary knowledge                                                                                                                        |
| Interview Q.                                     | Do you ever struggle to maintain cohesion and coherence in your writing      |                                                                                                                |                                                                                                    |                                                                                                               |                                                             |                                                                                                                                                                      |                                                                                  |                                                |                                                                 |           |                                                                                                                                                                   |
| Difficulty in organizing writing tasks. (AFI 14) | Often use repetitive transitional words. (RAB22)                             | Difficulty in producing coherent piece of writing. Lost track sometime and end up with messy writing. (AFR 22) | Face difficulties in connecting ideas and paragraph. Writing look disconnected and messy. (ZAI 22) | Face difficulties to maintain coherence in writing. Sometimes forget to use transition in exam hall. (PUS 26) | Sometime writing looks like it all over the place. (SAN 22) | Writing looks disconnected and do not flow like a one writing piece. Struggle to use transitional word and repeat common transitional words in the writing. (NEH 26) | Writing lack logical flow. Often connector words get missing in writing (Sum 22) | Difficulties using transitional words (TON 26) | Face difficulties to maintain coherence in writing. (DU KAB 60) |           | Face difficulty in maintaining logical flow and messy writing<br>Difficulty in maintaining coherence<br>Difficulty in transition and repetitive transitional word |

## Appendix F: Rating for Students' Interview by Rater

Please respond to the following themes by choosing “Agree” or “Disagree”. You can also suggest new themes on the comments column.

| RQ. 1. What are the challenges Bangladeshi STEM students face in academic writing? |                                                                                                 |                      |                                                                                                                                                                                                                                                                                                                                                                                 |             |          |                      |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------|----------------------|
| Theme                                                                              | Main ideas                                                                                      | Discourse unit       | Verbal support                                                                                                                                                                                                                                                                                                                                                                  | Inter-Rater |          | Comments/Suggestions |
|                                                                                    |                                                                                                 |                      |                                                                                                                                                                                                                                                                                                                                                                                 | Agree       | Disagree |                      |
| <b>Lack of vocabulary</b>                                                          | Students' lack of knowledge in English vocabulary is one the main challenge in academic writing | AFI 16<br><br>ZAI 18 | <p>“I did not learn many synonyms in my school...I am facing these vocabulary issues for a long time, since my first semester.”</p> <p>“But the vocabulary issues are the real struggle. I often cannot find the proper word or the academic word. I know if I could replace few words with better academic word it would sound more polish, but I often struggle with it.”</p> | /           |          |                      |
| <b>Difficulties in maintaining</b>                                                 | Students face major                                                                             | AFR 22               | “I think producing a coherent piece of writing is difficult for me, as                                                                                                                                                                                                                                                                                                          | /           |          |                      |

|                                         |                                                                                                           |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |  |                                                             |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|-------------------------------------------------------------|
| <b>coherence and cohesion</b>           | difficulties in maintaining coherence in their writing                                                    | NEH 26                      | <p>many times I lost track and my writing end up becoming a bit messy.”</p> <p>“Sometimes when I end up finishing a writing tasks, its looks disconnected like there are lot of information are put together but when someone read it just does not flow like one piece. My instructor advises me to use transitional words to connect paragraph, but many time I end up repeating the common one and my writing get average grade.”</p>                                                                                    | / |  | Here repetitive writing is a challenge, not only coherence. |
| <b>Lack of conceptual understanding</b> | <p>Students’ lack of conceptual understanding lead to writing difficulties</p> <p>*Faulty Lab reports</p> | <p>NEH 40</p> <p>PUS 42</p> | <p>“I think sometimes I struggle in writing not because of my writing skill itself. Cause sometimes if our topic is not covered completely or a tasks came from an area which was not included in our syllabus, how am I supposed to complete that tasks...”</p> <p>“In lab report, it happens that we cannot conduct the experiment properly. Sometimes we are ab not able to completely understand the procedure or sometimes there is not enough lab facility which is required to do an experiment. So we often end</p> | / |  |                                                             |





|  |                          |        |                                                                                                                                                                                |   |  |  |
|--|--------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|--|
|  | conference paper, books) | PUS 36 | “finding reference is a regular challenge. Even though we have some access through university, but many time we cannot access it due to paid version or regional restriction.” | / |  |  |
|--|--------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|--|

NAME OF THE RATER: DR SABREENA AHMED

DATE: December 18,2025

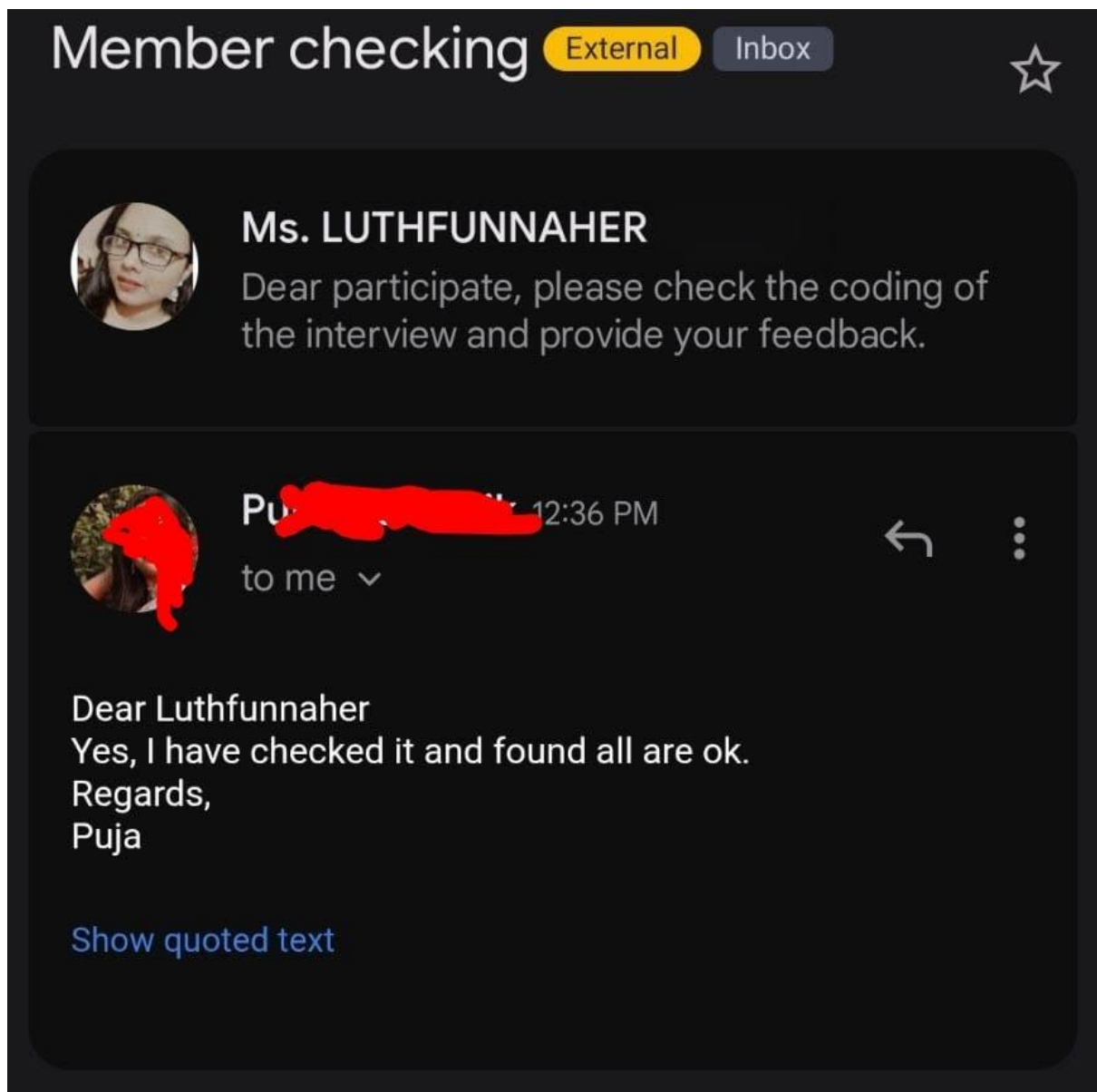
## **Appendix G: Inter-rater reliability calculation for students' interviews**

Percentage of agreement:  $(11/12) * 100 = 91.6\%$

12= Total number of verbal supports

11= Inter-rater's agreement with the verbal supports

## Appendix H: Sample of email for member checking



## Appendix I: Audit trial of the study

| Date                                                        | Activities                                                            | Records                   |
|-------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------|
| August 2,2025                                               | Approval of topic from the supervisor                                 | Zoom                      |
| October 23,205                                              | Contacting the supervisor for permission of data collecting procedure | Zoom                      |
| November 5 <sup>th</sup> to November 18 <sup>th</sup> ,2025 | Interviews of participants                                            | Zoom meeting              |
| 20 <sup>th</sup> November,2025                              | Transcribing of interviews                                            | Recording                 |
| 1 December,2025                                             | Member checking                                                       | Email                     |
| December 18 <sup>th</sup> ,2025                             | Contacting rater and receiving inter-rater feedback                   | Soft copy of the document |