The Use of ChatGPT in Acquiring Technical Term for Report Writing among Aircraft Maintenance Students

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Abstract

This study examines the usefulness of utilising Chat Generative Pre-Trained Transformer (ChatGPT), an Artificial Intelligence (AI) powered conversational language model, to facilitate the acquisition of technical term essential for report writing among aircraft maintenance students. As technology continues to permeate educational landscapes, exploring the role of AI in enhancing specialised learning becomes increasingly pertinent. Leveraging a constructivist framework and cognitive load theory, this study applied a qualitative research design taking 14 students from the aircraft maintenance course in the university. This qualitative investigation employed semi-structured interviews to delve into the experiences, and challenges encountered by aircraft maintenance students when utilising ChatGPT for technical term acquisition. Through thematic analysis of gathered data, the study aims to elucidate the effectiveness, limitations, and potential improvements of ChatGPT as a supplementary tool in technical education. By focusing on report writing—an integral aspect of aircraft maintenance training, this research provides valuable insights into how AI-driven platforms can support students in mastering the intricacies of specialized terminology. The findings not only contribute to the existing body of knowledge on AI integration in education but also offer practical implications for educators, curriculum developers, and AI developers seeking to optimize learning experiences in technical domains. Understanding the nuances of ChatGPT's role in technical term acquisition can inform the design of tailored educational interventions that better cater to the needs of aircraft maintenance students, thereby fostering their proficiency in report writing and enhancing their overall learning outcomes.

Keywords: ChatGPT, Technical Term Acquisition, Aircraft Maintenance Education, report writing, Constructivism, Cognitive Load Theory.

1. Introduction

It can be mentioned that ChatGPT is a conversational chatbot with a wide purpose that makes use of OpenAI's GPT-3 language model (Zhai 2022). Its main objective is to produce writing that sounds like human speech, and it can hold free-form conversations about a range of subjects. In contrast to its predecessor, ChatGPT was trained to mimic genuine conversations through the use of reinforcement learning with human feedback.

Proximal Policy Optimization is used to rank the quality of machine responses and fine-tune the model based on human feedback in the form of rewards (Schulman, et al. 2017). ChatGPT can now successfully

respond to follow-up inquiries, admit mistakes, refute false premises, and reject inappropriate inquiries thanks to this new development methodology. According to Esmaeil, et al. (2023), compared to other AI language models, such as Meta's language tool or RoBERTa, which has been labeled "more creative", ChatGPT produces more innovative responses.

The utilisation of artificial intelligence (AI) tools such as ChatGPT, is progressively gaining significance in the realm of scientific writing (Golan et al. 2023). Regardless of personal sentiments towards it, the reality is that numerous individuals are presently employing ChatGPT to produce numerous manuscripts. Rather than resisting or allocating time to critique it, a more constructive approach is to harness this potent tool as an ethical assistant, augmenting both productivity and work quality. ChatGPT proves invaluable in assisting students to craft review articles with greater efficiency. Below are several compelling reasons advocating for its use to enhance proficiency in review writing, expedite the writing process, and economize time. Crafting a report often entails a laborious endeavor, entailing extensive research, organisation, and writing. ChatGPT streamlines this process by autonomously generating content that can subsequently be refined and edited by human authors, thereby conserving valuable time and resources (Zhai, 2022; Yan, 2023).

ChatGPT can aid students in handling data efficiently. When tasked with sorting through extensive datasets and research papers to extract pertinent information for their review articles, ChatGPT's capacity for analysing and summarising vast amounts of data far surpasses human capabilities, doing so effectively and expeditiously (Zhai, 2022). Moreover, ChatGPT contributes to enhancing the caliber of scientific writing. By pinpointing potential errors, inconsistencies, or gaps in arguments, it assists human authors in refining their prose, ensuring manuscript accuracy, structural integrity, and robust support from available evidence (Golan et al., 2023).

ChatGPT could assist students maintain an impartial and balanced perspective in addition to its other advantages. This platform's capability to remain impartial means that a wider variety of viewpoints can be offered on any given subject, which is one of its main benefits. This capability can be very helpful in areas where there are a lot of points of view, for example when writing a report on the maintenance of the aircraft. ChatGPT gives students access to a wide range of viewpoints, which helps them comprehend a subject more thoroughly and decide on a course of action based on the information at hand.

Furthermore, for non-native English speakers, ChatGPT can provide invaluable assistance. It can be pointed out that when the student is weary of facing criticism from reviewers and editors regarding their English writing, ChatGPT stands ready to aid them with grammar and sentence structure, offer suggestions for appropriate vocabulary usage, facilitate translation between languages, and much more (Esmaeil, et al. 2023).

Report writing afford students the opportunity to outline proposals for a project, report on the progress of a subject, present research and findings from a project. They can detail technical aspects of innovations, present a feasibility or cost benefit analytical study. Additionally, reports can be based on experiences of any event such as experiences at practical sessions, of armed robbery incident, theft etc. Hence every report has a definite goal to achieve and the final product of a report is a concise, objective, well-articulated document presented for assessment. (Cavagnetto, 2010).

This study emphasises the importance of report writing in enhancing students' abilities in technical communication, refining their conceptual understanding, and sharpening their problem-solving skills (Aguirre-Mendez et al., 2020; Cigdemoglu et al., 2017; Jang & Hand, 2017; Shultz & Gere, 2015; Walker & Wolf, 2017). With the advent of ChatGPT, an innovative AI tool trained on extensive datasets to

generate text resembling human writing (Birhane et al., 2023), and its increasing usage among students (Welding, 2023), there is a growing concern about its impact on report writing. This paper, therefore, aims to explore the experiences, and challenges encountered by aircraft maintenance students when utilising ChatGPT in acquiring technical term for report writing. In order to fill the gap, this study aims to answer to following research questions:

1. How do aircraft maintenance students perceive the use of ChatGPT in their learning experiences?
2. What are the major challenges faced by the aircraft maintenance students in the use of ChatGPT?

2. Literature review

ChatGPT responds to text prompts from users by utilizing patterns it has already identified from its vast text corpus and its comprehension of the input. It can produce a variety of styles, including lengthy essays, succinct responses, and even dialogue-style exchanges. In order to accomplish this, ChatGPT breaks down the input text into tokens, which the transformer model processes to generate a probability distribution over each token in turn. Golan et al. (2023) indicated that the process selects the token with the highest probability and generates an output text iteratively until the halting criteria are met.

Enthusiasm has surged since the launch of ChatGPT in 2022. ChatGPT is an innovative application that has sparked spirited debates among people from diverse backgrounds. It is a potent tool that can assist media and communication students with their academic writing assignments and courses in a number of ways. The most significant ways that ChatGPT can help are by coming up with ideas based on keywords and phrases that the student enters, delivering writing advice and hints, helping with editing and proofreading, and responding to certain academic queries. It is worth noting that ChatGPT and other AI tools have proven to be capable of generating responses in a variety of contexts, such as ordinary discussions, scientific writing, and creative writing (Hutson 2022).

Enthusiasm has surged since the launch of ChatGPT in 2022. ChatGPT is an innovative application that has sparked spirited debates among people from diverse backgrounds. It is deemed as a potent tool that can assist media and communication students with their academic writing assignments and courses in a number of ways (Baidoo-Anu and Ansah 2023). On the other hand, Sok (2023) argued that the most significant ways that ChatGPT can help are by coming up with ideas based on keywords and phrases that the student enters, delivering writing advice and hints, helping with editing and proofreading, and responding to certain academic queries. Therefore, it is worth noting that ChatGPT and other AI tools have proven to be capable of generating responses in a variety of contexts, such as ordinary discussions, scientific writing, and creative writing (Hutson 2022).

ChatGPT presents both advantages and drawbacks for students. Positively, it can enhance student motivation to improve their reading and writing skills (Ali et al. 2023). It develops the learning process by providing personalised feedback and fostering interactive discussions, hence fostering understanding and critical thinking (Neumann et al., 2023; Silva & Janes, 2021). According to Sullivan et al. (2023), ChatGPT also helps clarify complex concepts for better comprehension, prepares students for assessments, and corrects grammatical errors. Thus, many students see ChatGPT as an efficient learning tool that simplifies learning, writing, and brainstorming processes (Bonsu & BaffourKoduah, 2023; Chan & Hu, 2023). In addition, it can alleviate teachers' workloads (Farrokhnia et al., 2023).

Conversely, Sysoev and Philatov (2023) criticised the use of ChatGPT, that it could impede critical thinking and diminish students' independent learning abilities. Rahman and Watanobe (2023) holds the view that this tool poses challenges to academic integrity since it can generate misleading information and

bypass plagiarism detection systems. Besides that, Neumann et al. (2023) questions the discrepancies among educators regarding the implementation and usage of ChatGPT, as well as concerns about its impact on the integrity of online exams due to its advanced reasoning capabilities. In regards to writing, research indicates that ChatGPT can outperform humans in producing written work (Herbold et al., 2023). Another study found that ChatGPT provides more comprehensive feedback on student essays than human educators (Thurzo et al. 2023).

2.1 Issues and Concerns with Artificial Intelligence (AI)

Despite the potential advantages, there are a number of issues and concerns with ChatGPT implementation that need to be carefully considered. One of the primary issues is the accuracy of the data that ChatGPT offers. According to Marzuki et al. (2021), in order to verify the accuracy of AI-generated content and stop the spread of false information, students must critically assess it. This emphasises the significance to instruct students on the use AI-powered resources with a critical mindset. Conversely, Michel et al., (2023) underscores the possible effects of an excessive reliance on ChatGPT on students' capacity for critical thinking and self-directed learning are a further cause for worry. Over-reliance on AI to retrieve information can impede students' ability to actively interact with the content and develop their analytical skills.

Though promising, Natural Language Processing (NLP) models such as ChatGPT and Google Bard have a number of problems and moral dilemmas that need to be resolved. The research emphasises how important it is to put accuracy first, with data security and privacy being two of the most important ethical issues. Issues concerning student privacy and security are raised by ChatGPT's utilization of vast amounts of data to produce responses. Researchers stress that in order to safeguard student data and stop illegal access, strong privacy regulations, data encryption, and informed consent processes are essential (Neumann, Rauschenberger, & Schön, 2023).

The accuracy of the system is highly dependent on student input as well as the quantity, complexity, and quality of the training data. The system may learn erroneous patterns and produce wrong responses if the training data is of low quality or lacks diversity. Furthermore, the intricacy of the input data—particularly idiomatic phrases and linguistic subtleties—can affect how accurate NLP models are. The possibility of technological misuse is another ethical concern (Perera & Lankathilaka, 2023). Due to its capacity to generate human-like text, ChatGPT can be abused by disseminating false information or engaging in impersonation. Ensuring accountability for any misbehaviour and preventing misuse are made possible by putting safeguards in place.

2.2 Use of technology in technical education

The integration of technology into technical education revolutionised the learning landscape and also provided the students with enhanced resources and interactive tools as well as different innovative methods to acquire and apply technical knowledge. In the words of Murray (2020), the journey of technology in education started in the mid-20th century when computers entered the creation of simulation and computer-aided design programs. After technology advances, interactive multimedia and online platforms, as well as virtual laboratories, become integral components of technology logically shaped by the integration of AI and virtual reality as well as augmented reality, developing a new wave of massive and experiential learning. As stated by Shamsuzzoha *et al.* (2020), technology also serves a myriad of purposes in technical education, and different simulation software allows students to practise complex tasks in a risk-free environment. Online learning platforms also provide proper access to a wealth of resources and enable students to learn at their own time and pace.

Apart from this, collaborative tools also facilitate group projects and remote collaboration, as well as help the student to prepare for the collaborative nature of different technical professions. The infusion of technology also addresses long-standing challenges in technical education and bridges the gap between theoretical knowledge and practical applications. As per the views of Hamed and Aljanazrah (2020), Students can get hands-on experience with a variety of simulators and virtual labs to try out a variety of tools and techniques in a controlled setting. In the parts of airplane mains, virtual test systems can recreate upkeep situations and guarantee that understudies can acquire down to earth abilities prior to entering what is happening. Then again, innovation in specialized training changes geological limits and offers understudies admittance to a worldwide pool of mastery. In the expressions of McKimm et al. (2020), different web-based discussions and online courses, as well as cooperative activities, interface students to experts and teachers around the world.

This interconnectedness not only broadens the students' horizons but also exposes them to a variety of approaches and industry best practices. Consequently, one might say that the proceeded with progression in man-made reasoning and expanded reality, as well as the Web of Things, offer more modern apparatuses for learning. This revolution significantly enriched the learning experiences and prepared the students for the complexities of modern technical professions.

2.3 Cognitive aspects of language learning and technical terminology acquisition

The acquisition of technical term is a cognitive process which is intricately linked to language learning. Understanding the cognitive aspects is highly important for developing effective strategies in technical education, especially in fields like aircraft maintenance, when precision in language is vital. As opined by Hadi *et al.* (2023), technical terminology involves the memorisation of substantial amounts of information that includes complex terms and definitions as well as their contextual uses. Long-term memory consolidation is crucial for the retention of technical vocabulary, and techniques like space repetition and mnemonic devices aid memory traces and facilitate faster and more accurate recall of technical terms during practical applications. At the same time, Castro-Alonso *et al.* (2021) suggested that learning the technical terminology involves managing the cognitive load efficiently. Chunking the process of group information into meaningful insights allows the learner to process and remember large amounts of information.

In the words of Thambirajah and Krish (2023), effective communication, in the form of oral communication skills, is a precondition for aircraft maintenance personnel to perform their routine tasks. On a similar note, breaking down complex technical terms into manageable chunks adds to comprehension and retention and further optimises cognitive resources for more effective learning. In the context of technical terminology acquisition, learners develop a conceptual framework which connects related terms and concepts, and understanding all this internal relationship between different technical terms helps the learner to develop a cohesive mental structure and enhance comprehension as well as provide a more holistic understanding of the subject matter. As suggested by Mao et al. (2024), it is evident that language processing often involves decoding the words and understanding the syntax as well as extracting the meaning. In technical education, students mostly engage in receptive and productive language skills and develop proficiency in technical terminology, requiring the learner to navigate through the syntactic and semantic intricacies of specialised language. This also required the emphasising of the importance of exposure and practises in diverse linguistic contexts. Cognitive aspects of language learning are intricately connected with motivation and affective factors.

In the words of Chen et al. (2021), learners are required to have a desire to learn technical term, and its

relevance to their study goals can significantly impact the cognitive process involved. Learners who also have positive emotions and curiosity, as well as interest, can enhance their cognitive engagement, while negative emotions like anxiety can hamper the learning process. At the same time, the ability to transfer knowledge from a language learning context to real old applications is highly important in cognitive aspects. In technical education, learners need to go beyond memorisation and apply their knowledge to solve problems while performing different tasks like diagnosing aircraft issues or following maintenance procedures. Committee flexibility and the capacity to transfer the learning are included in cognitive skills in technical terminology acquisitions.

2.4 Relevance of natural language processing in technical education

Natural language processing plays a pivotal role in reshaping the landscape of technical education and offers innovative solutions that enhance learning experiences. As coined by Torfi et al. (2020), natural language processing also enables the development of interactive learning environments through the creation of virtual assistance and chatbots in the technical education students need to engage in natural language conversion with AI powered virtual assistance to clarify their doubts and sitting explanation as well as practise technical terminology. This interactive approach fosters dynamic learning experiences and allows individuals to have active engagement with their course content. As mentioned by Goldberg (2022), Natural language processing uses algorithms that can analyse and understand individual learning patterns and preferences. It further allows the customisation of learning pathways. In the case of technical education, this adaptability is highly vital as students come from different backgrounds and different levels of familiarity with complex technical concepts.

Personalising learning pathways guided by the NLP also ensured that students received tailor support and resources to optimise their understanding of technical terminology. Technical education also involves the mastery of specialised jargon and languages, and it excels in language comprehension while helping the students navigate and comprehend complex technical terms. As coined by González Canche (2023), through machine learning algorithms, the NLP model can contextualise technical jargon and provide the students with proper understanding and exploration in the development of subject matter. NLP facilitates automatic assessment and feedback mechanisms while streamlining the evaluation process in technical education in the field of aircraft maintenance, where precision is highly important. The NLP algorithm can evaluate composed and spoken reactions, further giving moment input on the utilization of specialized wording and the precision of the idea. This fast input circle further speeds up the educational experience and permits the understudy to have the right comprehension.

As expressed by Steigerwald et al. (2022), technical education also requires students to work together on a global skill, and NLP-powered language translation can help students work together seamlessly across language barriers. This is especially significant with regards to airplane support, where global joint effort is essential and normal. NLP cultivates a globalized learning climate and assists us understudies with getting ready for the worldwide idea of specialized callings. For the development of practical skills, technical fields, including aircraft maintenance simulations, are crucial. As indicated by Toncu et al. (2021), NLP interfaces improve client encounters by permitting understudies to connect with recreations utilizing regular language orders. This drive connection improves on the expectation to learn and adapt for complex techniques and makes specialized training more open and locking in. Consequently, one might say that the importance of normal language in specialized training lies in the capacity to change the conventional learning worldview.

2.5 Theoretical Framework

2.5.1 Constructivism learning theory

The constructivism learning theory alludes to the information which is effectively developed by the students instead of latently received. According to Burhanuddin et al. (2021), it likewise stresses that the students play a part in building their own figuring out through various encounters and reflection as well as friendly collaborations. With regards to involving ChatGPT in specialized schooling, constructivism lines up with the possibility that understudies need to develop their insight into specialized terms by participating in discussion with ChatGPT. According to Javaid et al. (2023), ChatGPT is a platform for students to actively participate in the learning process and serves as a conversion agent. Through the discourse with the chatbot, understudies can effectively take part in making exercises and further well-spoken how they might interpret specialized terms while getting quick criticism.

This intuitive nature of ChatGPT lines up with the constructivist approach by empowering the understudies to clarify some pressing issues and refine their seeing appropriately. In the expressions of Atlas (2023), the integration of constructivist standards permits educators to plan exercises which influence ChatGPT conversational abilities to support act commitment with specialized terms. Different assignments involving dialogue-based exploration and problem-solving can be implemented, and it will foster a learning environment where students develop knowledge and a deeper understanding of the specialised language used in aircraft maintenance.

2.5.2 Cognitive load theory

The cognitive load theory focuses on the cognitive resources learners expand during the learning process. As mentioned by Janssen and Kirschner (2020), it also distinguishes between the intrinsic load and germane load. With regards to technical education, particularly in airplane maintenance, where the volume of specialized phrasing is overwhelming, cognitive load theory gives bits of knowledge into overseeing mental assets appropriately. ChatGPT is a device for specialized term obtaining and is intended to limit cognitive loads. Simultaneously, the discussion can be organized to introduce specialized terms in a progressive and cognizant way and further union with the standards of cognitive load theory.

As per the views of Bai *et al.* (2023), the adaptability of ChatGPT allows the students to respond to individuals' learning needs and optimise the cognitive load by tailoring explanations and examples to the student's level of understanding. The selected theoretical framework successfully aligned with the topic of using ChatGPT in acquiring technical terms among aircraft maintenance students. Constructivism underscores the importance of active engagement and collaborative knowledge cons while reflecting the interactive nature of ChatGPT. The cognitive load theory also addresses the cognitive challenges that are associated with the acquisition of technical terminology and further provides a framework to optimise the learning process through the proper design of interactions.

The integration of both theories into the study design allows a comprehensive exploration of the effectiveness of ChatGPT in supporting the active learning and cognitive efficiency of aircraft maintenance. It also helps the student to successfully navigate through the intricacies of technical languages.

3. Research Methodology

The present study examined and evaluated the impacts of ChatGPT utilisation on students enrolled in the private educational institution using a qualitative research methodology. Analysis of qualitative data enables a deeper understanding of participants' viewpoints, experiences, and the background factors

influencing their Chat-GPT interactions. An outline of the key components of the research design is given in this section, which includes the research methodology, data collection techniques, participants, and data analysis protocols. Semi-structured interviews: 14 students from the Diploma in Aircraft Maintenance course (Year 1) in the university participated in semi-structured interviews. These students were chosen to participate in this study based on convenience sampling. To ensure participants' confidentiality, they were given codes such as "P1" or "P2", meaning P1 is Participant 1 and P2 is Participant 2, respectively (refer Table 3.1). The participants were selected from an intact class that was conducted fully online. They were selected based on the following three criteria:

1. First-year undergraduate students, who did not have prior knowledge or experience of the aircraft maintenance technical terms.
2. The learners were registered for the 'Academic English with Research' course.
3. The participants were all school-leavers and have taken their Sijil Pelajaran Malaysia examination (Malaysian Certificate of Education), which is a national examination sat for by all fifth-form secondary school students in Malaysia and have got a minimum C+ grade.

No.	Participants	Gender	Age	SPM English Language Result
1	Participant 1 (P1)	Male	19	C
2	Participant 2 (P2)	Male	20	C+
3	Participant 3 (P3)	Male	19	B
4	Participant 4 (P4)	Female	19	B-
5	Participant 5 (P5)	Female	20	B-
6	Participant 6 (P6)	Male	19	C+
7	Participant 7 (P7)	Male	20	A
8	Participant 8 (P8)	Male	20	B
9	Participant 9 (P9)	Male	19	B
10	Participant 10 (P10)	Female	20	C
11	Participant 11 (P11)	Male	19	B+
12	Participant 12 (P12)	Male	21	A-
13	Participant 13 (P13)	Male	19	C-
14	Participant 14 (14)	Male	20	C+

Table 3.1: Participant's demographic data

The Academic English with Research is a compulsory course offered in the programme. This course was compulsory for learners majoring in aircraft maintenance. Also, the course introduced technical terms of the aircraft and exposed the learners to the writing style for preparing aircraft maintenance reports and developing their writing towards becoming an effective writer.

3.1 Data Analysis

Thematic analysis is the chosen method of analysis for this qualitative investigation. It is important to note that the most widely utilised method for analysing interview data is the thematic analysis. Thematic analysis is a technique for "identifying, analysing, and reporting patterns (themes) within the data," according to Braun and Clarke (2006:79). This is because "a rigorous thematic mode can produce an insightful analysis that answers particular research questions" (Braun and Clarke, 2006:97). Therefore, the researcher decided to employ this approach.

When it comes to data coding and interpretation, the researcher employed a deductive strategy. The analysis was conducted top-down, with the researcher applying a number of concepts, ideas, or themes to the data. This means that the themes and codes are mostly derived from the thoughts and ideas the researcher applies to the data; thus, the mappings made during analysis may not always have a direct connection to the semantic content of the data.

Furthermore, by enabling an examination of the interview data from two angles—first, data-driven and coding-based—and second, from the perspective of the research questions to determine whether the data was in line with the questions and provided enough information, this approach enhanced the research questions. Ultimately, the data analysis was carried out and documented.

4. Findings and Discussion

This part presents the findings from the survey that had been conducted among 14 students in the university. Findings in this section are presented based on the answers delivered by the participants. The first question addresses how the students perceive the use of ChatGPT in their learning experiences.

Research Question 1:

1. How do aircraft maintenance students perceive the use of ChatGPT in their learning experiences?

Thematic analysis of the qualitative study on the use of ChatGPT in acquiring technical term among aircraft maintenance students revealed several key themes:

4.1.1 Perceived usefulness of ChatGPT

Participants expressed varying degrees of satisfaction with the use of ChatGPT for learning technical terminology. Some found it to be a helpful tool in quickly looking up definitions and explanations, while others felt that it lacked the depth and accuracy needed for complex aviation terminology.

> "I like the use of ChatGPT because it is useful for my essay writing" (P13)
>
> "I think learning words from ChatGPT is effective. I just read them out loud every day. I guess that helped me a lot in completing my assignment. (P5)
>
> "When I use the application, there are a lot of technical terms I don't know. Terms such as landing gear, corrosion, aircraft structural maintenance or aircraft rivets. I don't understand some terms, so I use ChatGPT to understand and use it for my assignment". (P6)
>
> "Some aircraft maintenance journals are easy to understand and I apply it in my assignment". (P2)
>
> "I really love using ChatGPT, so the technical terms are repeated over and over to the point that I memorise and am able to write the assignment". (P3)

Therefore, ChatGPT can be highly useful for students when writing reports. It offers several key benefits such as Idea Generation whereby ChatGPT can help brainstorm and generate ideas, providing a starting point for topics and content. Additionally, ChatGPT could be used as Research Assistance as it can provide summaries of complex topics, making it easier for students to understand and include relevant information. Besides that, ChatGPT can assist in structuring reports, suggesting outlines, and improving the overall

flow of writing. Furthermore, it helps in refining language, checking grammar, and ensuring the report is well-written and polished. Finally, by providing quick responses and suggestions, ChatGPT can save students time during the writing process. The benefits of ChatGPT are in line with Atlas (2023), who postulates that tertiary education could benefit greatly from the usage of ChatGPT and other language models, which can be applied in a wide range of contexts, including writing aid, language acquisition, research, and administration. Thus, it could be argued that ChatGPT has the potential to be a useful tool for education and research. Overall, ChatGPT acts as a valuable tool to enhance the quality and efficiency of report writing for students.

4.1.2 Supplementing traditional learning methods

Participants discussed how ChatGPT could complement traditional learning methods in acquiring technical terminology. They noted that while ChatGPT was useful for quick reference and clarification, it should not replace in-depth study and practice with subject matter experts.

> "Compared to classroom learning, I learn more through ChatGPT". (P1)
>
> "What the lecturer teaches during class is little compared to the information I get on ChatGPT". (P3)
>
> "I can type any information on ChatGPT I immediately get answers for it". (P8)
>
> "I understand the aircraft tools and its usage better because ChatGPT explains it well". (P9)
>
> "For quick reference, I use ChatGPT, I don't have to meet the lecturer". (P4)

It is worth mentioning that ChatGPT is a promising tool that can be utilised as the perfect personal tutor for students, in contrast to traditional learning approaches. This finding supports the point made by Mhlanga (2023) and Qadir (2022), who stated that students who ask ChatGPT, which provides virtual intellectual tutoring services, can get personalised responses and comments. Students can easily instruct ChatGPT for help with their homework, assignments, projects, and even math exercises whenever they need it. This method enables students to develop into independent and self-directed learners. Likewise, according to Baidoo-Anu & Ansah, (2023), ChatGPT may answer questions from students and converse about a wide range of subjects. Nevertheless, in order to fully benefit from ChatGPT's support, educational institutions must create clear policies and make them known to students so that they understand how to use it effectively and responsibly.

4.1.3 Improving engagement and motivation:

Some students reported increased engagement and motivation in learning technical terminology through the interactive and conversational nature of ChatGPT. They appreciated the instant feedback and personalized responses that ChatGPT provided, which enhanced their learning experience.

> "I feel much motivated doing assignments now with ChatGPT". (P13)
>
> "Without ChatGPT, I would not be able to do much assignment and get good grades". (P10)
>
> "With ChatGPT, I don't have to ask my friends or lecturer for help" (P11)
>
> "I am able to learn more through this app". (P9)

The participants were able to create more engaging activities in the classroom with the help of ChatGPT's interactive communication platform. According to Herft (2023), educators can "create visual aids, for example slides or worksheets that clearly define the learning objectives and success criteria for a lesson using ChatGPT" (p. 2). It is important to note that there is a good opportunity that these resources will inspire higher education students to study and participate in the classroom setting. Furthermore, ChatGPT's questions and prompts may promote students' engagement with a range of knowledge and

skill levels and enhance their ability to solve problems and think critically, all of which are essential for education in the twenty-first century (Kasneci et al., 2023). It is certain that encouraging classroom participation is made possible by this new AI technology.

The findings for research question 2 will be explained in the following section.

Research Question 2:

What are the major challenges faced by the aircraft maintenance students in the use of ChatGPT?

Concerns were voiced by participants on the ethical consequences of using ChatGPT and other AI technologies excessively to learn technical terms.

> "I am worried that the Turnitin report will show percentage of me taking from ChatGPT" (P7)
>
> "It is illegal because everything is done by this ChatGPT". (P9)
>
> "It is better to check with the lecturer again so that I will not be penalized for copy and paste". (P12)
>
> "I will not learn anything if I continuously use ChatGPT for all the assignments". (P2)

In order to guarantee the correctness and dependability of the knowledge learned, they underlined the significance of critical thinking, independent investigation, and human oversight during the learning process. Overall, the study's theme analysis brought to light the possible advantages and difficulties that ChatGPT may present for undergraduates studying aircraft maintenance as they learn technical terms. It reiterated how crucial it is to approach ChatGPT as a supplement to rather than as an alternative for conventional teaching techniques and how continual assessment and improvement of AI systems are necessary to further improve student learning outcomes.

An excessive reliance on AI could be detrimental. Since ChatGPT is so convenient, students, particularly those working on last-minute assignments may use it to do their work fully without applying critical thinking or decision-making abilities.

> "In actual fact, I do not have to think much when I use ChatGPT". (P3)
>
> "I always do last minute assignment as I have ChatGPT" (P4)
>
> "I am worried during my internship I won't be able to write clearly because I am using ChatGPT extensively" (P5)

It has been suggested that using ChatGPT will negatively affect students' development of critical thinking abilities (Kasneci et al., 2023; Mhlanga, 2023; Shiri, 2023), problem-solving abilities (Kasneci et al., 2023), imagination, and research skills (Shiri, 2023). Using ChatGPT may have a variety of other detrimental effects on students, including a lack of creativity and poor decision-making skills, given that these skills are crucial to their success in both their academic and professional lives.

4.1.4 Integration into the Aircraft Maintenance Curriculum

The incorporation of ChatGPT into the aircraft maintenance curriculum program is indispensable and plans to improve the growth opportunities of aeronautics upkeep understudies. The reconciliation cycle is intended to effectively line up with the educational plan objective and guarantee a consistent mix of innovation with conventional instructing strategies. The primary learning objective is to enhance students' communication abilities within the industry-specific term and their comprehension of aircraft maintenance term. The learning objective is likewise centered around encouraging a more profound perception of specialized ideas. As referenced by Degas et al. (2022), in this case, the aircraft systems and maintenance procedure, in addition to other regulatory compliances, are the areas where the integration of ChatGPT

can provide substantial benefits. Mapping down the technical terminology module is also helpful. This model is additionally adjusted to guarantee that it tends to the particular mechanical language challenges understudies face in their coursework.

This action likewise incorporates exchange-based tasks and situation re-enactments, as well as conversational activities revolved around airplane support. According to Hew et al. (2023), the objective is to appropriately foster a unique learning climate that supports dynamic investment and decisive reasoning as well as powerful correspondence through collaborations with chatbots. All through the combination, an undeniable level observing and assessment cycle will be set up. As referenced by Ali et al. (2023), the educators will gather criticism straightforwardly from the understudies and furthermore evaluate the effect of ChatGPT on the learning results. This strategy will make it possible to keep making improvements and make sure that the integration is in line with the curriculum and the changing needs of students.

In this manner, one might say that by decisively integrating ChatGPT into the designated module and planning intelligent growth opportunities, educators can effectively establish a dynamic and strong climate where understudies can effectively dominate the specialized terms. In addition to making technical education more efficient, this integration will assist students in preparing for entry into the aviation industry.
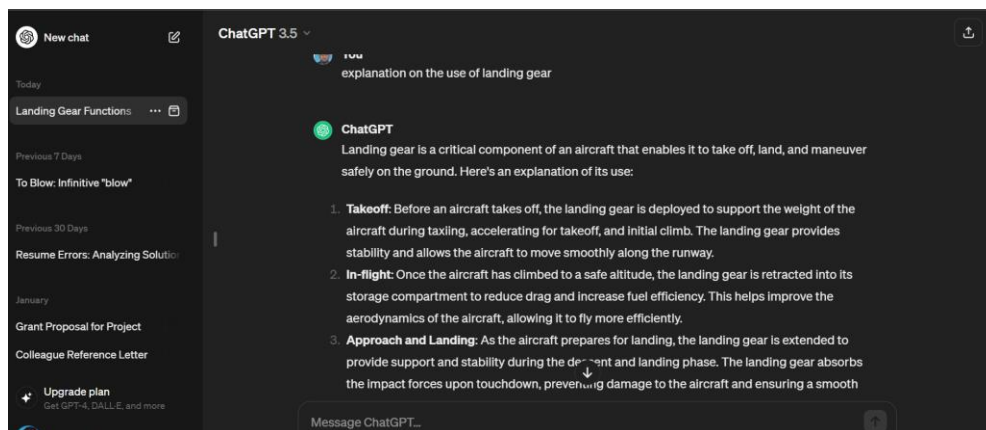

Figure 3.1 Participant 2 finding information on the use of landing gear

4.1.5 Training process and customisation for technical terms

The preparation cycle and the customisation of ChatGPT for specialized terms with regards to airplane support are the fuse of basic parts which guarantee the model's effectiveness inside the particular space. As expressed by Scott et al. (2022), the preparation cycle begins with the gathering of a complete informational collection which is custom fitted to the field of airplane support. This informational collection primarily incorporates specialized manuals and industry distributions, as well as administrative records and different sources that incorporate aeronautics explicit phrasing. In the expressions of Kocoń et al. (2023), the variety of the informational collection will additionally guarantee that ChatGPT is presented to many specialized terms and relevant use. On a comparative note, a dataset with pre-handling to clean and normalize the text and explanations is likewise added to feature specialized terms and their definitions as well as context-oriented data.

These means further guide the model in figuring out the connection among terms and catching subtleties, as well as perceiving explicit language pervasive in airplane support. In the expressions of Caruccio et al.

(2024), the specialized data set that focuses on technical terminology can be used to fine-tune the base ChatGPT model. During this process, the model will learn to successfully generate responses that align with the language used in aircraft maintenance. Tweaking further permits the model to adjust the language age abilities to the particular phonetics and can make the syntactic designs which are pertinent to the field. In a similar vein, the model's proficiency can be improved through refinement, as can any obstacle that might hinder the recognition or generation of particular technical languages. To upgrade its functional pertinence, ChatGPT goes through situation based reenactment preparing, which includes the consideration of the model in sensible situations experienced in airplane support, such as diagnosing specialized issues and performing routine checks, as well as speaking with the upkeep group.

As outlined by Biswas (2023), the simulation training will further contribute to the model's ability to generate contextually appropriate responses in real-world situations. Throughout the training and customisation phase, ethical considerations are highly important. Ethical guidelines need to be established to govern the model's behaviour while prompting a learning environment which is more respectful and aligns with the industry standards. Hence, it can be said that the training process and the customisation of ChatGPT for technical terms in aircraft maintenance involves a series of steps which aim to tailor the models to the specific linguistic and contextual demands of the aviation field.
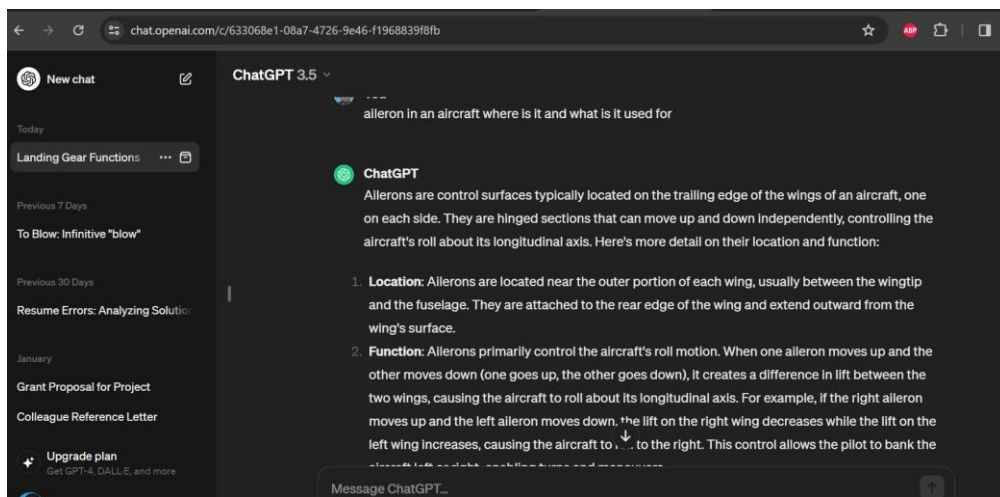

Figure 3.2 Participant 7 finding information on the use of aileron

4.1.6 Challenges encountered during implementation

A truly transformative initiative is the implementation of ChatGPT in the context of teaching aircraft maintenance students' technical terms. In any case, a few difficulties are consolidated and should be wiped out to streamline the combination and guarantee a consistent growth opportunity for the flying understudies. As coined by Nazir and Wang (2023), the essential test is keeping up with the exactness and accuracy of ChatGPT in the reaction age, which is connected with the specialised terms. This model can experience hardships in distinctive unobtrusive subtleties and industry-explicit varieties in the wording. This can prompt mistakes and requires nonstop refinement and adjusting. The aviation business is dynamic, and the phrasing is developing to oblige the innovation headway and administrative changes appropriately. The use of ChatGPT can battle to keep pace with these progressions, and this might prompt occurrences where the model can produce obsolete or rebellious data (Liu et al., 2023).

Specialised terms in aircraft maintenance, for the most part, depend on context-oriented seeing; consequently, equivocalness can emerge in various circumstances. The ChatGPT model can confront difficulties in deciphering ventures' explicit questions precisely and possibly prompt reactions that need accuracy. On a comparative note, understudies can confuse or utilise the data given by ChatGPT. As a result, there might be new misconceptions about the technical terms. Aside from this, Jo (2023) expressed that the outcome of the ChatGPT mix depends on client commitment and acknowledgement. During the underlying stages, understudies can oppose or underuse the model, which further affects the adequacy of the learning device. Subsequently, one might say that the execution of ChatGPT in procuring specialised terms offers enormous potential, yet at the same time, addressing the difficulties connected with precision, versatility, and relevant comprehension is profoundly significant.

4.2 Discussion

4.2.1 Implications of the findings for aircraft maintenance education

The findings derived from the study on the use of ChatGPT in acquiring technical terms among aircraft maintenance students have significant implications for the field of aircraft maintenance education. The positive finding regarding the ChatGPT on technical term acquisition suggests that the integration of such technology can enhance the learning efficiency of the student (Burhanuddin et al. 2021). The arrangement of a dynamic and intelligent stage for the understudies to appropriately draw in with the specialized phrasing ChatGPT adds to more compelling and facilitated learning results. This further offers that instructors can use comparative man-made intelligence driven apparatuses for streamlining the growing experience and guarantee that the understudies can secure and hold specialized information all the more proficiently. The reception of ChatGPT to a singular's learning style can upgrade customized learning. It is clear that the understudy can profit from a fitted way to deal with specialized term securing where the visit bot can effectively change its reactions in view of the understudy's requirements (Chen et al. 2021). This likewise has a more extensive ramifications for the plan of customized learning pathways inside the airplane upkeep educational program and further guarantees that the understudies can effectively get modified help in dominating the specialized wording. Consequently, one might say that this piece of the conversation has effectively made the primary goal of the review, which is to assess the effect of ChatGPT on the speed and precision of specialized term procurement.

The effective combination of ChatGPT into the airplane support educational plan additionally features the potential for expansive joining of computer-based intelligence innovation in the educational program plan. The educators can effectively consider the reception of simulated intelligence driven devices in various subjects to give understudies intuitive and versatile opportunities for growth (Steigerwald et al. 2022). The recreation ability of ChatGPT and the versatility towards this present reality situation likewise have suggestions for expanded useful preparation in the airplane support field. It additionally permits the understudy to apply the specialized term in the applicable setting (Javaid et al., 2023). This likewise has the ramifications to plan the virtual labs and reproduction practices and further advance common sense preparation encounters which are lined up with the hypothetical information. Subsequently, one might say that this current conversation has effectively satisfied the second even-handed of this exposition, which is to analyse the versatility of ChatGPT to different learning styles inside the setting of airplane support training.

The versatility of ChatGPT to advance specialized phrasing lined up with the nonstop expert improvement needs of people in the airplane support industry. The investigation additionally discovered that the model

can powerfully conform to industry changes and guarantee that the understudies are getting presented to the most recent phrasing and industry rehearses. While simultaneously, the AI-driven language translation tool can foster a more inclusive learning environment. Hence, it can be said that this study discussion also has met the third objective of this paper, which is to assess students' perception and satisfaction regarding the use of ChatGPT in technical education.

4.2.2 Recommendations for improvement

Based on the study findings, different recommendations can be made in order to enhance the effectiveness of the integration and address the potential areas for improvement. It is recommended to improve the model's performance in handling the industry specific context and scenario. At the same time, finetuning must be conducted by using a data set, which closely reflects the nuances and challenges faced during real-world aircraft maintenance. This needed to involve proper collaboration with the industry experts and continuously update the model to align with the industry changes. Simultaneously, Regmi and Jones (2020) presumed that it is additionally prescribed to upgrade the client direction and input systems, which can further develop client cooperation and learning results. Students can use ChatGPT more effectively if they are given clear instructions on how to formulate questions, request clarification, and interpret responses. On a comparable note, the joining of client criticism components inside the framework can help the understudies and model to make nonstop upgrades and get experiences into the model's presentation and exactness.

Then again, the unique idea of the aeronautics business prescribes making standard updates to the ChatGPT model to stay up with developing specialized wording and industry rehearses. As proposed by Rane et al. (2023), appropriately laying out support plans for the actual model will guarantee that it stays a dependable and modern asset for the understudy. It is likewise prescribed to consolidate new information resources and address arising difficulties in the models' exhibitions. In order to develop a more robust and responsive tool for technical term acquisition in the field of aircraft maintenance, educators and developers alike will benefit from the implementation of these recommendations. In addition, the ChatGPT will continue to be a useful tool in the ever-changing field of technical education if it is continuously improved and adapted to meet industry needs.

4.2.3 Future research directions

In the future, this study can focus on the integration of artificial intelligence, particularly in the model of ChatGPT, to explore the long-term impact on the students' practical skills and industry readiness as well as job performances. At the same time research in future can investigate the scalability of AI driven tools across diverse technical disciplines and evaluate the transferred ability of acquiring knowledge to the real-world scenario.

5. Conclusion

In conclusion, the integration of ChatGPT in aircraft maintenance education presents promising opportunities for enhancing technical term acquisition. The study highlights the model'
s effectiveness in providing interactive and personalised learning experiences. Recommendations for fine-tuning, user guidance, and industry collaboration aim to further optimise its application. While challenges exist, the positive implications suggest a transformative role for AI in technical education. Future research should delve into practical skill development and the broader applicability of AI tools across technical disciplines, fostering continuous improvement in the dynamic landscape of aviation education. As technology continues to evolve, tools like ChatGPT will undoubtedly play an increasingly significant role

in technical education, enhancing both the learning experience and the quality of technical communication in the field of aircraft maintenance.

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