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Research Article:

Acquiring Technical Terms for Report Writing Using Online Resources: A Case Study with Aircraft Maintenance Learners

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ABSTRACT

Aviation English is a compulsory course in the aircraft maintenance programme to acquire technical terms for safety and efficient operation of aircrafts. Research on technical term acquisition for writing is limited, and little is known about teaching and learning technical terms in the aircraft maintenance programme. The current study examines how the online learning mode assisted the aircraft maintenance learners to use the technical terms appropriately in their written tasks. This study employed a qualitative research design, and 14 first-year Diploma in Aircraft Engineering (DAE) learners participated in this study. The data collection process involved learners submitting their assignment (tasks) via online to their instructor. The tasks set for them were based on the topics of aircraft maintenance and safety, namely Corrosion, Aircraft rivets and Aircraft Structural maintenance. The findings revealed how they integrated technical terms in their assignments using online resources. Learners generally used online resources, such as e-books, video lectures, e-dictionaries, online articles, online text and documents, aircraft maintenance web pages and blogs, and listening to podcasts to understand the technical terms and integrate them into their assignments. Additionally, the findings also explained how the use of online forums enabled the learners to improve their assignments. These findings elucidate the use of online resources as an influential platform to integrate technical terms in learners' written assignments and help increase their knowledge in using the technical terms and writing the reports correctly.

Keywords: Online learning mode, online resources, technical terms, writing assignments, aircraft maintenance learners

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INTRODUCTION

Among many kinds of businesses, the aviation sector is one where the use of English language is mandatory since the invention of aircraft (Estival et al., 2016). This is because aviation necessitates English as the official international language. According to the International Civil Aviation Organisation (ICAO), all air traffic controllers and flight crews involved in or in contact with international aircraft as of 1 January 2008 must be fluent in English. Such emphasis is essential since communication errors involving inadequate English ability have frequently resulted in deadly incidents (Tajima, 2003). In order to prevent misunderstandings, Tajima (2003, p. 26) adds that "more serious efforts must be made to create an error-resistance and mistake-free language environment for those non-native English-speaking pilots and controllers." The new understanding by ICAO that the need to emphasise English proficiency of personnel in the aviation industry "stem from idea of the preservation of aviation safety" with the goal of "keeping communication between pilots and controllers clear and effective without jeopardising safe operations," (Tajima, 2003, p. 26) as well as maintaining effective communication from the cabin crew to the flight attendants and vice versa (Satvindar Singh et al., 2021).

The effective communications, in the form of oral communication skills, are a precondition for the aircraft maintenance personnel to perform their routine tasks. For example, seeking additional details from senior technicians or the supervisor on the aircraft reparation is an important process because clear communication can prevent mistakes such as misinterpretation that could lead to faulty aircraft operations and maintenance (Fisher, 2017). Another skill that the aircraft maintenance personnel must have is active listening, and one of the best ways to be an active listener is to paraphrase what has just been heard into similar phrasing to ensure that the information has been fully understood (Satvinder et al., 2021). Additionally, asking questions for verification is also a vital communication skill, since maintenance of an aircraft is an area where clear communication in the English language is needed to ensure accidents do not occur. According to White (2018), poor levels of listening to instructions could in a worst case scenario result in accidents and loss of life. Hence, communication skills, in the form of reading, writing, listening and speaking are a significant part of the aircraft maintenance personnel.

For the aircraft maintenance personnel, it is essential to learn writing skills since many technical and maintenance documents are written in English (Satvindar Singh et al., 2021). They are responsible for accurately writing reports to the officials of the aircraft's safety and efficiency (White, 2018). Hamzah and Wong (2018) mentioned that mistakes such as writing the wrong technical terms in a written report may also occur, and this could confuse the pilot, causing human-related errors that lead to air accidents, which could detrimentally affect aviation safety (Tetiana, 2015). When writing a report, the aircraft maintenance personnel should know the report's purpose, who the readers are, and why the issue must be reported. Thus, the writer must present the incident in words clearly to allow readers to understand what has happened and the action that has to be taken (Rus, 2015). In short, writing skills among aircraft maintenance personnel is crucial in the aircraft industry.

It would be ideal, but rather difficult and unfeasible, to improve the understanding of the technical terms among aviation maintenance personnel in the actual work environment. In this regard, the use of online resources and pertinent technologies (online websites, online videos such as Youtube and Vimeo, electronic dictionary and animations) would enable aircraft maintenance learners to acquire technical terms with a realistic work environment (Bennett et al., 1999; Dommett, 2019; Buchem 2012). Studies show that the online resources have the capabilities to facilitate effective learning outcomes (Wildana et al., 2020; Nurul Haidah et al., 2020). This is because, according to Brett (2000), the online resources have the potential to deliver and combine the traditional media of language learning alongside pedagogic tasks since learners have the opportunity to acquire knowledge through the online technologies. The online resources can also provide helpful implications for classroom-based instruction, particularly for programmes related to aircraft maintenance. There are not many research studies done in acquiring technical terms for report writing. Furthermore, there is a lack of aviation studies that examine the acquisition of technical terms using the online resources. The above problems and the research gap prompted the researchers of this study to embark on an investigation on how first-year Diploma in Aircraft Engineering (DAE) learners acquire aviation-related technical terms using online resources in an aircraft maintenance course at a private university. The study, therefore, seeks to answer the following research question: How were the online resources utilised by the aircraft maintenance learners in completing their online written assignments?

LITERATURE REVIEW

Many related studies highlight the lack of technical term knowledge of aircraft maintenance personnel, especially in handling emergency problems with the aircraft (Prinzo et al., 2008; Molesworth & Estival, 2015; Tajima, 2004; Cookson, 2009). These studies and reports emphasise the requirement for better training, mainly in the essential utilisation of ESP in aircraft maintenance training sessions that focus on writing because the aircraft maintenance personnel lack the ability to fully comprehend documents in the English language (Ma et al., 2010). So far, the use of online learning resources in aircraft maintenance is only limited to analysis for speaking, reading and listening (Hidayat, 2018; Rahmat & Al As'ary, 2017) and does not involve the development of technical terms in report writing. Studies from other fields indicate that online resources can be an effective mode to develop writing skills. For example, a recent study by Oh (2020) investigated the nature of second language (L2) learners' use of online resources and analysed the difference in their writing performance with and without an online writing resource feature. The study found that the test takers used the spell-check function most, followed by an electronic dictionary (e-dictionary), a search engine, and a web-based translator. The use of these functions led to the improvement of their writing test scores across all scoring domains (content, organisation, vocabulary, grammar and appropriateness), which suggests that the use of such writing resources assist the test takers to produce better quality writing. Nevertheless, Oh (2020) suggest that realistic scenarios provided in the programme could enhance the ability of the test-takers in this study and most participants found the online resources

beneficial and were satisfied with the experience of using them. This is because online resources enable and support simulations that accommodate and deliver various learning situations, as well as the contexts and materials.

Several studies have also undertaken similar issues but on different aspects of the computer-based writing instructions. Hajimaghsoodi and Maftoon (2020) presented a computer-assisted writing platform to 67 English as Foreign Language (EFL) learners and found that the students made a significant improvement in their writing through interactions and collaborations on the online platform. Rashtchi and Porkar (2020) investigated the extent to which integrating technology and brainstorming might affect EFL learners' writing skills. They indicated that an online brainstorming tool, "Wordle" promoted the participants' writing performance, largely due to the word clouds stimulating the student's background knowledge, which led to useful ideas required for composing essays. Nevertheless, more studies that specifically investigate whether exposure to other kinds of external sources, for example, the internet search engines, might enrich the 'content' of the writing are necessary. Sun and Hu (2020) examined the effect of data-driven learning (DDL) on the use of lexical grammatical resources, hedges, in writing and showed that the participants used hedges more frequently after the DDL treatment. In particular, the participants of their study reported that they used online dictionaries the most, and also found them helpful in learning to use the hedges more appropriately in their writings. However, Sun and Hu (2020) only examined the effect of DDL approach on the learners' language use aspects, specifically on the use of hedges. Little is yet known about what other elements of language use, such as collocations or grammar uses, can also be improved through the DDL approach.

Online resources are considered beneficial and an alternative to the traditional method of learning in schools and universities because it provides opportunities for better understanding of the topic (El Seoud et al., 2014; Freeman et al., 2013). Previous studies suggest that online resources offer many advantages for learners because this type of learning involves student-centeredness, it is flexible (Dhawan, 2020; Martin, 2012) and it also can improve the writing skills among learners by providing online tools such as e-mails, online essays, and quizzes (Marinoni et al., 2020). Engaging the students with the online resources will promote an active learning environment and this will help the students to improve their understanding of the topic. The students would not only be able to acquire the knowledge, they are also able to gain an understanding of the subject deeply as it stimulates their curiosity (Padmini & Saravanakumar, 2016). Also, learners performed better when acquiring technical terms through online resources compared to students who underwent the conventional method of acquiring technical terms (Khoshnoud & Karbalaei, 2015). This is because learners discovered that engaging actively using online resources enhances their long-term memory and gives them an advantage over online instruction.

Theoretical Perspective

Vygotsky's (1978) social constructivism perspective is used as the foundation of this study since online resources can provide an alternative to the actual and authentic contexts and settings. The theory posits that the individual internalises social activities with more language use, and leads to behavioural transformations and bridges early, and later results in individual language development (Vygotsky, 1978). The fundamental notion of this theory is the zone of proximal development (ZPD), which refers to the distance between what a learner can do with and without help (Vygotsky, 1978). ZPD focused on student-centred learning where learning outcomes can be achieved through guided practice. Hence with a constructivist perspective, Vygotsky (1978) encouraged lifelong learning in order to enhance learners' higher cognitive abilities.

Learner knowledge is developed internally and externally (Vygotsky, 1978). Thus, the student-centred learning approach which is based on constructivist learning theory highlights the student's role in constructing knowledge. Vygotsky pointed out that learning takes place when the education model concentrates on the students' interest rather than on the needs of the outside world (McLeod, 2014). The theory revealed that student language development depends on self-chosen learning items and practices the items within a collaborative learning group or with the assistance from more proficient students. In this study, the utilisation of the online learning resources can engage students in a dynamic learning process through active learning and group connection at multiple levels as well as to enhance technical term acquisition through self-determination and collaboration (Robin & Aziz, 2022). Hutchison and Colwell (2015) emphasised that learners can share their online acquisition among the group members in a class blog or website by supporting each other to construct knowledge. Hence, social constructivism will be able to assist in the acquisition of technical terms using the online resources.

The current study's focus is on how the online resources are utilised by the aircraft maintenance learners in completing their online written assignments. Kelly (2012) suggests that social constructivism could be applied in the online classroom using instructional methods such as case studies, research projects, problem based learning, brainstorming, collaborative learning or group work, guide discovery learning, simulations among others. This is because it has the potential for stimulating learning on a social constructivist paradigm given the wide range of applications available on the Internet and the web (Minghat et al., 2020). Since constructivism is a learner-centred approach, the objective is to create a meaningful learning environment that includes communication and collaboration (Duke et al., 2013). According to Kapur (2018), collaboration is a key component of making meaning. Online resources, therefore, allows for construction of knowledge through collaboration with their online peers, and learners acquire deeper understanding because of the opportunities for exposure to multiple perspectives and interpretations (Varma et al., 2023). In this study, the use of online resources such as online forums, enabled the learners to collaborate with peers and engage in discussions. This process encourages the exchange of diverse perspectives, which leads to the acquisition of technical terms (Xu & Jaggars, 2013). The instructor

in this study encouraged collaboration among learners by dividing them into groups as well as pairs and utilised the online resources to acquire technical terms according to the intended objectives. Jegede (2010) pointed out that the collaborative method enhances learning by giving students the opportunity to develop their communication skills. The role of the instructor in this method is that of a facilitator, as the instructor guides the learners through informed discussion to discover things for themselves. Additionally, the utilisation of the online resources provide learners an opportunity to actively participate in the learning process, through e-dictionary, and other digital tools (Omwirhiren, 2015). According to Axmedova and Kenjayeva (2021), these learning processes promote the development of higher levels of thinking and encourage learners to construct their knowledge through the utilisation of the online resources. Overall, in the context of this study, learners acquire the technical terms through activities that involve online resources and it is enhanced when learners are given the opportunities to communicate.

Methods

This section begins with the research design; which addresses strategies and methods employed in this study. Then, a brief description of the research participants will be given. The next part is an elaboration of the research instruments and the procedure for data collection and analysis. Finally, an explanation of the reliability and validity of this study will be elaborated.

Research Design

A qualitative method based on a case study approach was employed in this study to obtain in-depth data from the participants in acquiring technical terms for report writing using online resources. A case study was employed as it was set to describe the natural phenomena which occur within the data in question and to examine the depth and scope of the case under study (Merriam, 2009). Therefore, the use of a case study in this research was to discover and explore the acquisition of technical terms using online resources, and to provide necessary insights into understanding the participants' experiences and perspectives.

Participants

The participants of the study were 14 first-year Diploma in Aircraft Maintenance Engineering (DAME) learners (with an average age of 18 years) studying in a private university and agreed to participate in this study voluntarily. To ensure participants' confidentiality, they were given codes such as "P1" or "P2", meaning P1 is Participant 1 and P2 is Participant 2, respectively. The participants were selected from an intact class that was conducted fully online. They were selected based on the following two 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.

This course was compulsory for learners majoring in aircraft maintenance. Also, the course provided an introduction to the 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.

Research Instruments

Three research instruments were used to collect data: Online observations, interviews and student assignments. To examine the students' use of online resources in acquiring technical terms, an observation checklist was created using the Student Participation Questionnaire (SPQ) developed by Finn et al. (1991). The checklist was used to record the students' use of online resources to acquire technical terms during the weekly online class sessions. The SPQ is focused primarily on the indicators of student engagement. Affective engagement refers to a student's feelings toward acquiring the technical terms (Jimerson et al., 2003). The terms psychological and emotional engagement have also been used to describe this construct (Appleton et al., 2006; Reschly et al., 2007). Behavioural engagement includes observable student actions or participation while at the university and is investigated through a student's positive conduct, effort, and participation of acquiring the technical terms (Fredricks et al., 2004). Cognitive engagement includes a student's perceptions and beliefs associated with university and learning. It refers to the cognitive processing a learner brings to academic tasks as well as the amount and type of strategies a student utilises using the online resources (Walker et al., 2006).

The second research instrument is the interview protocols that consisted of 14 questions that were designed based on the online observations. These questions are listed in Appendix.

Document analysis was also used, i.e., the online assignments that were submitted by participants to their instructor on topics based on aircraft maintenance and safety. Altogether there were three major topics and these assignments were assigned beginning week 4 to week 13 of the course. The three topics were as follows: corrosion, aircraft rivets and aircraft structural maintenance.

The use of these three research instruments ensured triangulation of the qualitative data (Denzin & Lincoln, 2005) and enabled multiple facets of the phenomenon to be understood. It also allowed the researcher to validate or cross-check data from various sources or perspectives (Vockell & Asher, 1995) as well as reducing: (a) misinterpretation of the participants' behaviour during observation (b) being biassed and; (c) having inadequate or lacking data.

DATA COLLECTION AND ANALYSIS

Online observations were conducted during the online lectures to take note of the use of online resources by the participants. They were carried out to provide information that cannot be gathered through interviews (Creswell, 2012). Interviews with the participants were supplemented with data from the 14 assignment reports prepared by the learners and submitted to the course instructor at the end of the semester. Each assignment was carefully studied to obtain data on the use of technical terms by the learners (Englander, 2012). In this study, thematic analysis was used to determine the presence of certain words, themes, or concepts within the given qualitative data (Braun & Clarke, 2006). Hence, by using thematic analysis, the researchers were able to analyse the emerging themes in acquiring technical terms using the online resources among the aircraft maintenance learners. The analysis of the content took place over the course of a three-week span. During week five of the semester, thematic analysis was conducted and the researchers analysed participants' assignments. For the purpose of this study, the researcher used the social constructivism theory by Vygotsky (1978). The use of social constructivism framework allowed the researchers to examine how the online resources were utilised by the aircraft maintenance learners in completing their online written assignments. Besides that, using thematic analysis in conjunction with social constructivism allowed the researchers to determine precisely the themes captured in the data. Additionally, since constructivism is a learner-centred approach, the goal is to create a meaningful learning environment that includes communication as well as collaboration. Thus, by using thematic analysis in this research, there is the possibility to link the themes with the data that has been gathered during the study. Moreover, it provided the researchers opportunity to analyse the role of the online resources in acquiring and utilising the technical terms in their assignments. Table 1 shows the phases of thematic analysis, with the sample data according to Braun and Clarke (2006).

In this study, the first step taken was reading the transcription of the data and it is seen as an interpretive act. The transcript needs to reflect the interview "true to its original nature" (Braun & Clarke, 2006, p. 88) After transcribing the verbal data, the researchers actively studied the transcripts to create first ideas about themes and patterns. From that, a first draft of the initial codes was created. A code stands for a piece of information within the data that is of interest to the research question. These codes represent very literal aspects of the data. The themes that are derived from them in the next step go deeper on an interpretive level. The different codes are put into a relationship with each other based on the underlying interpretation. The goal is to identify main themes with potential sub-themes. This is then reassessed to assess its validity in relation to the full data set. Once a satisfactory theme is created, the next step is to capture the core point of each theme. Lastly, all findings are put together to formulate the analysis findings and finally the precise answer to the research question.

Table 1. Phases of Thematic Analysis with sample data (Braun & Clarke, 2006)

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Familiarising with the data, focused on reading and re-reading the data, noting down initial ideas	Generating initial codes: coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code	Searching for themes, collating codes into potential themes, gathering all data relevant to each potential theme	Reviewing themes, checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis	Defining and naming themes, ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definition and names for each theme	Producing the report: the final opportunity for analysis. Selection of vivid, completing extract examples, final analysis of selected extracts, relating back of the analysis to the research questions and literature, producing a scholarly report of the analysis
- Watching Youtube videos was helpful. - Able to use online articles and write the correct technical terms in my essay (P4) - It is very easy to use blogs because I can read it at any time (P7) - I used e-books (P9) - I could learn the terms from some online articles (P10) - Video lectures were easy to understand (P14)	-Watching Youtube videos - Online articles - Blogs - E-books - Video lectures	Students used Information Communication Technology (ICT) applications	Specific use of ICT applications to assist in assignment writing	The use of specific ICT supported learning activities to write online assignments	- Watching Youtube videos was helpful. I was able to use online articles and write the correct technical terms in my essay. I also found it is very easy to use blogs because I can read it at any time - It is very easy to use blogs because I can read it at any time - I used e-books - I could learn the terms from some online articles - Video lectures were easy to understand Emerging theme: The use of specific ICT

All in all, there were two main themes identified in the interview transcripts. All of them revolve around how the online resources are utilised by the aircraft maintenance learners in completing their online assignments. From these initial code themes emerge, which are more directly related to the research question. Therefore, themes were created by the researchers by merging related codes into categories and interpreting underlying roots for codes.

Reliability and Validity of Data collected

The interview questions were validated by two English language lecturers from the university to ensure the clarity of the question in relation to the study (Joppe, 2000). A total of five (5) students from the March 2023 semester who took the aircraft maintenance course were interviewed as pilot study. Based on the pilot study, the questions were further enhanced.

Relying on a single method of verification will not effectively expound on the interwoven and shared phenomena; therefore, the researcher utilised one additional coder (a language lecturer) to ensure thoroughness of the method and trustworthy interpretation of data (Patton, 2002). Triangulation is a method utilised in qualitative research to ensure and maintain credibility of the data. Multiple data sources are used to yield comprehensive, powerful themes (Lincoln & Guba, 1985). Therefore, triangulation was implemented in this study using multiple methods including: (a) data coding, (b) taking notes, and (c) analysing data with an additional coder (Creswell, 2007; Patton, 2002).

Apart from that, another ethical issue that was addressed is the relationship between the researcher and the participants. As the research activity required the researcher to have a number of visits to the online classroom, the expectation was that he might get personally engaged with the research context, which included the participants of the research. According to Gay et al. (2009), it is good that the closeness between the two parties may bring about deep and rich data, yet it may also result in unintended influences on objectivity and data interpretation. To get this problem avoided, the researcher had to stay focused on the objectives of the research, besides practising epoche (Merriam, 2009) and reflexivity (Gay et al., 2009)

RESULTS

Research Question: How were the online resources utilised by the aircraft maintenance learners in completing their online written assignments?

In this section, the findings from the research question are presented. The results from the interview, student's assignments as well as the observations were analysed into the major theme of multimedia application and it was divided into two subcategories which are the use of specific ICT supported learning activities to write online assignments and online forums.

Multimedia Application

The use of specific ICT supported learning activities to write online assignments

First, the interview data showed that all the 14 students had learnt the technical terms through various types of multimedia, and they thought that it was an effective learning method. Some excerpts are reported as follows:

> I really love watching Youtube videos, so the technical terms are repeated over and over to the point that I memorise and am able to write the assignment. (P3)

> I think learning words from online articles 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, some reading, watching or listening, 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 Youtube videos to understand and use it for my assignment. (P6)

> Some aircraft maintenance journals are easy to understand and I apply it in my assignment. (P8)

The flexibility of the use of specific ICT supported learning activities to write online assignments has been widely recognised as one advantage in this study. The most important factor that contributed to participants' positive experience was the helpfulness of the online resources for them to gather information for their assignments. Thus, all the fourteen participants in this study emphasised the convenience they enjoyed from being able to use the online resources that are available to find materials for their assignment. Additionally, the learners could log in at any time when they are available to find resources. The learners had full control of when to study the required knowledge content by the instructor. It was considered as one remarkable advantage for the learners who do not need to depend on the instructor for information and clarifications.

Furthermore, when asked about how the participants figured out the meaning of the technical terms from the multimedia, some of the responses from the interviews are presented as follows:

> I use various methods in understanding the meanings of technical terms. The most common one is the online dictionary; such as, Dictionary of Aviation (2nd Edition), Encyclopedia of Technical Aviation, Aeronautics Dictionary, or even Aviation Glossary. (P1)

> I normally look up the meaning from available online dictionary websites. (P4)

P1 and P4 explained about e-dictionary as being a helpful factor in understanding the technical terms. One of the possible reasons is the ease of its use and the accessibility of e-dictionary which includes web search, thesaurus and translator. These helped the learners to recognise and identify the meaning of the technical terms and integrate the terms in their assignment.

During the online observations, it was found that participants 2, 7, 9, 10, 11, 12, 13 and 14 expressed their preference towards the use of multimedia applications; however, they were more inclined towards the utilisation of blogs, e-books, video lectures, peer-reviewed journals and webpages. P2 wrote the following text message in the Microsoft Teams (MS Teams) chat box to explain her perception of using blog to understand the term aileron:

> I still don't understand the meaning of aileron in that word or the content during the lecture. So I used an aircraft maintenance blog to help me understand the term. The person who wrote it was very clear with the meaning and how it works in an aircraft. I think this way I can understand better. (P2)

Having explained the above, P2 then starts presenting about the use of aileron in an aircraft and its reparation process to the class. The other participants responded and asked questions accordingly. P2 further emphasised to the class that the use of blog has assisted her to gain a better understanding of the topic and have used it to do a part of the assignment.

Participant 11 on the other hand suggested that the use of the online search engine was useful in providing extra materials for learning and for performing personal research. He asserted that it had increased his chances of writing the assignment better. The observation highlights the precise response that he provided about how implementing an online learning mode supported the process of conducting further research or engagement in extra-learning activities.

> If we Google EASA part 66 question banks, they have uploaded quite a lot on the web as well. You can find it online. I do get more resources online compared to going to university. Nowadays, everything can be found online. In the university, we will be bound to the contents and what is shown on slides. During online classes, we will discuss with our classmates, and everything is online and sometimes the instructor will show videos on YouTube and we can go and if we have any issue, we can screenshot and further research it online. (P11)

The classroom observations conducted support the interview findings on the use of specific ICT supported learning activities to write online assignments. The instructor used some of the online resources such as webpage, e-books, Youtube videos as a motivational tool to encourage students to be more aware of their writing. For instance, during one of the online lectures, the instructor stated:

> When you write next your next assignment, if you wish to get bonus mark when you submit your class exercise next week, watch Youtube videos, or aircraft maintenance web page on aileron and landing gear, and discuss with your friends before you start writing (Observation: Lecture week 5).

This was prevalent in the assignment, when P5 wrote the following in her essay on corrosion, in the beginning he did not know the meaning of corrosion, he mentioned in the interview:

> It was a challenge for me to understand the meaning of corrosion, then I surfed on the Internet and found the meaning of it.

However, after reading several web pages on aeronautics, he was able to integrate the correct technical terms and complete his assignment. Figure 1 shows participant five's assignment on corrosion, whereby the bold words are the terms he found from the online resources, especially from the American Institute of Aeronautics and Astronautics (http://www.aiaa.org/).

Topic: Corrosion

Corrosion is one of the most common phenomena that we observe in our daily lives. You've probably seen that over time, some iron objects become covered in an orange or reddish-brown coloured layer. This layer is formed as a result of a chemical reaction known as rusting, which is a type of corrosion. **Metal higher in reactivity** series such as iron and zinc corrodes when it reacts with another substance such as oxygen, hydrogen, electrical current or even dirt and bacteria. There are few types of corrosion normally found on aircraft. Firstly, uniform corrosion is the most common corrosion that occurs uniformly on a larger surface of a metal. Stress corrosion refers to the cracking of the metal as a result of the **corrosive environment** and the tensile stress placed on the metal. It often occurs at high temperatures. **Intergranular corrosion** occurs due to the presence of impurities in the grain boundaries that separate the grain formed during the **solidification** of the **metal alloy**. It can also occur through the depletion or enhancement of the alloy at grain boundaries. Finally, dissimilar metal corrosion occurs when different types of metals are into contact with electrolytes such as condensation, rainwater or other sources such as oil, dirt and airborne particles, it can produce an electrochemical reaction. Corrosions in metal are unavoidable but can be treated in an early stage to delay the **degradation of the metal**.

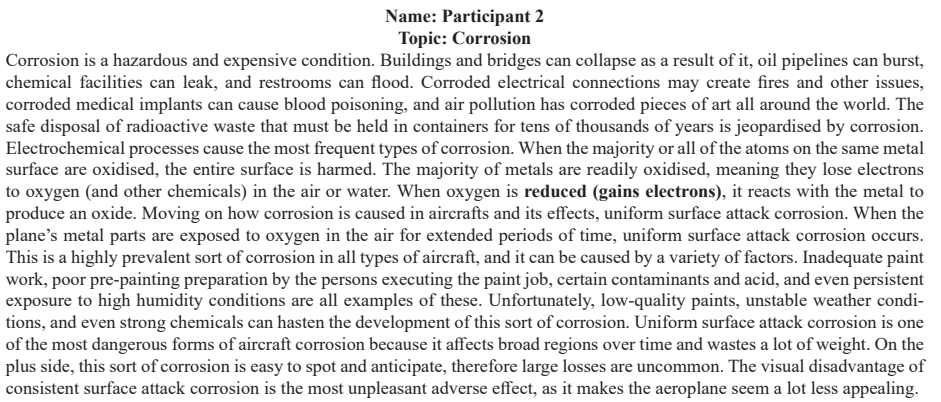
Figure. 1. P5 assignment on corrosion

Participant 5 suggested that the online learning mode, especially the use of the online search engine, was useful in providing extra materials for learning and for performing personal research. He asserted that it had increased his chances of acquiring technical terms better. The response from P5 highlights the precise response that he provided about how implementing an online learning mode supported the process of conducting further research or engagement in extra-learning activities.

> When I surf the Internet, I can find it online. I do get more resources online compared to going to the physical library. In the online class, I am bound to the contents and what is shown on slides. During online classes, we will discuss with our classmates, and everything is online and sometimes the instructor will show videos on YouTube

> and we can go and if we have any issue, we can screenshot and further research it online.

Similarly, during the interview, P2 indicated that surfing the internet for sources is one of the actions he took when in doubt. "I would refer to internet sources". Furthermore, the participant indicated that online learning has more resources that they could explore. "For online learning, we can explore more articles to see how they use the words correctly in a sentence". "I get more time to do that due to online learning". Figure 2 illustrates participant two's assignment on corrosion, which, according to the instructor, was written correctly. This is because the participant had watched some Youtube videos pertaining to corrosion prior to writing the assignment. Hence, the participant could correctly integrate the technical terms into his assignment.



Name: Participant 2
Topic: Corrosion

Corrosion is a hazardous and expensive condition. Buildings and bridges can collapse as a result of it, oil pipelines can burst, chemical facilities can leak, and restrooms can flood. Corroded electrical connections may create fires and other issues, corroded medical implants can cause blood poisoning, and air pollution has corroded pieces of art all around the world. The safe disposal of radioactive waste that must be held in containers for tens of thousands of years is jeopardised by corrosion. Electrochemical processes cause the most frequent types of corrosion. When the majority or all of the atoms on the same metal surface are oxidised, the entire surface is harmed. The majority of metals are readily oxidised, meaning they lose electrons to oxygen (and other chemicals) in the air or water. When oxygen is **reduced (gains electrons)**, it reacts with the metal to produce an oxide. Moving on how corrosion is caused in aircrafts and its effects, uniform surface attack corrosion. When the plane's metal parts are exposed to oxygen in the air for extended periods of time, uniform surface attack corrosion occurs. This is a highly prevalent sort of corrosion in all types of aircraft, and it can be caused by a variety of factors. Inadequate paint work, poor pre-painting preparation by the persons executing the paint job, certain contaminants and acid, and even persistent exposure to high humidity conditions are all examples of these. Unfortunately, low-quality paints, unstable weather conditions, and even strong chemicals can hasten the development of this sort of corrosion. Uniform surface attack corrosion is one of the most dangerous forms of aircraft corrosion because it affects broad regions over time and wastes a lot of weight. On the plus side, this sort of corrosion is easy to spot and anticipate, therefore large losses are uncommon. The visual disadvantage of consistent surface attack corrosion is the most unpleasant adverse effect, as it makes the aeroplane seem a lot less appealing.

Figure 2. P2 assignment on Corrosion

Like P11, P12 indicated that surfing the internet for sources is one of the actions he took when in doubt. "I would refer to internet sources". Furthermore, the participant indicated that online learning has more resources that they could explore. "For online learning, we can explore more articles to see how they use the words correctly in a sentence. I get more time to do that due to online learning".

> I do my personal research by going through the lessons, the journals, the videos, the articles written by the manufacturers themselves, like Boeing. I will use online and sometimes the university's library. For this assignment on corrosion, I surf through online to get more information. (P12)

Similar sentiment was held by P14. He specifically shared:

> I mainly get my sources from Google for the assignments. If online learning, then from lecturer's notes, I watch a lot of videos and do some research. I can search in Google if there are any parts that I don't know. In one click, I will get the answers to my question. (P14)

The participants indicated the benefits of online resources in writing their assignments as well as learning a new technical term of the aircraft parts can be done at their own pace and at a time of their convenience. The participants felt comfortable using the Internet such as Google, Firefox, MSN and Yahoo search engines, which can be easily and efficiently used to find the meaning of technical terms and how they function in an aircraft. The instructor, on the other hand, pointed out that the students needed to have more knowledge on technical terms, so she preferred using the resources that are available online as it provided more information for them to acquire and understand.

The utilisation of the internet was vital for aircraft maintenance learners and promoted independent learning that offered a rich selection of learning experiences. The students always searched for information on the internet when they did not understand the task. The relationship between internet usage and students' learning illustrated an essential role of their interaction that they preferred accessing the internet for their learning. The internet assisted students to be successful in their learning, so it is significant for students' learning and promoted self-learning to offer a rich selection of learning experiences. Information Technology in education was used by learners in their efforts to elucidate the challenges of educational effectiveness. The use of information technology and the internet had a positive impact on students' learning that earned them higher grades in their course. Therefore, the use of the internet was important for students' learning, and it also assisted them to learn new knowledge and find information that they wanted to learn.

Based on the observations, the participants' reactions to use of online search engines in developing their technical terms understanding and improving their writing were positive. They asserted that finding information about the technical terms as well as checking with the instructor had given them the motivation to write since it allowed them to grow as critical and evaluative thinkers. Participant 3 pointed out the following during the online group discussion:

> I always use Google even when the lecture is going on so that i know what the lecturer is mentioning about. For instance, when the lecturer was explaining about landing gear, i did not understand at first, but after going through the Google webpage, i was able to understand and also use it in the assignment. (P3)

Compared to the traditional writing in the classroom approach, they felt comfortable using the online resources to find information. The observations pointed out that the participants were inspired to write more actively and interactively using the online activities. This was because they could write freely without the interruption from the instructor and other friends. Most participants in the interview maintained that they could "effortlessly use the

online resources to find information" (P13) and that "the online resources were helpful in the assignment" (P10) and "the online resources significantly improved the essay writing style regarding the technical terms" (P8), and "could download required articles and pictures regarding the technical terms" (P9). Therefore, the online resources should be used as an important tool in improving students' understanding of the technical terms and improving their assignments.

The findings revealed that the use of specific ICT supported learning activities to write online assignments such as e-books, video lectures, reading e-books, online articles, slides, online text and documents, and blogs, and listening to podcasts were popular among the participants. The observations correlated with the interview findings and also the students' assignments, whereby the data illustrated that the online classes were conducted focused mainly on the use of online resources to complete the learners' assignment, and understanding the technical terms used in the aircraft maintenance courses.

Online forums

The findings pointed out that the discussion forums exposed the participants to a broader range of views compared to face-to-face discussions, allowing them to progress to a more complex perspective on technical terms (Prain & Lyons, 2000). Interview excerpts from the participants showed strong evidence of the use of online forums during the lesson in helping the participants to integrate technical terms. Based on Figure 8, P12 used the online forum to obtain information on Aircraft structural maintenance. The terms in bold indicate that the participants have used the technical terms appropriately in their assignment.

> The lecturer poses questions on the terms and how it functions. This helped me to understand the term better and how it is used. It is not confusing but at times I don't know whether it is right or wrong. (P12)

The findings showed that the use of online forums as a teaching and learning tool supports the process of writing and results in achieving better results in students' writing performance than the traditional method does. It is believed that the improvement of the students' writing skills may be attributed to the utilisation of the online forums which provided the participants with the opportunity to have extensive practice in writing where they could write, post topics, add texts, images and audio and video scripts, provide relevant links, interact with the instructor and peers by making comments or entries, and reply to posts by other forum members. Such benefits were clear and by participating in online forums, access to information is free and the forum members could willingly share their wealth of knowledge and experience with other members. In particular, the most significant characteristic of the online discussions in the process of writing was that it also provided the learners with a written record of other learners' ideas. In the forum, other learners' ideas were public and visible, and, as such, available for being taken up, challenged, and used by the participants to refine and further develop their arguments and opinions in their essays.

Considering this, online forum discussions became powerful supports or "scaffolds" for the development of academic literacy in the context of the writing class.

DISCUSSION

The study indicated that the acquisition of technical terms using the online learning resources in the aircraft maintenance course assisted the participants in improving their information, knowledge, and interactions and the technical terms acquisition processes were enhanced. The participants in this study utilised both ICT supported learning activities and online forums to write online assignments. The instructor provided opportunities for the learners to find information for their assignment as a way to improve their technical terms acquisition. The learners obtain information through blogs, e-dictionaries, video lectures, peer-reviewed journals, Youtube videos, aircraft maintenance-related web pages and search engines which allowed them to consciously and intentionally (Barcroft, 2016; Schmitt, 2000) acquire and utilise new technical terms as they write.

In this study, to acquire and utilise new technical terms and obtain information using the online resources, the student-centred learning approach was used by the learners. According to Vygotsky (1978), a learner's knowledge is developed internally and externally. Therefore, the learner's active participation and understanding the information provided through the online resources had an impact in their report writing assignment. Furthermore, the instructor played a key role to assist learners to search for information or notes by guiding them through the relevant online resources. This is in line with the social constructivism theory since learning is mediated by social interaction and this happens when someone with more knowledge assists the learner to progress (Hutchison & Colwell, 2015).

Based on the findings, the use of online resources improved the learners' technical terms retention during the lesson. Apart from the use of online resources, interactive games also could assist learners in acquiring technical terms for their report writing. The researchers suggest that with the current trend in gaming simulations using handheld devices, learners could engage in online gaming applications available on Google Play Store and Apple App Store such as Airplane Mechanic Workshop, Airlines Manager Tycoon 2023, and Airline Technician to name a few. These online gaming applications start with a few tutorials in the English language that go over the simulation processes of servicing, repair, modification, overhaul, and inspection of an aircraft to determine its airworthiness. Online gaming applications that use simulations have been used mostly to improve acquisition and performance to learn English language skills (Elaish et al., 2017) and many studies have shown that they have obtained good results (Zarzycka-Piskorz, 2016; Hsu et al., 2017; Tao et al., 2010). Amin (2019) points out that dimensions that focus on the availability of graphics, video, audio, and text found in online resources enable the learners to use the technical terms effectively in their reports and this contributes to learning goals. In this study, the learners are the decision makers and are given full responsibility to decide how they will utilise the online resources to understand and integrate the technical terms into

their reports. It also provides the freedom to each learner to decide what learning outcome they would personally like to derive out of the online resources to understand the technical terms.

Findings from this study indicate that the aircraft maintenance course should be based on constructivism since it is essential to the success of acquiring technical terms using online resources. Social constructivism and the integration of technology offer real promise for the improvement in the achievement of the subject matter (Lunenberg, 1998). Lunenburg and Ornstein (1996) argue that constructivism and technology might be the key to educational reform (cited in Lunenberg, 1998). Furthermore, the social constructivism approach allows active learning to take place as it facilitates collaboration among learners and the instructor. For example, collaborative learning activities in this study using online resources helped engage students' participation, interaction, and working together with the instructor and their peers towards understanding the technical terms and writing their reports. This increases the level of satisfaction and feelings of connection among the aircraft maintenance learners. These activities, such as the use of webpage, blogs, e-dictionaries and YouTube videos can be seen as a tool in promoting the acquisition of technical terms through the use of technology in the online classroom. Similarly, the learning environment encourages learners' responsibility for learning and this bodes well with the social constructivist approach since collaboration provides an opportunity for learners to clarify and refine their understanding of concepts through discussion and rehearsal with their instructor and peers (Zhan, 2008).

It can be mentioned that online forums are effective learning materials that can be used in the online learning environments. In this context, learning can be achieved in online forums where instructors support social relations between learners by guiding them. Similar to this result, Chau and Xu (2012) stated that online forums are a significant tool for effective learning in the online learning environments. In addition, online forums provide asynchronous learning, and it is a suitable tool for learners to learn at their own pace. In this context, So (2009) emphasised that discussion forums allow learners more time to reflect on their own ideas and respond to their peers in the learning process. For learners who are not confident in participating in the physical classroom setting, uncertain how to voice their ideas verbally, or do not have sufficient time to contribute to the class discussion, the online forum may provide a safe entry point for them to convey themselves in a more organised manner. When online forum inputs are related to class lectures, class assignments, and class management, online forums could be an alternative tool for discussion or sharing for them to participate and to be engaged in a more constructive learning process (Porter. 2004).

Vygotsky (1978) emphasises that learning occurs within a social context, and that collaboration between learners and their peers is a significant part of the learning process. The Zone of Proximal Development (ZPD) is defined as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or

in collaboration with more capable peers. The online forum in this study serves as a zone where the instructor moderates the online discussion efficiently. It also serves as a zone for the learners to practise their language proficiency and acquire language input as well as content knowledge. Another benefit is that they contribute or post correct information in terms of content during the online forum. Hence, the language acquisition process is not limited within the physical classroom setting but may continue in an online setting. With the advancement of Information Communication and Technology (ICT), the ZPD for learners can even be extended and explored further during the learning process. Therefore, if ICT is integrated appropriately in the course, learners may be able to go beyond the prescribed learning zone.

CONCLUSION

The acquisition of technical terms for report writing using the online resources is perceived positively by the aircraft maintenance learners in language learning and language acquisition. It implies that aircraft maintenance instructors should give the learners the freedom to use online platforms such as aircraft maintenance webpages, blogs, e-dictionaries and YouTube videos which are perceived as useful tools in promoting the acquisition of technical terms. Additionally, the instructors could utilise online forums in their lessons to encourage peer assessment and learner-centred learning. It can be mentioned that besides face-to-face interactions, online resources can serve as a platform for a more dynamic learning process if optimally used. In conclusion, it is pivotal to note that online resources can have a positive effect on the acquisition for aircraft maintenance learners. The learning institutions, workforce and world have high expectations of aircraft maintenance learners to be literate members of the aviation society. In order to be successful, aircraft maintenance learners need focused, intensive instruction in technical terms acquisition skills, as well as instruction on how to correctly and effectively use technological tools to facilitate and encourage language development. And finally, the ultimate success of the online resources as part of a course depends on how it is integrated into the course design, and simply introducing a new tool in the programme does not necessarily warrant positive outcomes, and it holds true with any new tool or technology. The role of the instructors in guiding and facilitating learning goes hand in hand with technology.

As the study participants belonged to the aircraft maintenance course from a private university, therefore the findings are only applicable to similar contexts. For generalisability, a survey based on our findings should be conducted across other professional courses such as medicine, pharmacy, dentistry, and law. Despite the limitations, the findings offer an understanding of the advantages and recommendations for improvement in the use of online resources for effective learning.

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APPENDIX

Student Interview Question

1. How would you describe acquiring technical terms using the online resources?
2. Was it difficult to learn technical words online using the online resources? Why or why not?
3. Did you complete all the online assignments? Why or why not?
4. Was the online resources helpful? Why or why not?
5. What did you like the most about acquiring the technical terms using the online resources?
6. What did you like the least about online resources?
7. Do you feel the online resources have any disadvantages for the students? Why?
8. If you could suggest changes to the online resources, what would you suggest?
9. Could you have learnt the technical terms without using the online resources?
10. What were the steps you took if you did not understand the technical terms?
11. Explain how online learning resources helped to improve your technical terms proficiency when writing the report?
12. How did you know that you are using the correct technical term in the assignment?
13. Did the discussion/group activities help you in acquiring the technical terms?
14. Based on your experience, what are the most important problems that hinder the students' acquisition of technical terms in the language classroom?