

ENGLISH LANGUAGE PROFICIENCY AMONG AVIATION MAINTENANCE PERSONNEL IN MALAYSIA

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Abstract: The occurrence of various aviation maintenance incidents in Malaysia has been linked to the decline in English language competency among local aviation maintenance personnel. In view of this, an online survey has been conducted among 38 maintenance personnel in Malaysia to establish the level of use and importance of English language while performing their tasks. It is inferred that most essential activities involved in performing the aviation maintenance tasks substantially require the use of English language. Overall, the findings indicate that English language proficiency is highly necessary for aviation maintenance personnel to be competent in their job. English language is highly applied in the execution of local aviation maintenance tasks such as for communication, manuals reading and report writing. In essence, the findings greatly support the enforcement of the additional English language requirements by the local authority for aviation maintenance personnel in Malaysia.

Keywords: English language; language competency; aviation maintenance; survey; CAAM

1. Introduction

Safety consideration is always a paramount factor in the aviation sector, especially for the airlines industry. To date, substantial efforts are made to warrant proper safety level for aircraft operators and passengers such as through the improvement of aircraft designs that lowers potential risk of mechanical system failures and pilot errors [1]. Moreover, maintenance is also one of the primary aspects in ensuring continuous aviation safety and providing reliable services for air transportation [2]. The importance of good aviation maintenance practices to flight safety is well documented in several studies. For instances, aircraft maintenance has been indicated as one of the major causes or contributing factors in aircraft accidents [3] and positive influence of good maintenance practices on the aircraft safety has been widely acknowledged [4]. In general, aircraft maintenance tasks can be classified as scheduled or unscheduled types. Scheduled maintenance is essentially a preventive form of maintenance to maintain the aircraft's airworthiness to fly as specified by the aviation regulations. It is conducted at pre-set intervals based on total flight hours that the aircraft has been operated. On contrary, unscheduled maintenance tasks are those required when there have been any failed or damaged components that need to be immediately repaired or replaced before the aircraft can be flown again. It should be noted that maintenance tasks have also been classified as preventive, corrective and also condition-based, among others [5].

All aviation maintenance tasks can only be carried out by certified aircraft maintenance technicians (AMTs). To be qualified and licensed to work in aviation maintenance industry, AMTs are required to undertake rigorous trainings that are specified by aviation authorities [6]. These trainings are prescribed to ensure that all certified AMTs have necessary skills and competencies to perform any maintenance

tasks on the aircraft. Despite this highly regulated certification process of AMTs however, it is observed that there are still occurrences of incidents related to maintenance errors. In between years 2005 and 2015, 14% to 21% of helicopter accidents among the US civil fleets are caused by flawed maintenance and inspection [7]. Moreover, almost 60% of the aircraft mishaps caused by maintenance-related issues have been linked to human errors [8]. This is supported by the findings of a research study that found AMTs regularly committed unintentional errors while performing aircraft maintenance tasks [9]. It is thus not surprising that a crucial effort towards the enhancement of safety and reliability of commercial aviation system is managing the human errors, especially among aviation maintenance personnel [10]. The cases of human errors in aircraft maintenance have shown to cause damage to the aircraft system, departure delay, urgent emergency repair, flight cancellation and/or injury to crew and passengers [11]. In worst case scenario, it could lead to loss of lives whereby it has been found that maintenance-related accidents are about 6.5 times more likely to be fatal in comparison to other types of general aviation accidents and when it does happen, the average number of fatalities is also relatively 3.6 times higher [1]. It should be noted that the issue of managing human errors is also common in the other industries such as manufacturing [12].

To ease this situation, many conducted research studies are focused on establishing the probable causes of human errors in aviation maintenance. In this respect, some of the factors that are identified include human fatigue, incorrect use of maintenance procedure, inadequate knowledge and experience to effectively carry out maintenance tasks, and also improper housekeeping and tools control [13]. Apart of the competency issues of AMTs, several studies have also highlighted possible causal factors of the human errors in the maintenance at organization level that include issues with communication [14] and implementation of the maintenance management system [15]. In the hindsight, this is parallel with the two classifications of factors for the aviation maintenance error: individual- and management- related [16]. While the causes related to skills and competencies of AMTs can be addressed through improved enforcement and delivery of the compulsory training session before they are licensed to work, the issues with miscommunication and maintenance mismanagement require a deeper analysis on the underlying root sources. Due to complexity and extensive nature of maintenance tasks, margins of communication and also coordination in performing aviation maintenance are highly critical and it is usually hard to maintain necessary levels of effective and efficient communication, and good team collaboration [17]. There have been efforts to resolve management-related contributing factors towards human errors in aviation maintenance, including development of assisting tools such as online maintenance assistance platform [18] and also framework process for aviation maintenance monitoring [19]. Despite the efforts and proposed solutions however, incidents of aviation maintenance error continue to occur.

In recent years, there are emerging interests in studying the effects of English language competency level of AMTs on their job performance. Language incompetency usually causes miscommunications and incorrect task executions, and this situation has been well-acknowledged across various industries including manufacturing [20] and construction [21]. For local aviation maintenance industry in Malaysia, emphasis on sufficient English language competency among local AMTs has garnered a high attention after local aviation authority, Civil Aviation Authority Malaysia (CAAM) formally imposed additional English language requisites for licensing purposes of aviation maintenance workers in Malaysia. This rule is enforced by CAAM as a part of their major effort to reduce the number of aviation maintenance incidents in Malaysia due to misinterpretation of Aircraft Maintenance Manual and misunderstanding of shift report, which have been subsequently linked to perceived decline in level of English language proficiency among local AMTs [22]. An overview of incidents related to the local aviation maintenance in Malaysia that can be linked to English language proficiency is presented in Ref. [23]. In line with this new policy development, there is emerging interest to establish the real need and importance of English language for local AMTs in enabling them to effectively perform their aviation maintenance tasks. This is the objective of this study that is accomplished by surveying several aviation maintenance personnel in Malaysia.

2. English Language in Aviation

Similar to the other multi-national industries, it is clear that English language is also widely used in the aviation industry. English is generally viewed as the official language for the civil aviation worldwide, particularly since many essential manuals and documents are written in this language [24]. Additionally, English is remarked as the formal language of international aviation communications [25]. With wide application throughout the industry, it is anticipated that all personnel working in aviation possess the proper level of English language proficiency to effectively perform their designated tasks. An exemplary case that is often used to highlight the necessity of English language competency in aviation is the oral communication between pilots and air traffic controllers. Since the pilots and air traffic controllers in different localities around the world have varieties of “Englishes” that differ based on their proficiency levels and local influences, this situation has caused serious and fatal accidents over the years [26]. Such variety of highly accented English could lead to problems of intelligibility and comprehensibility [27]. Due to its high consequences to the overall operational aviation safety, this situation has spawned many researches and new regulations that ensure miscommunication over use of English language between pilots and air traffic controllers can be effectively avoided. Since 2008, it is compulsory for both pilots and air traffic controllers to acquire certification of the English language proficiency as commanded by International Civil Aviation Organization (ICAO) [28]. In addition to the regulations, there have been research efforts to reduce potential effects of English language barrier in aviation operation, including the development of aviation language standards and a better language training and testing for aviation personnel. It is recommended that pilots and air traffic controllers to strictly use only standard aviation phraseology and avoid plain English while communicating [29].

Although the focus on aviation English language thus far is largely emphasized on effectiveness of radiotelephony communications between the pilots and air traffic controllers, there is also an emerging concern on English language proficiency of aviation maintenance personnel. This issue attracts a serious attention in light of the rising numbers of aviation incidents that have been associated with incorrect and improper execution of the maintenance tasks. For instances, there were 112 cases of accidents and serious incidents between years 2003 to 2017 that are contributed to aviation maintenance errors [30]. While this can still be considered as low, these maintenance-related accidents or incidents regularly incur notably high operational and repair costs due to inflicted damages to the aircraft, not to mention that they are more likely to involve fatalities than the other types of aviation accidents or incidents [31]. In view of that, reducing and preventing errors during aircraft maintenance is acknowledged as crucial to ensure the integrity of aviation safety system remains intact. According to some studies on the aviation maintenance errors, human error has been identified as one of the largest contributors for improper maintenance events, which could be linked to factors like miscommunication and misinterpretation of maintenance instructions. This means that many committed maintenance errors might not be fully due to lack of theoretical or technical skills of the personnel to perform the tasks but they could be attributed to other reasons including language barriers. It is noted that most incidences of miscommunications in aircraft maintenance organizations, which often further led to accidents, haste and misunderstanding of maintenance procedures, often involved non-native English speakers with problems to converse or fully comprehend documents in the English language [32]. Since aviation maintenance manuals are all prepared in English, though they are essentially written in simplified English to avoid misunderstanding or miscomprehension of instructions, this situation should be taken as a critical issue that negatively affects the aviation industry. After all, due to high risk of aviation operations, the execution of aviation maintenance tasks requires strict adherence to the manual instructions. In other words, the outlined procedures in the maintenance manuals should be exactly followed while performing maintenance tasks and the provided instruction comprehensively cover warnings and cautions up to actions after the task is completed [33]. On the whole, such working circumstances have prompted the impression that all maintenance personnel should have appropriate English language competency level to effectively work

within the aircraft maintenance field, in addition to theoretical knowledge and practical skills that are gained from their rigorous trainings.

At present, ICAO holds primary responsibility to set the minimum necessary standard of English language ability and the related certification tests for international aviation communities [34]. However, the current enforced rule of the English language requirement is only applicable for pilots and air traffic controllers. Although there have been calls for the requirement to be also prescribed for maintenance personnel, there is still no standard regulation in place for international use. In Malaysia, amid concerns on increasing local case reports, CAAM as local aviation authority took proactive action to introduce the additional English language requirements for all maintenance personnel working in the local aviation industry. This is due to the general impression that English language competency of the local AMT's is in decline. Prior to this new rule, proficiency level in English language is also required for the issuance of basic aviation maintenance license and workplace, but no clear outline is given on specific evidence or proof that has to be provided to indicate the fulfillment of required attainment level. On contrary, under the new rule by CAAM, requirements for English proficiency level in the implementation manual of ICAO Language Doc 9835 are adopted and extended for certification of local aviation maintenance personnel. This means that, while ICAO does not impose any formal requirement of English language proficiency level, CAAM effectively requires all aircraft maintenance personnel in Malaysia to acquire proper English Language Proficiency certification for their licensing.

In general, the introduction of this additional English proficiency requirement for the local AMT's in Malaysia is justified and supported if it can be shown that English language is predominantly used and compulsory for them to effectively perform aviation maintenance tasks such that lack of English language competency can hinder their job performance. To establish this, a survey is conducted among local aviation maintenance personnel in several companies in Malaysia. The survey findings are analyzed to establish the relevancy and also necessity of this added English language requirement by CAAM.

3. Methodology

Survey method is a well-accepted means to acquire an insight or establish the perception of public or targeted groups of people with regards to specific issues of interest. Specifically, for aviation fields, some exemplary usage of the survey method can be observed for development of new aircraft design concepts [35] and evaluation of impact of aircraft subsystem functional designs and operations [36]. For this study, an online survey is conducted among the aviation maintenance personnel in Malaysia to collect the data for analysis. The survey is publicly made available on the Google Forms platform for a month, which is throughout the entire month of June 2020. Invitation to the target survey participants are sent through various social media outlets such as email, WhatsApp and also Facebook. The applied survey instrument is tailored to the objective of this study and is prepared using simple English language in order to avoid misunderstanding of the questions for non-native English speaking participants. In addition, following the standard procedure for preparing the survey instrument, an initial test run with a small group of people has been conducted to ensure that all questions are correctly worded and easy to understand. This is a very crucial step to ensure the correct answers are being extracted from survey participants. Overall, the questions are designed to establish the level of usage and importance of the English language in local aviation maintenance workplace and the difficulties in performing aviation maintenance tasks due to English language incompetency.

In general, there are three major sections of the survey questionnaire. The first section is designated to establish survey participants' background profile including gender, age, native speaking language, work experiences in local aviation maintenance industry and also qualification level of English language. Meanwhile, the second section aims to analyze the current level of English language usage among local

aviation maintenance personnel in their workplace. In this section, the typical maintenance activities or tasks have been listed and the survey respondents are asked to rate their frequency of occurrence and importance of proper English language proficiency to execute them. Furthermore, in the third section of the questionnaire, possible difficulties in performing aviation maintenance task when the personnel do not have proper English language competency level are identified. In the final part before the survey is concluded, respondents are enquired to give their opinion regarding the new added English language requirements by CAAM and their general perception of English proficiency level among maintenance personnel in their workplace.

All in all, the total number of respondents in this conducted survey study is 38 and they all currently work as maintenance personnel in few local aviation companies. While the number of the respondents is rather low to represent the entire population of local aviation maintenance workers in Malaysia, it is taken to be adequate for this exploratory study. Of the total respondents, only four of them are female and this small number is consistent with the observed situation in the local aviation industry, where the aviation maintenance personnel are predominantly males. The overall average of the respondents' age is around 33 years old and their average work experience in the local aviation maintenance industry is around 6.4 years. Among the highest positions that have been held (or are currently being held) by the respondents during their career in local aviation maintenance industry ranges from junior technician up to lead engineer. It should be noted the respondents are all non-native English speakers but most of them passed the standard Malaysian University English Test (MUET) or international English language tests such as IELTS. In fact, several of them also possess the international aviation English language competency certification. All things considered, it is concluded that the pool of survey participants is greatly relevant to this study. Their diverse background and level of work experiences in local aviation maintenance industry could provide a more rounded view for the topic of interest and ensure that the collected data is accurately reflective of the actual current situation in the industry. Table 1 presents the summary of the respondents' background details.

Table 1: Background details of survey respondents

Characteristics		Respondents %
Gender	Male	89.5
	Female	10.5
Age	< 30 years old	31.6
	30 to 40 years old	57.9
	> 40 years old	10.5
Years in Aviation Maintenance	< 5 years	39.5
	5 to 10 years	50.0
	> 10 years	10.5
Highest English Language Certification	Professional Aviation	10.5
	International Test	15.8
	Malaysia National Test	34.2
	Lower Qualification	39.5

The respondents have also been asked to rate their own perceived level of English language ability. Based on the responses, they all rated their speaking, writing, reading and listening skills to be at average level or above. This is a good situation as it assures a very low possibility that they had difficulties or misunderstood any of survey questions while completing the questionnaire. The overall responses from

survey participants regarding assessment of their own English language competency are presented in Figure 1. It is observed that the skills that have been rated as average by most of them are speaking and writing, which are the general capabilities necessary to effectively communicate instruction, report and idea for maintenance tasks. Without these skills, it could be difficult to properly communicate among colleagues or subordinates, and this increases the level of possibility for miscommunications. Moreover, the perceived English language competency of their co-workers in the local aviation industry have been rated by 87% of survey respondents to be at necessary level to effectively perform aviation maintenance task. It should nevertheless be noted that four respondents thought that the English proficiency among their work colleagues is lower than the expected or required level. This is taken to imply that there are cases of local aviation maintenance personnel who possess inadequate English language capability and this condition has hindered their job performance.



Figure 1: Respondents' rating of their own English competency

As previously mentioned, the survey instrument used in this study essentially contains two major sections that are designed to establish the level of English language usage by maintenance personnel in the local aviation companies while they perform their maintenance tasks and the importance of having good competency in English language to properly conduct their maintenance task. The responses of survey respondents for these two sections are presented and discussed in the following section.

4. Results and Discussion

Several typical activities that have been identified while performing the aviation maintenance tasks are listed in the survey questionnaire and the respondents are asked to rate their typical level of English language usage for each of these activities. Figure 2 summarizes the responses on the use of English in common communication activities in their organization. It is noted that only 50% of them implied that English is "often" or "very often" used in the oral communications with their superiors or subordinates. Meanwhile, 42% of them answered "neutral" and there are three respondents who actually "rarely" or "very rarely" use English language in their oral communications with their superiors or subordinates. A similar response situation is also found for communications with colleagues, where only 50% of the respondents stated they used English language to speak and interact with their co-workers. Close to 24% of them "rarely" or "very rarely" talked to their co-workers in English while the other remaining respondents were "neutral". However, as could be implied from the obtained responses regarding the language used in discussion and meetings, it shows that English language is very much used with the positive response from 79% of the respondents. In fact, out of all respondents, only one indicated that discussion and meetings at his organization were rarely conducted in English language, which may be

an outlier case. On the whole, it is concluded that English language has been customarily used in most of formal communications in the local aviation maintenance companies, although there appears to be a notable preference to communicate in the native mother tongue language among the local non-native English speaking personnel. The latter situation is predictable and hardly surprising as it is aligned with findings from many studies on native language as the favored communication language for most people throughout the world [37].

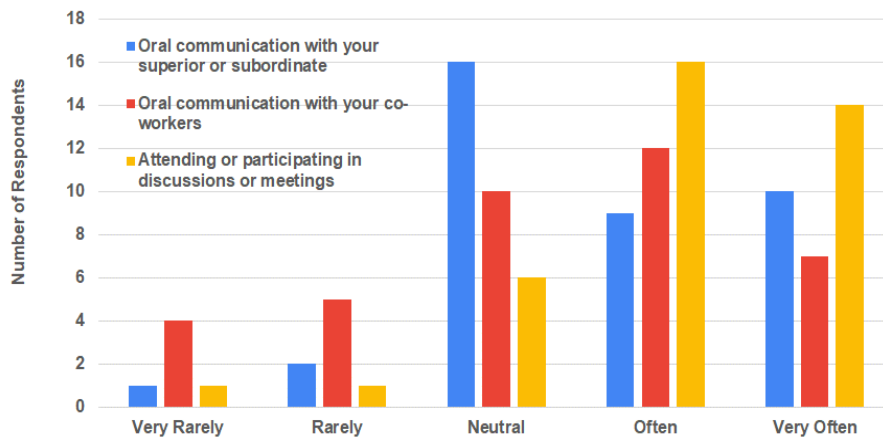


Figure 2: English language use for communication among aviation maintenance personnel

In the meantime, the respondents are also asked to rate the level of English usage in several direct activities while performing their aviation maintenance task. It can be observed in Figure 3 that English language is heavily used for these activities as the given ratings are evidently biased towards “often” and “very often”. Unlike the formal (or informal) interaction and communication with their co-workers and work colleagues where they have the choice to use native mother tongue language, aviation maintenance personnel are “forced” to use English language here since almost all aviation maintenance documents such as reports and manuals are written in English. Moreover, they are also anticipated to prepare the reports or notes in English language for the maintenance work due to the global nature of the industry. In line with this notion, the skewed responses towards a high use of English language for the considered maintenance activities here is not surprising. In addition, it is observed from Figure 3 that about 95% of respondents indicated that they have to apply the English language to read aircraft manuals, memos, letters, notices and other maintenance documents for instructions in order to perform their assigned task at hand, and to prepare written maintenance reports, logbooks and other necessary documentations upon completion of their work. However, it is noted there are few “very rarely” and “rarely” responses, which indicates other languages other than English is used when they are giving and/or receiving work instructions to/from others. This can be linked to the previous inference on the preference to use native mother language in communication with other non-native English speaking co-workers and colleagues.

Moreover, there are also questions in the survey that are designed to establish the importance of English language in performing aviation maintenance tasks. In this case, the respondents were asked to answer the questions based on their perception and work experiences. Figure 4 portrays the responses regarding the importance in having appropriate English proficiency level to effectively perform aviation maintenance tasks. The respondents’ perception regarding the importance of adequate English language competency level is highly consistent with their response on English language use while performing the aviation maintenance tasks. This observed agreement acts as good support for accuracy of the findings. Almost all common activities are perceived to entail proper English language proficiency to be properly conducted. Only exception is communication activities, whereby there are still notable numbers of “not

important” and “neutral” responses. Again, this is very much in parallel with the previous findings on the preferred use of native mother tongue language while communicating with other non-native English speaking personnel in either personal capacity or work-related communication. When responding to the query on the imposed additional English language rules by CAAM, they unanimously agree to it with half of them marked “strongly agree”. This reflects the perceived importance of having a proper English language competency among local aviation maintenance personnel to effectively perform their tasks from the viewpoint of the respondents.

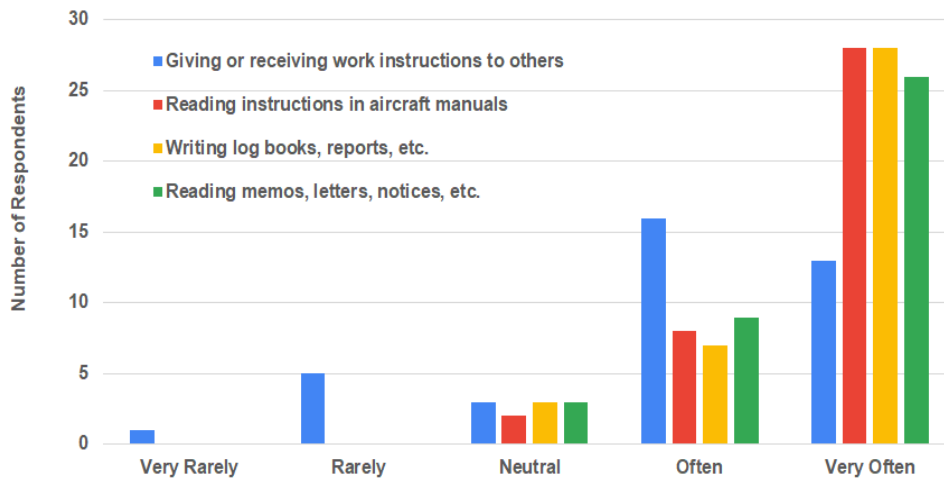


Figure 3: English language use in essential activities while performing aviation maintenance tasks

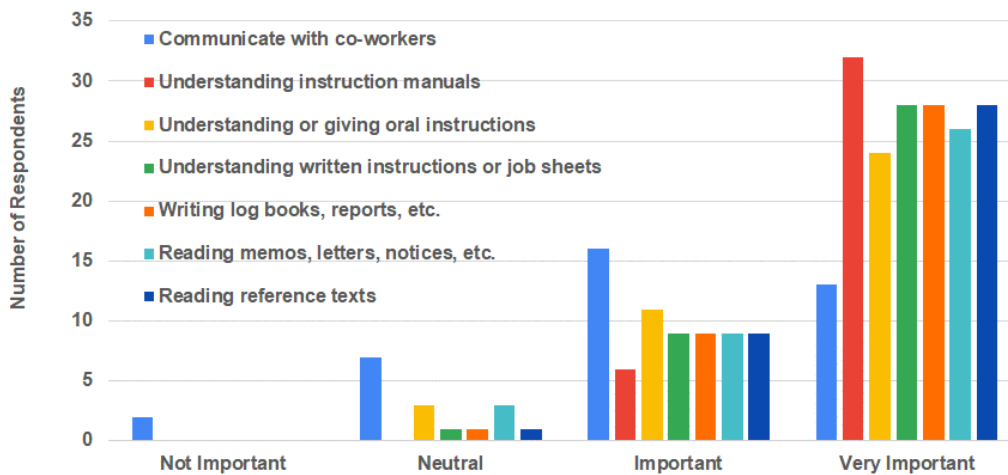


Figure 4: Importance of English language proficiency to effectively perform aviation maintenance tasks

On the other hand, the frequency of occurrence for types of typical difficulties or mistakes when performing aviation maintenance tasks due to lack of the English language proficiency as experienced or observed by the respondents throughout their working experience is depicted in Figure 5. While the occurrence of all difficulties and errors has been rated as either “rarely” or “very rarely” by almost 50% of them, it is still alarming to note that they still regularly happened as reflected by the “sometimes”, “often” and “very often” responses from other 50% of the respondents. This finding corroborates the assertion of CAAM that aviation maintenance errors related to lack of appropriate English language

proficiency still regularly happen among local aviation maintenance personnel in Malaysia. When asked on whether they faced similar difficulties or made similar errors as those listed in Figure 5, occurrence frequency for each of them is rated with “sometimes”, “often” and “very often” by about 30% of the respondents. Once again, this implies that such events do regularly happen in local aviation maintenance industry, which tallies with previous inference made from Figure 5.

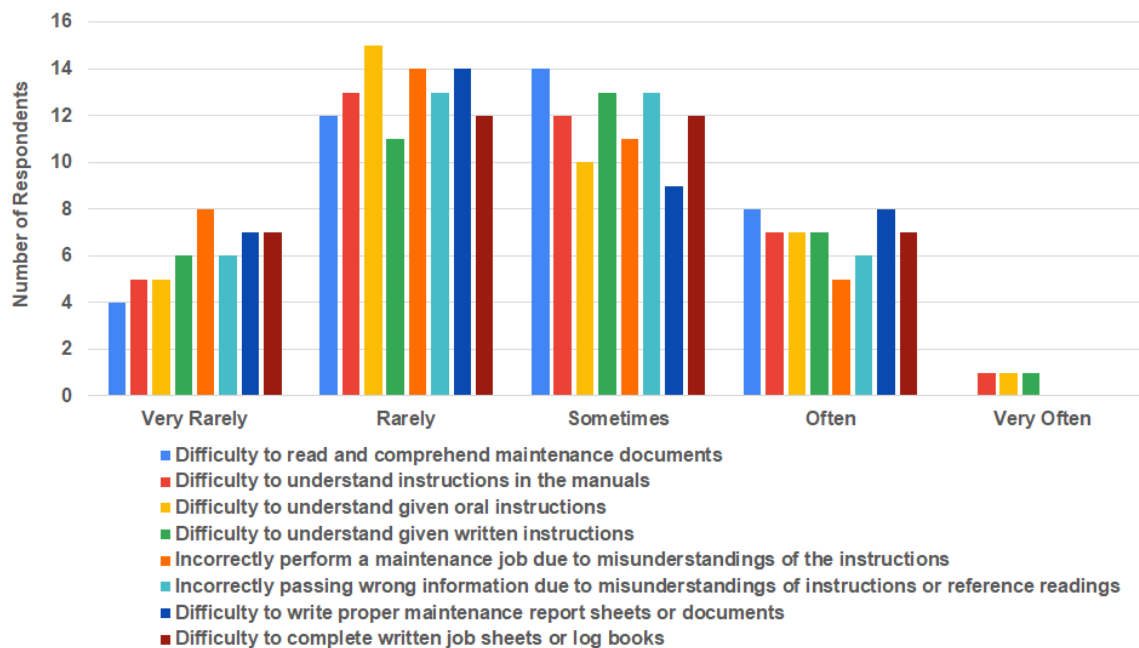


Figure 5: Frequency of observed difficulties in performing aviation maintenance tasks without English language proficiency

In hindsight, referring back to level of English language certification of the respondents in previous Table 1, it can be deduced that the percentage of the respondents who had difficulties or made errors while performing maintenance task is closely similar to percentage of them with lower English language certification. Hence, it seems that there exists connection between English language certification (which reflect on level of proficiency) and effectiveness of aviation maintenance personnel in performing their task.

5. Conclusion

An online public survey has been conducted among the local aviation maintenance personnel in Malaysia, which is aimed to establish the level of usage of English language and importance of proper English language proficiency in performing effective aviation maintenance tasks. Based on the collected responses, it is inferred that most essential activities involved in performing the aviation maintenance tasks substantially require the use of English language. However, there appears to be notable preference in using native mother tongue language for communication among the aviation maintenance personnel, either in personal or work-related communications. Meanwhile, importance of having appropriate level of English language competency to enable an effective execution of the aviation maintenance tasks has been reflected by the survey responses. Common essential tasks to perform aviation maintenance tasks have been rated with high importance of English proficiency, with only exception is for communication activities that can be linked back to the inference on the preference in using their native mother tongue language when communicating among non-native English speaking aviation maintenance personnel. Based on the responses on task difficulties and committed errors due to the lack of English language

competency among local aviation maintenance personnel, it appears that their occurrences are regular and this should be seen as an alarming situation. On the whole, it is concluded that the English language is highly used in the execution of local aviation maintenance tasks and it is important for all local aviation maintenance personnel to acquire appropriate proficiency level of the English language to perform their tasks effectively. The findings of this study are evidently in good support for the action by CAAM to impose additional English language competency requirement to local aviation maintenance personnel in Malaysia.

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