

THE CHALLENGES IN LEARNING ICAO RADIOTELEPHONY: STUDENTS' PERSPECTIVE

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Abstract: This study examines the critical challenges faced by Batch 13 Air Traffic Control (ATC) students at Politeknik Penerbangan Surabaya in mastering standardized ICAO Radiotelephony skills—skills that are vital for ensuring safety and efficiency in global aviation. Using qualitative methods such as interviews, observations, and document analysis, the research uncovers significant barriers, including linguistic complexities and difficulties in practical application. Key challenges involve limited English proficiency, accent variations, and the struggle to apply phraseologies accurately in real-world scenarios. These issues pose risks to clear communication, which is essential for preventing misunderstandings and ensuring operational safety. The study underscores the urgent need for continuous practice, peer collaboration, and interactive pedagogy to build the necessary competencies. By offering fresh insights for aviation education, this research advocates for tailored learning approaches to address diverse student needs. It calls for the creation of an inclusive, adaptable training environment that ensures students effectively master ICAO Radiotelephony skills, which are critical to global air safety.

Keywords: ICAO Radiotelephony, student perspective, pedagogical strategies, register

Introduction

In aviation, clear and standardized communication is essential for maintaining safety and operational efficiency. Radiotelephony, standardized by the International Civil Aviation Organization (ICAO), forms the foundation of this communication, ensuring seamless coordination between pilots and air traffic controllers (ATCs) (Chi *et al.*, 2023). Effective communication in aviation prevents misunderstandings that could lead to accidents, delays, and operational inefficiencies (Friginal, Mathews and Roberts, 2019). When communication breaks down, it poses serious risks to the safety of flights, passengers, and crew members. In this high-stakes environment, even small errors in communication can have catastrophic consequences (Krejčíková, 2019).

Several factors can hinder or support the effectiveness of communication in aviation. Language proficiency, clarity of phraseology, and cultural differences are key elements that influence how well pilots and controllers understand each other. Other supportive factors include the use of standardized protocols and continuous training, which reinforce consistency and reduce ambiguity. On the other hand, factors like stress, fatigue, and non-standard phraseology can hinder communication, increasing the risk of miscommunication (Clark, 2020).

Radiotelephony, as governed by ICAO, provides a framework to ensure communication remains standardized and universally understood, regardless of the native languages of the individuals involved (Farris and Molesworth, 2016). English was chosen as the global standard

for radiotelephony due to the early dominance of the United States in commercial aviation and its widespread use in international commerce and diplomacy (Clark, 2020).

Established in 1944, ICAO developed standardized communication protocols aimed at enhancing global safety and efficiency. These protocols, detailed in ICAO Document 9432, define the phraseology and procedures that pilots and ATCs must use to ensure clear and effective communication in international airspace. A critical element of this system is the use of standardized English phraseology, which minimizes ambiguities and ensures that critical information is conveyed accurately and promptly (Borowska and Warsaw, 2018).

Despite these standards, non-native English-speaking ATC students often face significant challenges in mastering ICAO radiotelephony. The linguistic demands, combined with the need for precision and speed in communication, present considerable cognitive challenges for learners (Estival and Molesworth, 2020). The use of non-standard phraseology further complicates effective communication, as highlighted in a review by Chen, Wei and Meng (2023), which emphasizes the need to refine phraseology standards to optimize communication efficiency.

The importance of adhering to ICAO radiotelephony standards cannot be overstated. Effective communication ensures high levels of safety and operational efficiency, benefiting passengers, crew, and the broader aviation industry (Friginal, Mathews and Roberts, 2019). However, understanding the specific challenges faced by ATC students—particularly those from non-native English-speaking backgrounds—remains a critical area of study (Mearns *et al.*, 2013).

At Politeknik Penerbangan Surabaya, Batch 13 ATC students experience a range of linguistic and technical challenges in mastering ICAO radiotelephony. This study seeks to explore these challenges from the students' perspectives, addressing the following research questions:

1. What are the most significant challenges in learning ICAO radiotelephony for Batch 13 ATC students at Politeknik Penerbangan Surabaya?
2. How do these students navigate these challenges during their training?

Method

To understand the challenges encountered by Air Traffic Control (ATC) students in acquiring ICAO Radiotelephony skills, we employed a Thematic Analysis Qualitative Case Study. Thematic analysis qualitative case study is a research methodology that assists in exploring phenomena within certain contexts using a variety of data sources and revealing multiple aspects of the phenomenon through diverse lenses (Marshall and Rossman, 2014). Case study research involves an intensive examination of a single unit with the aim of comprehending a broader category of similar units, typically observed within a specific timeframe or over a defined period (Jackson, 2015). Consequently, case studies provide researchers with a valuable opportunity to obtain a comprehensive and holistic perspective on the research problem. This approach can aid in the description, comprehension, and explanation of a given research issue or situation (Baxter and Jack, 2015). Ultimately, this methodology allowed for an in-depth exploration of students' experiences and perspectives. Data collection was conducted through one primary source and two additional sources:

Semi-structured interviews as primary source of data.

Semi-structured interviews will be the primary means of data collection. Magaldi and Berler as cited by (Ruslin *et al.*, 2022), define a semi-structured interview as an exploratory interview. They further explain that semi-structured interviews are typically guide-based and often focus on key topics that provide a general framework. We conducted semi-structured interviews with ATC students from Batch 13 at the ATC School of Politeknik Penerbangan Surabaya. The interviews aimed to capture the students' perceptions, challenges, and insights

regarding their learning journey. Each interview was transcribed and analyzed to identify recurring themes and sub-themes.

Classroom observations.

Marshall and Rossman (2014) define observation as “the systematic description of events, behaviors, and phenomena in a social context selected for study.” In this study, observations were conducted by the researcher, who is also a radiotelephony instructor, playing the role of a neutral observer. This approach allows for a systematic and unbiased description of events during Radiotelephony training sessions. The researcher utilized direct observation to capture real-time situations, utilizing the five senses to provide a comprehensive "snapshot" of the classroom dynamics.

Document analysis.

Document analysis is a systematic procedure for examining or evaluating documents, whether in printed or electronic form (transmitted via computers and the Internet). Like other analytical methods in qualitative research, document analysis requires data to be examined and interpreted to derive meaning, gain understanding, and develop empirical knowledge (Morgan, 2022). Essential training documents, lesson plans, and training modules related to Radiotelephony will be reviewed. This analysis aims to understand the curriculum's structure, the depth of content, and the pedagogical approaches employed. We reviewed relevant materials, including the ICAO Doc 9432 Manual of Radiotelephony, to understand the standardized phraseology and communication protocols. This helped to evaluate the consistency between theoretical content and its application in training.

Findings

The findings from this study reveal that students at the ATC School of Politeknik Penerbangan Surabaya face significant challenges in mastering ICAO Radiotelephony skills. The core challenge centers on understanding and applying specialized radiotelephony phraseology, which requires a high level of English language proficiency and familiarity with aviation-specific terms.

Challenges: The Difficult Words and Phrases

The Difficult Words and Phrases, intricately examines the significant challenges that students face when using specialized language in various air traffic control scenarios. The thematic exploration highlights the difficulties in applying complex lexicon and phraseology, revealing the multiple obstacles students encounter in mastering ICAO Radiotelephony terminology.

It was selected as the first finding because it highlights the multifaceted challenges encountered by Air Traffic Control (ATC) students in learning ICAO Radiotelephony. This finding is based on the profound exploration of various sub-themes that reveal the depth and complexity of these challenges.

The sub-theme **Initial Difficulty Due to The Use of English Language** highlights the linguistic challenges confronted by ATC students as they dig into the environment of radiotelephony communication. The context here is the struggle of non-native English-speaking students to master the specialized language used in aviation. Participants candidly expressed their struggles, echoing sentiments such as, *"So, I personally feel a bit challenged because my English is still lacking, sir. It still needs learning and honing."* This sentiment was further articulated by

another student who remarked, *"My first experience learning about phraseology. First, I faced difficulty in understanding phraseology. Why? Because, in phraseology, English is used, but the English used in phraseology is different from ordinary English; it should be aviation English."* These excerpts vividly illustrate the initial hurdles encountered by students in grappling with the specialized language of radiotelephony. Moreover, classroom observations complement these insights, revealing instances where students exhibit hesitancy and uncertainty in applying radiotelephony terminology during practical exercises.

Furthermore, the sub-theme **Challenges in Understanding New Aviation Terminology (Contextual)** reveals the difficulties that ATC students face when trying to understand new aviation terminology, which is crucial for effective communication within air traffic control contexts. The context here is the process of learning and assimilating specialized vocabulary that is essential for their future roles. Participants provided poignant insights into their experiences, with one student expressing, *"Initially, I found it challenging, sir. Because we need to know the pauses and intonations precisely. This is the time to convey information, the time to give instructions."* Another participant shared their surprise during the early stages of learning, stating, *"So, the first time I entered the class, it was about 3 months we got theoretical material. There we were explained about what radiotelephony contains. And also there I was surprised, sir, for the first time, especially when we were introduced with the aviation terminology that will be used in radiotelephony."* Classroom observations also revealed consistent struggles among students in assimilating new aviation terminology. These observations underscored the importance of providing structured learning experiences to help students navigate the complexities of radiotelephony vocabulary.

The sub-theme **Challenges in Applying Radiotelephony in The Real World** addresses the practical difficulties students face when applying their knowledge of radiotelephony register and specialized phrases in real-world scenarios. Participants provided illuminating accounts of their experiences, with one student expressing, *"The difficulty lies in the phraseology 'line-up behind,' which is present in the latest document. For example, 'behind traffic on short final or behind traffic on final, we mention the type of aircraft. Now, it's no longer using 'landing passing line up behind.' That's the first difficulty."* Classroom observations confirmed these insights by highlighting the gap between theoretical understanding and practical application in radiotelephony scenarios. Students often struggled to adapt their knowledge to dynamic operational contexts, indicating a need for experiential learning opportunities that bridge theory and practice.

Additionally, "Initial challenges in learning radiotelephony" uncover on the intricate hurdles students face during the early phases of their learning journey. Participants shared insights into their initial struggles, with one student expressing, *"My first experience learning about phraseology. First, I faced difficulty in understanding phraseology."* Another participant articulated, *"So, the first time I entered the class, it was about 3 months we got theoretical material. There we were explained about what radiotelephony contains".* Classroom observations corroborate these experiences by revealing students' initial difficulties in grasping fundamental radiotelephony concepts. The observations highlighted instances where students struggled to comprehend basic phraseology and procedural protocols, indicating a need for targeted instructional support during the early stages of the curriculum.

Moreover, "Communication challenges with foreign pilots due to accent differences" highlights the cross-cultural communication intricacies students navigate when interacting with pilots from diverse linguistic backgrounds. For instance, one participant reflected on their experience during OJT in Bali, stating, *"For my own experience, during OJT in Bali, many flights came from other Asian countries like Korea, then China, and also Vietnam."* This excerpt

underscores the diverse linguistic landscape encountered in air traffic control settings and the challenges posed by unique accents. Classroom observations further elucidate the complexities of cross-cultural communication, revealing instances where students encountered difficulties in understanding pilots with varying accents during simulated communication exercises. Additionally, insights gleaned from ICAO Doc 9432 Manual of Radiotelephony (ICAO, 2016) underscore the importance of clear and unambiguous communication protocols to mitigate the impact of accent differences on operational efficiency and safety.

Finally, **Difficulty in Dealing with Unexpected Situations like Emergencies** highlights the challenges posed by unforeseen and critical scenarios, requiring students to use clear and concise language to navigate through emergency communications effectively. As one participant articulated, *"During emergency situations, it's like unexpected conditions, sir. So, we have to be ready for unusual conditions, we have to use plain language, sir, outside of standard phraseology."* This excerpt underscores the necessity for students to adapt their communication strategies during emergencies, emphasizing the importance of clarity and precision to ensure safe and efficient air traffic management. Classroom observations complement these insights by revealing the practical application of emergency protocols and communication procedures. Notably, students demonstrated proficiency in responding to simulated emergency scenarios, effectively coordinating with air traffic controllers and pilots to mitigate risks and ensure the safety of air operations. Furthermore, insights from ICAO Doc 9432 Manual of Radiotelephony underscore the importance of standardized emergency phraseology and protocols in facilitating rapid and effective communication during critical situations.

The comprehensive exploration of these sub-themes provides invaluable insights into the formidable nature of learning ICAO Radiotelephony and informs targeted approaches in addressing the diverse challenges inherent in ATC training programs.

Strategy: Repetitive Practice and Collaborative Peer Learning

The second finding, articulated as "Repetitive Practice and Collaborative Peer Learning," revolves around the impediments germane to repetitive practical application and the collaborative dimensions intrinsic to the learning paradigm. Through a systematic exploration of challenges in comprehension and collaborative engagement, this theme offers a nuanced perspective on how students navigate and contend with the pragmatic dimensions inherent in ICAO Radiotelephony training. Together, these refined themes serve as a methodologically rigorous lens through which to address the core research inquiries, rendering invaluable insights into the most formidable facets of the learning process and the adaptive strategies employed by ATC students in their trajectory of training and education.

In grounding the thematic analysis in the rich narratives gleaned from the interview transcripts, it becomes imperative to substantiate each identified theme with concrete references. The ensuing table encapsulates key excerpts extracted from the participants' accounts, providing a tangible link between the emergent themes and the firsthand experiences shared during the interviews. The total references for each theme stand as testament to the depth and richness of participant insights. The interviews were conducted in Bahasa Indonesia, and all the excerpts were interpreted in English. This meticulous integration of references not only fortifies the authenticity of our thematic findings but also imbues the subsequent discussion with the nuanced insights offered by the ATC students of Batch 13 at the ATC School of Politeknik Penerbangan Surabaya. Through this meticulous alignment of themes with participant references, the subsequent discourse endeavors to offer a comprehensive and substantiated exploration of the challenges in learning ICAO Radiotelephony and the adaptive strategies employed by the students in their training journey.

The sub-theme **Learning Strategies to Face the Challenge** clarifies the adaptive approaches students employ to navigate the complexities of ICAO Radiotelephony. Students engage in role-play mini-games during the culmination of radiotelephony practice sessions, fostering collaborative learning environments where groups assume distinct roles. This interactive format integrates scoring mechanisms, enhancing students' enjoyment and immersion in radiotelephony education. Moreover, individual initiatives manifest as students diligently rehearse phraseology, honing proficiency through repetitive practice. Peer collaboration emerges as a cornerstone, as evidenced by participants who emphasize the importance of practicing with roommates and engaging in continuous self-directed practice in dormitories. Participant 1 reflects on these strategies, stating, *"So, at the end of the radiotelephony practice session, it's filled with role-play mini-games, students are divided into groups, and then students work according to their roles. Of course, there are scores, which I think are quite fun, and we can enjoy learning radiotelephony."* Participant 2 further explains the significance of collaborative learning, noting, *"For me, I focused more on this, Sir. When I was in the dormitory, I kept repeating the phraseology that I found difficult until I felt I was fluent."* These proactive strategies make point to students' resilience and commitment to mastering radiotelephony amidst linguistic challenges, providing tangible evidence of their efficacy in overcoming educational hurdles.

The sub-theme **Role of Peer Collaboration in Phraseology Practice** emphasizes the critical importance of collaborative learning dynamics in mastering ICAO Radiotelephony phraseology. Students harness the power of peer collaboration as they delve into the intricacies of phraseology practice. Dormitories transform into active learning spaces where students engage in repetitive phraseology exercises with roommates, fostering an environment conducive to skill development. Furthermore, students augment individual practice routines with collaborative study sessions, leveraging collective insights and support networks. Through these collaborative endeavors, students fortify their comprehension and application of radiotelephony phraseology, exemplifying the synergistic benefits of peer-driven learning approaches. Participant 1 reflects on the significance of peer collaboration, stating, *"So far, at the beginning, I often practiced phraseology with my roommate in the dormitory, sir."* Participant 2 further emphasizes the importance of collaborative learning, adding, *"As for me, I added self-practice, continuously practicing in the dormitory, and sometimes studying with friends as well."*

These insights highlight the intrinsic value of peer collaboration in enhancing students' proficiency and confidence in radiotelephony phraseology, demonstrating the efficacy of collaborative learning methodologies in addressing educational challenges.

Discussion

This study provides valuable insights into the challenges faced by Batch 13 Air Traffic Control (ATC) students at Politeknik Penerbangan Surabaya in mastering ICAO Radiotelephony. The discussion synthesizes these findings, linking them to existing literature and providing recommendations for enhancing radiotelephony training.

1. Linguistic Barriers

The study reveals that students face significant linguistic barriers when learning ICAO Radiotelephony. The specialized nature of aviation English poses unique challenges for non-native speakers. This finding aligns with (Clark, 2020), who emphasizes the importance of proficiency in aviation-specific English for effective communication. The initial difficulty in understanding and using specialized phraseology underscores the need for targeted language support within aviation training programs. Enhanced English language training focused on

aviation contexts could bridge the gap between general English proficiency and the specialized language needed for radiotelephony.

2. Comprehension of Aviation Terminology

Students also struggle with the comprehension of new aviation terminology, which is crucial for effective communication in air traffic control. The findings suggest that the complexity of aviation-specific vocabulary requires repeated exposure and practical exercises to ensure proper understanding and usage. This aligns with (Estival and Molesworth, 2020), who found that linguistic and cognitive demands of aviation terminology can hinder effective communication. Implementing interactive learning methods, such as simulations and role-plays, can provide students with the contextual understanding necessary to master this terminology.

3. Practical Application

A significant gap exists between theoretical knowledge and practical application of radiotelephony skills. Students often struggle to translate classroom learning into real-world scenarios, highlighting the need for experiential learning opportunities. This finding is consistent with (Tosqui and Santana, 2022), who argue that hands-on training is essential for bridging the gap between theory and practice. Incorporating more real-world simulations and practical exercises into the curriculum can help students develop the skills needed to apply their knowledge in dynamic operational contexts.

4. Role of Peer Collaboration

Peer collaboration plays a crucial role in helping students master ICAO Radiotelephony. The study found that students who engaged in collaborative learning activities, such as role-play mini-games and study groups, showed improved proficiency in radiotelephony phraseology. This finding supports the work of (Marshall and Rossman, 2014), who advocate for collaborative learning as a means to enhance educational outcomes. Encouraging collaborative learning environments can help students support each other in overcoming linguistic and practical challenges.

5. Emergency Situations

Students face additional challenges when dealing with unexpected situations like emergencies, requiring them to adapt their communication strategies rapidly. The need for clarity and precision in these scenarios is paramount, as highlighted by insights from ICAO Doc 9432 Manual of Radiotelephony. Providing students with more opportunities to practice emergency protocols through simulations can improve their ability to handle real-life emergencies effectively. This approach not only enhances their practical skills but also boosts their confidence in managing critical situations.

Recommendations

Based on the findings, the following recommendations are proposed to improve ICAO Radiotelephony training for ATC students:

1. Enhanced Language Support: Integrate targeted English language training focused on aviation contexts within the curriculum to address linguistic barriers.
2. Interactive Learning Methods: Implement simulations, role-plays, and other interactive exercises to help students grasp complex aviation terminology.

3. **Experiential Learning Opportunities:** Increase the use of real-world simulations and practical exercises to bridge the gap between theoretical knowledge and practical application.
4. **Collaborative Learning Environments:** Foster collaborative learning through group activities, study sessions, and peer-supported practice to enhance students' proficiency in radiotelephony.
5. **Emergency Protocol Training:** Provide regular opportunities for students to practice emergency protocols through simulations to improve their ability to manage unexpected situations effectively. This will enhance their practical skills and boost their confidence in handling critical situations.

Conclusion

This study meticulously examined the myriad challenges encountered by Batch 13 Air Traffic Control (ATC) students at Politeknik Penerbangan Surabaya in mastering ICAO Radiotelephony. Through comprehensive interviews, classroom observations, and document analyses, a nuanced understanding of the complexities inherent in radiotelephony education was illuminated. The findings reveal significant linguistic barriers, difficulties in comprehending aviation terminology, and challenges in the practical application of theoretical knowledge.

Peer collaboration emerged as a crucial element in overcoming these challenges, while the need for more experiential learning opportunities was emphasized. Additionally, dealing with emergencies requires students to adapt quickly and communicate effectively, highlighting the importance of clarity and precision.

By addressing these challenges through targeted language support, interactive learning methods, and collaborative environments, educators can enhance the effectiveness of ICAO Radiotelephony training programs. These improvements will not only help students overcome educational hurdles but also prepare them for real-world aviation scenarios, ultimately contributing to global aviation safety and efficiency.

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